

CERTIFICATION CURRICULUM MANUAL

CHAPTER SIX

HAZARDOUS MATERIALS

NFPA 1072, 2017 Edition

Effective January 1, 2021



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CERTIFICATION CURRICULUM MANUAL – CHAPTER SIX

HAZARDOUS MATERIALS AWARENESS

REFERENCE LIST FOR THE HAZARDOUS MATERIALS AWARENESS CURRICULUM

This Reference List is provided as a general guide for both instructors and students to locate information pertaining to the specific objectives in the TCFP Curriculum. This list is **not** all-inclusive and does not in any way limit TCFP development and use of questions to test the objectives of the curriculum:

Required References

Texts

- Certification Curriculum Manual*. Texas Commission on Fire Protection. (Most current edition). Austin, TX: Texas Commission on Fire Protection.
- Code of Federal Regulations, Title 29 Part 1910.120, Appendix A*. United States. U.S. Department of Labor, Occupational Safety & Health Administration.
- Emergency Response Guidebook*. United States. (Most current edition). Washington, DC: U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration.
- Essentials of Fire Fighting, 7th edition*. International Fire Service Training Association. (2018). Stillwater, OK: Fire Protection Publications, Oklahoma State University.
- Fundamentals of Fire Fighter Skills and Hazardous Materials Response, 4th edition*. International Association of Fire Chiefs, & National Fire Protection Association. (2019). Burlington, MA: Jones and Bartlett.
- Hazardous Materials Awareness and Operations, 3rd edition*. Schnepf, R. (2019). Sudbury, MA: Jones & Bartlett.
- Hazardous Materials for First Responders, 5th edition*. International Fire Service Training Association. (2017). Stillwater, OK: Fire Protection Publications, Oklahoma State University.
- Hazardous Materials/Weapons of Mass Destruction Response Handbook, /2018 edition*. McGowan, T. (2018). Quincy, MA: National Fire Protection Association.
- NFPA 472: Standard for Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents*. (2018 ed.). Quincy, MA: NFPA Publications. National Fire Protection Association.
- NFPA 1072: Standard for Hazardous Materials/Weapons of Mass Destruction Emergency Response Personnel Professional Qualifications*. (2017 ed.). Quincy, MA: NFPA Publications. National Fire Protection Association.
- Standards Manual for Fire Protection Personnel*. Texas Commission on Fire Protection. (Current edition). Austin, TX: Texas Commission on Fire Protection.

Recommended References

The most current edition of the following publications and media are recommended (not required) supplemental material for program use.

Media

DOT Chart 18: Hazardous Materials Marking, Labeling and Placarding Guide. (or current edition) United States. Washington, DC: U.S. Dept. of Transportation, Pipeline and Hazardous Materials Safety Administration.

Emergency Response Guidebook 2012. [DVD]. United States. (2012). Washington, DC: U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration.

Hazmat Awareness. Action Training Systems, Inc. (2008). [2 Disc DVD Set - Recognition & Identification]. Poulsbo, WA: Action Training Systems.

Hazardous Materials Awareness and Operations [DVD]. International Association of Fire Chiefs, & National Fire Protection Association. (2006). Sudbury, MA: Jones and Bartlett.

**CHAPTER 6
SECTION 601
HAZARDOUS MATERIALS AWARENESS
CURRICULUM OUTLINE**

SECTION	SUBJECT	RECOMMENDED HOURS
601-4.1	General - Introduction - Laws, Regulations, and National Consensus Standards	1
601-4.2	Recognition and Identification	5
601-4.3	Initiate Protective Actions	
601-4.4	Notification	2
	TOTAL RECOMMENDED HOURS	8

The recommended hours include time for skills evaluation and are based on 12 students. Hours needed depend on the actual number of students.

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Course Instructor Information
Hazardous Materials
Awareness

Overview

The Hazardous Materials curricula are designed to provide clear guidance that ensures adequate presentation of the information required to meet the Job Performance Requirements (JPRs) of National Fire Protection Association (NFPA) 1072, *Standard for Hazardous Materials/Weapons of Mass Destruction Emergency Response Personnel Professional Qualifications*, 2017 edition.

The Hazardous Materials curricula is found in Chapter 6 of the TCFP Curriculum Manual.

Certification Level	TCFP Section Number	NFPA 1072 Chapter
Awareness	601	4
Operations	602	5
Operations-Mission Specific Competencies (MSC)	603	6
*Technician	604	7
*Incident Commander	605	8

Layout

The NFPA numbering sequence is mirrored to allow easy correlation between this document and the NFPA Standard. For example, 601-4.1.2 identifies the section in Awareness that corresponds to NFPA section 4.1.2.

When a section references information from “Annex A Explanatory Material” in the NFPA Standard, it is identified by a boxed Instructor Note. For example, the boxed Instructor Note listed in 601-4.2.1 and that immediately follows the Requisite Knowledge section corresponds to the NFPA Annex A information for NFPA 1072 section 4.2.1.

* Asterisks by Technician and Incident Commander above indicate that both are voluntary (non-mandatory) certifications. Therefore, **a formal “curriculum outline” is not provided**. Please use chapters 7 and 8, respectively, of NFPA 1072 as a guide when creating your own course curricula or selecting a prepared instructional curriculum package from a publisher/vendor for Technician and Incident Commander.

TCFP Standards Manual

It is critical that you review the chapters in the TCFP Standards Manual that apply to this curriculum. Of primary importance are the following two chapters: Chapter 423, which defines the course of study, documentation and medical requirements necessary

for Awareness and Operations certification (required) and Chapter 453, which covers certification requirements for Technician and Incident Commander (voluntary). Additionally, instructors are expected to review the following chapters as they pertain to the instructional, examination, certification processes:

- Chapter 421, Standards for Certification
- Chapter 427, Training Facility Certification
- Chapter 435, Fire Fighter Safety
- Chapter 437, Fees
- Chapter 439, Examinations for Certification
- Chapter 441, Continuing Education

These chapters do not address every issue that could impact this curriculum; therefore, you are encouraged to become familiar with the TCFP Standards Manual.

Instructor Qualifications

Hazardous Materials courses must be taught by an instructor meeting the requirements described in Chapter 427.307 of the TCFP Standards Manual.

Supplemental Information

Instructors are expected to provide supplemental information if the main reference text does not provide adequate information to ensure successful completion of the Job Performance Requirements as listed in the curriculum.

Components of the Curricula

Each section of a curriculum identifies the NFPA Job Performance Requirement (JPR) and subdivides the requisite knowledge requirements into learning components. For example:

View within the Curriculum	Explanation
<p>601-4.3.1 Isolate the hazard area and deny entry at a hazardous materials/WMD incident, given a hazardous materials/WMD incident, policies and procedures, and approved reference sources, so that the hazard area is isolated and secured, personal safety procedures are followed, hazards are avoided or minimized, and additional people are not exposed to further harm.</p>	<p>Section Number and NFPA JPR</p>
<p>Requisite Knowledge: Use of the ERG, SDS, shipping papers with emergency response information, and other approved reference sources to identify precautions to be taken to</p>	<p>Requisite Knowledge Statement</p>

protect responders and the public; policies and procedures for isolating the hazard area and denying entry; and the purpose of and methods for isolating the hazard area and denying entry.	
(1) Use of the ERG, SDS, shipping papers with emergency response information, and other approved reference sources to identify precautions to be taken to protect responders and the public	First part of Requisite Knowledge
Identify precautions to be taken to protect responders/the public using ERG, SDS, shipping papers with emergency response information, other approved reference sources Identify the hazard a. Isolate the hazard area b. Deny entry c. Call for trained personnel d. Secure the scene	Associated learning components
(2) Policies and procedures for isolating the hazard area and denying entry	Second part of Requisite Knowledge
Policies and procedures, per AHJ/SOP a. Isolating the hazard area b. Denying entry	Associated learning components
(3) And the purpose of and methods for isolating the hazard area and denying entry	Third part of Requisite Knowledge
Purpose/methods a. Isolating the hazard area i. Establish perimeter ii. Erect barriers b. Denying entry i. Restrict hazard area access to	Associated learning components

<p>appropriately trained personnel only</p> <p>ii. Maintain perimeter</p>		
<p>Requisite Skills: Use of the ERG, SDS, shipping papers with emergency response</p>		<p>Requisite Skills Statement</p>
	<p>Instructor Note</p> <p>Recommended precautions found on numbered guides in the ERG include public safety issues; recommended protective clothing; evacuation; emergency response to fire, spill, and leak; and first aid sections.</p> <p>Examples of required knowledge include (1) precautions for providing emergency medical care to victims; typical ignition sources; ways hazardous materials/WMD are harmful to people, the environment, and property; general routes of entry for human exposure; emergency action (fire, spill, or leak; first aid); actions recommended not to be performed (e.g., closing of pipeline valves); protective actions (isolation of area and denial of entry, evacuation, shelter-in-place); size and shape of recommended initial isolation and protective action distances; difference between small and large spills; conditions that require the use of the ERG Table of Initial Isolation and Protective Action Distances and the isolation distances in the ERG numbered guide; techniques for isolating the hazard area and denying entry to unauthorized persons; how to recognize and protect evidence; and use of approved tools and equipment; (2) basic personal protective actions: staying clear of vapors, fumes, smoke, and spills; keeping vehicle at a safe distance from the scene; approaching from upwind, uphill, and upstream; and (3) types of protective actions and their purpose (e.g., isolate hazard area and deny entry, evacuation, and shelter-in-place); basic factors involved in the choice of protective actions (e.g., hazardous materials/WMD involved, population threatened,</p>	<p>Appendix A: Explanatory Material for 4.3.1</p>

	and weather conditions).	
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Unless otherwise specified, all curriculum references are to NFPA 1072. In some cases, (see, for example, 601-4.2.1), reference is also made under the section number and JPR to similar material in NFPA 472.

601-4.2.1	<p>Recognize and identify the hazardous materials/WMD and hazards involved in a hazardous materials/WMD incident, given a hazardous materials/WMD incident, and approved reference sources, so that the presence of hazardous materials/WMD is recognized and the materials and their hazards are identified.</p> <p>Given a hazardous materials/WMD incident, and approved reference sources, awareness level personnel shall recognize those situations where hazardous materials/WMD are present. (472-4.2.1)</p>	<p>Additional reference to NFPA 472</p>
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Skills

NFPA Requisite Skill requirements are addressed in the corresponding Skill Sheets in Chapter 6 of the TCFP Curriculum Skills Manual.

Definitions of Certification Levels

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/WMD, protect themselves, call for trained personnel, and secure the scene. These personnel have met all the performance requirements of Chapter 4 of NFPA 1072, *Standard for Hazardous Materials/Weapons of Mass Destruction Emergency Response Personnel Professional Qualifications*

Operations Level Personnel: Personnel 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. These personnel have met all the performance requirements of Chapter 5 of NFPA 1072, *Standard for Hazardous Materials/Weapons of Mass Destruction Emergency Response Personnel Professional Qualifications*

Operations-Mission Specific Competencies (MSC) Level Personnel: Responders assigned mission-specific responsibilities at hazardous materials/WMD incidents are

those operations level responders designated by the authority having jurisdiction (AHJ) to perform additional tasks to support the AHJ's response mission, expected tasks, equipment, and training in the following areas:

- (1) Personal protection equipment (PPE)
- (2) Mass decontamination
- (3) Technical decontamination
- (4) Evidence preservation and sampling
- (5) Product control
- (6) Detection, monitoring, and public safety sampling
- (7) Victim rescue and recovery
- (8) Illicit laboratories incidents

These personnel have met all the performance requirements of Chapter 5 of NFPA 1072, *Standard for Hazardous Materials/Weapons of Mass Destruction Emergency Response Personnel Professional Qualifications* and have also met the performance requirements of the subchapter(s) of Chapter 6 of NFPA 1072, *Standard for Hazardous Materials/Weapons of Mass Destruction Emergency Response Personnel Professional Qualifications*, to which they are trained and credentialed to perform.

Note: Basic TCFP Structural Fire Fighter certification requires that Structure Fire Fighter personnel meet all performance requirements for:

- *Hazardous Materials Awareness*
- *Hazardous Materials Operations*
- *Hazardous Materials Operations - MSC – 6.2 Personal Protective Equipment*
- *Hazardous Materials Operations - MSC – 6.6 Product Control*

Technician Level Personnel: Persons who respond 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, evaluate progress of the planned response, and assist in terminating the incident. These personnel have met all the performance requirements of Chapter 7 of NFPA 1072, *Standard for Hazardous Materials/Weapons of Mass Destruction Emergency Response Personnel Professional Qualifications*.

Incident Commander Level Personnel: That person, designated by the AHJ, responsible for all incident activities/operations, including the development of strategies and tactics and the ordering and release of resources. These personnel have met all the performance requirements of Chapter 8 of NFPA 1072, *Standard for Hazardous Materials/Weapons of Mass Destruction Emergency Response Personnel Professional Qualifications*.

SECTION 601

HAZARDOUS MATERIALS AWARENESS

Awareness Level Personnel are those who, in the course of their normal duties, may encounter an emergency incident 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

Response options for awareness level personnel are generally limited to nonintervention actions only.

601-4.1 General

601-4.1.1 Introduction

601-4.1.1 Awareness personnel are those persons who, in the course of their normal duties, could encounter an emergency involving hazardous materials/weapons of mass destruction (WMD) and who are expected to recognize the presence of the hazardous materials/WMD, protect themselves, call for trained personnel, and secure the area.

601-4.1.2 Awareness personnel shall meet the job performance requirements defined in Sections 601-4.2 through 601-4.4.

Instructor Note

Awareness personnel include public works employees, maintenance workers, and others who might see or encounter an incident involving hazardous materials/WMD occur while performing their regular assignment.

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601-4.1.3 General Knowledge Requirements

Role of awareness personnel at a hazardous materials/WMD incident, location, and contents of the AHJ emergency response plan, and standard operating procedures for awareness personnel.

1. Role of awareness personnel at a hazardous materials/WMD incident
2. AHJ emergency response plan
 - a. Location
 - b. Contents
3. Standard operating procedures for awareness personnel

601-4.1.4 General Skills Requirements (Reserved)

601-4.2 Recognition and Identification

Instructor Note

While the purpose of the JPR is to require the Emergency Response Guidebook (ERG) as the minimum reference at the awareness level, other reference sources can be provided as necessary, including an equivalent guide to the ERG; safety data sheets (SDS); manufacturer, shipper, and carrier (highway, rail, water, air, and pipeline) documents (shipping papers) and contacts; and the U.S. DOT Hazardous Materials Marking, Labeling and Placarding Guide. If provided, responders should be able to use these sources to accomplish the goals of the JPR.

In transportation, the name, placard applied, or identification number of the material provides access to information in the ERG or an equivalent document.

- ### 601-4.2.1 Recognize and identify the hazardous materials/WMD and hazards involved in a hazardous materials/WMD incident, given a hazardous materials/WMD incident, and approved reference sources, so that the

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presence of hazardous materials/WMD is recognized and the materials and their hazards are identified.

Given a hazardous materials/WMD incident, and approved reference sources, awareness level personnel shall recognize those situations where hazardous materials/WMD are present.
(472-4.2.1)

(A) Requisite Knowledge. What hazardous materials and WMD are; basic hazards associated with classes and divisions; indicators to the presence of hazardous materials including container shapes, NFPA 704 markings, globally harmonized system (GHS) markings, placards, labels, pipeline markings, other transportation markings, shipping papers with emergency response information, and other indicators; accessing information from the Emergency Response Guidebook (ERG) (current edition) using name of the material, UN/NA identification number, placard applied, or container identification charts; and types of hazard information available from the ERG, safety data sheets (SDS), shipping papers with emergency response information, and other approved reference sources.

1. Define hazardous materials and WMD

- a. Hazardous materials – 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).
- b. Dangerous goods (term used for hazardous materials in Canada)
- c. Weapon of mass destruction (WMD)
 - i. CBRNE problems from a terrorist attack
 1. chemical
 2. biological
 3. radiological
 4. nuclear
 5. explosives (i.e., IED - improvised explosive device)
 - ii. Radiological weapons of mass destruction
 1. Improvised nuclear device (IND)
 2. Radiation dispersal device (RDD) (i.e., dirty bomb)
 3. Radiation exposure device (RED) (i.e., radiation emitting device)

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2. Basic hazards associated with classes and divisions
 - a. Class 1 – Explosives
 - i. Division 1.1 – Explosives which have a mass explosion hazard
 - ii. Division 1.2 – Explosives which have a projection hazard but not a mass explosion hazard
 - iii. Division 1.3 – Explosives which have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but not a mass explosion hazard
 - iv. Division 1.4 – Explosives which present no significant blast hazard
 - v. Division 1.5 – Very insensitive explosives with a mass explosion hazard
 - vi. Division 1.6 – Extremely insensitive articles which do not have a mass explosion hazard
 - b. Class 2 – Gases
 - i. Division 2.1 – Flammable gases
 - ii. Division 2.2 – Non-flammable, non-toxic gases
 - iii. Division 2.3 – Toxic gases
 - c. Class 3 – Flammable liquids (and Combustible liquids [US])
 - d. Class 4 – Flammable solids; Substances liable to spontaneous combustion; Substances which, on contact with water emit flammable gases
 - i. Division 4.1 – Flammable solids, self-reactive substances and solid desensitized explosives
 - ii. Division 4.2 – Substances liable to spontaneous combustion
 - iii. Division 4.3 – Substances which in contact with water emit flammable gases
 - e. Class 5 – Oxidizing substances and Organic peroxides
 - i. Division 5.1 – Oxidizing substances
 - ii. Division 5.2 – Organic peroxides
 - f. Class 6 – Toxic substances and Infectious substances
 - i. Division 6.1 – Toxic substances
 - ii. Division 6.2 – Infectious substances
 - g. Class 7 – Radioactive materials
 - h. Class 8 – Corrosive substances
 - i. Class 9 – Miscellaneous dangerous goods/hazardous materials and articles

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3. Hazardous materials indicators
 - a. Container shapes
 - b. NFPA 704 markings
 - c. Globally harmonized system (GHS) markings
 - d. Placards
 - e. Labels
 - f. Pipeline markings
 - g. Other transportation markings
 - h. Shipping papers with emergency response information and other indicators
 - i. Military hazardous materials/WMD markings
 - ii. Special hazard communication markings for each hazard class (i.e., symbols)
 - iii. Container markings

4. Access information from the Emergency Response Guidebook (ERG) (current edition) using:
 - a. Name of material
 - b. UN/NA identification number
 - c. Placard applied – table of placards
 - d. Container identification charts
 - e. Other types of hazard information available from the ERG
 - i. Safety precautions
 - ii. Notification and request for technical information
 - iii. Hazard classification system information
 - iv. Railcar and road trailer identification charts
 - v. Globally harmonized system (GHS) of classification and labeling of chemicals information
 - vi. Hazard identification numbers
 - vii. Pipeline and pipeline marker information
 - viii. Response guide information
 - ix. Initial isolation and protective distances
 - x. Protective clothing information
 - xi. Fire and spill control information
 - xii. Boiling liquid expanding vapor explosion (BLEVE) safety precautions
 - xiii. Criminal/terrorist use of chemical/biological/radiological agents' information

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- xiv. Improvised explosive device (IED) safe standoff distances
 - xv. Glossary of terms
 - xvi. Response center contact information
5. Safety data sheets (SDS), as provided by the manufacturer
 6. Shipping papers
 - a. Bill of Lading or Freight Bill – highway
 - b. Dangerous Cargo Manifest – maritime
 - c. Waybill and/or Consist/Train List – railroad
 - d. Air Bill – aircraft
 7. Other approved references – per AHJ, i.e., DOT chart, pre-incident response plans, WISER, pocket guides

Instructor Note

Instructors should include indicators of terrorist attacks and other potentials, emphasizing that “if you can smell it, taste it, or feel it, you are now (or might be) part of the problem.”

While this is a minimum requirement, the AHJ has the option to select additional information from the operations chapter (Chapter 5) regarding container and hazard information as necessary, based on local conditions and circumstances.

Awareness level personnel should be able to match the hazard classes and divisions with the primary hazards and examples.

Indicators of the presence of hazardous materials include occupancy and locations, including facilities and transportation; container shape (general shape of the container); container owner/operator signage; placards and labels; markings, including NFPA 704 markings, military markings, transportation markings such as identification number marks, marine pollutant marks, elevated temperature marks, commodity markings, inhalation hazard marks, and pipe and pipeline markings and colors; GHS markings; shipping papers and emergency response information and SDS; and sensory clues (dead birds or fish, color of vapors, unusual

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odors, sheen, hissing noise, dead vegetation, etc.). Other items, such as fume hood exhaust stacks and vents on the exterior of a building, could indicate hazardous materials and can be identified in advance through pre-incident survey activities.

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 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 has implemented the GHS into EU law as the Classification, Labelling 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.

(B) Requisite Skills. Recognizing indicators to the presence of hazardous materials/WMD; identifying hazardous materials/WMD by name, UN/NA identification number, placard applied, or container identification charts; and using the ERG, SDS, shipping papers with emergency response information, and other approved reference sources to identify hazardous materials/WMD and their potential fire, explosion, and health hazards.

1. Recognize hazardous materials/WMD indicators, which may include, but not be limited to:
 - a. Odors
 - b. Gas leak
 - c. Fire
 - d. Vapor cloud or smoke
 - e. Corrosive actions
 - f. Visible chemical reactions
 - g. Pooled liquids
 - h. Sound of a pressure release
 - i. Condensation or ice on a pressure tank
 - j. Injured persons/casualties, dead animals, dead/dying vegetation

2. Identify hazardous materials/WMD (by):

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- a. Name
 - b. UN/NA identification number
 - c. Placard applied
 - d. Container identification charts
3. Use ERG, SDS, shipping papers with emergency response information and other approved sources to identify:
- a. Hazardous materials/WMD
 - i. Potential fire hazards
 - ii. Potential explosion hazards
 - iii. Potential health hazards

601-4.3 **Initiate Protective Action**

Instructor Note

People not directly involved in emergency response operations should be kept away from the hazard area, and control should be established over the area of operations. Unprotected emergency responders should not be allowed to enter the isolation zone.

At the awareness level, approved reference sources include the current edition of the Emergency Response Guidebook (ERG), safety data sheets (SDS), shipping papers with emergency response information, and other approved reference sources.

601-4.3.1 Isolate the hazard area and deny entry at a hazardous materials/WMD incident, given a hazardous materials/WMD incident, policies and procedures, and approved reference sources, so that the hazard area is isolated and secured, personal safety procedures are followed, hazards are avoided or minimized, and additional people are not exposed to further harm.

(A) Requisite Knowledge. Use of the ERG, SDS, shipping papers with emergency response information, and other approved reference sources to identify precautions to be taken to protect responders and the public;

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policies and procedures for isolating the hazard area and denying entry; and the purpose of and methods for isolating the hazard area and denying entry.

1. Identify precautions to be taken to protect responders/the public using ERG, SDS, shipping papers with emergency response information, other approved reference sources
 - a. Identify the hazard
 - b. Isolate the hazard area
 - c. Deny entry
 - d. Call for trained personnel
 - e. Secure the scene
2. Policies and procedures, per AHJ/SOP
 - a. Isolating the hazard area
 - b. Denying entry
3. Purpose/methods
 - a. Isolating the hazard area
 - i. Establish perimeter
 - ii. Erect barriers
 - b. Denying entry
 - i. Restrict hazard area access to appropriately trained personnel only
 - ii. Maintain perimeter

Instructor Note

Recommended precautions found on numbered guides in the ERG include public safety issues; recommended protective clothing; evacuation; emergency response to fire, spill, and leak; and first aid sections.

Examples of required knowledge include (1) precautions for providing emergency medical care to victims; typical ignition sources; ways hazardous materials/WMD are harmful to people, the environment, and property; general routes of entry for human exposure; emergency action (fire, spill, or leak; first aid); actions recommended not to be performed

(e.g., closing of pipeline valves); protective actions (isolation of area and denial of entry, evacuation, shelter-in-place); size and shape of recommended initial isolation and protective action distances; difference between small and large spills; conditions that require the use of the ERG Table of Initial Isolation and Protective Action Distances and the isolation distances in the ERG numbered guide; techniques for isolating the hazard area and denying entry to unauthorized persons; how to recognize and protect evidence; and use of approved tools and equipment; (2) basic personal protective actions: staying clear of vapors, fumes, smoke, and spills; keeping vehicle at a safe distance from the scene; approaching from upwind, uphill, and upstream; and (3) types of protective actions and their purpose (e.g., isolate hazard area and deny entry, evacuation, and shelter-in-place); basic factors involved in the choice of protective actions (e.g., hazardous materials/WMD involved, population threatened, and weather conditions).

(B) Requisite Skills. Recognizing precautions for protecting responders and the public; identifying isolation areas, denying entry, and avoiding minimizing hazards.

601-4.4 **Notification**

601-4.4.1 Initiate required notifications at a hazardous materials/WMD incident, given a hazardous materials/WMD incident, policies and procedures, and approved communications equipment, so that the notification process is initiated, and the necessary information is communicated.

(A) Requisite Knowledge. Policies and procedures for notification, reporting, and communications; types of approved communications equipment; and the operation of that equipment.

1. Policies and procedures (NFPA 472, 4.4.2)
 - a. Notification, per AHJ
 - b. Reporting, per AHJ
 - c. Communications, per AHJ

2. Types of approved communications equipment (NFPA 472, 4.4.2)
 - a. Radios
 - b. Phone/cell phone
 - i. 9-1-1

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- ii. Reverse 9-1-1
- iii. Notification/outreach software systems (i.e., Blackboard Connect, Swift Reach, Everbridge, etc.)
- c. Sirens, airhorns and public announcement (PA) systems

3. The operation of communications equipment, per AHJ

(B) Requisite Skills. Operating approved communications equipment and communicating in accordance with policies and procedures.

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CERTIFICATION CURRICULUM MANUAL – CHAPTER SIX

HAZARDOUS MATERIALS OPERATIONS

REFERENCE LIST FOR THE HAZARDOUS MATERIALS OPERATIONS CURRICULUM

This Reference List is provided as a general guide for both instructors and students to locate information pertaining to the specific objectives in the TCFP Curriculum. This list is **not** all-inclusive and does not in any way limit TCFP development and use of questions to test the objectives of the curriculum:

Required References

Texts

Certification Curriculum Manual. Texas Commission on Fire Protection. (Most current edition). Austin, TX: Texas Commission on Fire Protection.

Code of Federal Regulations, Title 29 Part 1910.120, Appendix A. United States. U.S. Department of Labor, Occupational Safety & Health Administration.

Emergency Response Guidebook. United States. (Most current edition). Washington, DC: U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration.

Essentials of Fire Fighting, 7th edition. International Fire Service Training Association. (2018). Stillwater, OK: Fire Protection Publications, Oklahoma State University.

Fundamentals of Fire Fighter Skills and Hazardous Materials Response, 4th edition. International Association of Fire Chiefs, & National Fire Protection Association. (2019). Burlington, MA: Jones and Bartlett.

Hazardous Materials Awareness and Operations, 3rd Edition. Schnepf (2019). Sudbury, MA: Jones & Bartlett.

Hazardous Materials for First Responders, 5th edition. International Fire Service Training Association. (2017). Stillwater, OK: Fire Protection Publications, Oklahoma State University.

Hazardous Materials/Weapons of Mass Destruction Response Handbook/2018 edition. McGowan, T. (2018). Quincy, MA: National Fire Protection Association.

NFPA 472: Standard for Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents. (2018 ed.). Quincy, MA: NFPA Publications. National Fire Protection Association.

NFPA 1072: Standard for Hazardous Materials/Weapons of Mass Destruction Emergency Response Personnel Professional Qualifications. (2017 ed.). Quincy, MA: NFPA Publications. National Fire Protection Association.

NIOSH Pocket Guide to Chemical Hazards. Cincinnati National Institute for Occupational Safety and Health. (most current edition). OH: US Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health. <http://www.cdc.gov/niosh/npg/>

Standards Manual for Fire Protection Personnel. Texas Commission on Fire Protection. (Most current edition). Austin, TX: Texas Commission on Fire Protection.

Recommended References

The most current edition of the following publications and media are recommended (not required) supplemental material for program use.

Media

DOT Chart 18: Hazardous Materials Marking, Labeling and Placarding Guide. United States. (Or current edition). Washington, DC: U.S. Dept. of Transportation, Pipeline and Hazardous Materials Safety Administration.

Emergency Response Guidebook 2012. United States. (2012). [DVD]. Washington, DC: U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration.

Hazardous Materials Awareness and Operations. International Association of Fire Chiefs, & National Fire Protection Association. (2006). [DVD Set]. Sudbury, MA: Jones and Bartlett.

Hazmat Decontamination. Action Training Systems, Inc. (2008). [4 Disc DVD Set]. Poulsbo, WA: Action Training Systems.

Hazmat Operations. Detrick Lawrence Corporation, Pye, S., & Lamont, J. B. (2006). [8 Disk DVD Set]. Edgartown, MA: Emergency Film Group.

**CHAPTER 6
 SECTION 602
 HAZARDOUS MATERIALS OPERATIONS
 CURRICULUM OUTLINE**

SECTION	SUBJECT	RECOMMENDED HOURS
602-5.1	General - Introduction - Laws, Regulations, and National Consensus Standards	1
602-5.2	Identify Potential Hazards	14
602-5.3	Identify Action Options	9
602-5.4	Action Plan Implementation	6
602-5.5	Emergency Decontamination	2
602-5.6	Progress Evaluating and Reporting – Reserved – None required at this level	
TOTAL RECOMMENDED HOURS		32

The recommended hours include time for skills evaluation and are based on 12 students. Hours needed depend on the actual number of students.

Note: In order to successfully complete the Texas Commission on Fire Protection’s Basic Structure Firefighter curriculum, all the job performance requirements and knowledge skills and abilities must be mastered pertaining to:

- Awareness Level Personnel (Section 601),
- Operations Level Responder (Section 602),
- Operations Level Responder: Mission Specific Competencies of:
 - Using Personal Protective Equipment (Section 603-6.2),
 - Performing Product Control (Section 603-6.6)

This is in accordance with the competency requirements of *NFPA 1001: Standard for Fire Fighter Professional Qualifications* 2019 ed., the *TCFP Standards Manual*, and the *TCFP Certification Curriculum Manual*.

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Course Instructor Information **Hazardous Materials** **Operations**

Overview

The Hazardous Materials curricula are designed to provide clear guidance that ensures adequate presentation of the information required to meet the Job Performance Requirements (JPRs) of National Fire Protection Association (NFPA) 1072, *Standard for Hazardous Materials/Weapons of Mass Destruction Emergency Response Personnel Professional Qualifications*, 2017 edition.

The Hazardous Materials curricula is found in Chapter 6 of the TCFP Curriculum Manual.

Certification Level	TCFP Section Number	NFPA 1072 Chapter
Awareness	601	4
Operations	602	5
Operations-Mission Specific Competencies (MSC)	603	6
*Technician	604	7
*Incident Commander	605	8

Layout

The NFPA numbering sequence is mirrored to allow easy correlation between this document and the NFPA Standard. For example, 601-4.1.2 identifies the section in Awareness that corresponds to NFPA section 4.1.2.

When a section references information from “Annex A Explanatory Material” in the NFPA Standard, it is identified by a boxed Instructor Note. For example, the boxed Instructor Note listed in 601-4.2.1 and that immediately follows the Requisite Knowledge section corresponds to the NFPA Annex A information for NFPA 1072 section 4.2.1.

* Asterisks by Technician and Incident Commander above indicate that both are voluntary (non-mandatory) certifications. Therefore, **a formal “curriculum outline” is not provided**. Please use chapters 7 and 8, respectively, of NFPA 1072 as a guide when creating your own course curricula or selecting a prepared instructional curriculum package from a publisher/vendor for Technician and Incident Commander.

TCFP Standards Manual

It is critical that you review the chapters in the TCFP Standards Manual that apply to this curriculum. Of primary importance are the following two chapters: Chapter 423, which defines the course of study, documentation, and medical requirements necessary

for Awareness and Operations certification (required) and Chapter 453, which covers certification requirements for Technician and Incident Commander (voluntary). Additionally, instructors are expected to review the following chapters as they pertain to the instructional, examination, certification processes:

- Chapter 421, Standards for Certification
- Chapter 427, Training Facility Certification
- Chapter 435, Fire Fighter Safety
- Chapter 437, Fees
- Chapter 439, Examinations for Certification
- Chapter 441, Continuing Education

These chapters do not address every issue that could impact this curriculum; therefore, you are encouraged to become familiar with the TCFP Standards Manual.

Instructor Qualifications

Hazardous Materials courses must be taught by an instructor meeting the requirements described in Chapter 427.307 of the TCFP Standards Manual.

Supplemental Information

Instructors are expected to provide supplemental information if the main reference text does not provide adequate information to ensure successful completion of the Job Performance Requirements as listed in the curriculum.

Components of the Curricula

Each section of a curriculum identifies the NFPA Job Performance Requirement (JPR) and subdivides the requisite knowledge requirements into learning components. For example:

View within the Curriculum	Explanation
<p>601-4.3.1 Isolate the hazard area and deny entry at a hazardous materials/WMD incident, given a hazardous materials/WMD incident, policies and procedures, and approved reference sources, so that the hazard area is isolated and secured, personal safety procedures are followed, hazards are avoided or minimized, and additional people are not exposed to further harm.</p>	<p>Section Number and NFPA JPR</p>
<p>Requisite Knowledge: Use of the ERG, SDS, shipping papers with emergency response information, and other approved reference sources to identify precautions to be taken to</p>	<p>Requisite Knowledge Statement</p>

<p>protect responders and the public; policies and procedures for isolating the hazard area and denying entry; and the purpose of and methods for isolating the hazard area and denying entry.</p>	
<p>(1) Use of the ERG, SDS, shipping papers with emergency response information, and other approved reference sources to identify precautions to be taken to protect responders and the public</p>	<p>First part of Requisite Knowledge</p>
<p>Identify precautions to be taken to protect responders/the public using ERG, SDS, shipping papers with emergency response information, other approved reference sources</p> <p>Identify the hazard</p> <ol style="list-style-type: none"> a. Isolate the hazard area b. Deny entry c. Call for trained personnel d. Secure the scene 	<p>Associated learning components</p>
<p>(2) Policies and procedures for isolating the hazard area and denying entry</p>	<p>Second part of Requisite Knowledge</p>
<p>Policies and procedures, per AHJ/SOP</p> <ol style="list-style-type: none"> a. Isolating the hazard area b. Denying entry 	<p>Associated learning components</p>
<p>(3) And the purpose of and methods for isolating the hazard area and denying entry</p>	<p>Third part of Requisite Knowledge</p>
<p>Purpose/methods</p> <ol style="list-style-type: none"> a. Isolating the hazard area <ol style="list-style-type: none"> i. Establish perimeter ii. Erect barriers b. Denying entry <ol style="list-style-type: none"> i. Restrict hazard area access to 	<p>Associated learning components</p>

<p>appropriately trained personnel only</p> <p>ii. Maintain perimeter</p>		
<p>Requisite Skills: Use of the ERG, SDS, shipping papers with emergency response</p>		<p>Requisite Skills Statement</p>
	<p>Instructor Note</p> <p>Recommended precautions found on numbered guides in the ERG include public safety issues; recommended protective clothing; evacuation; emergency response to fire, spill, and leak; and first aid sections.</p> <p>Examples of required knowledge include (1) precautions for providing emergency medical care to victims; typical ignition sources; ways hazardous materials/WMD are harmful to people, the environment, and property; general routes of entry for human exposure; emergency action (fire, spill, or leak; first aid); actions recommended not to be performed (e.g., closing of pipeline valves); protective actions (isolation of area and denial of entry, evacuation, shelter-in-place); size and shape of recommended initial isolation and protective action distances; difference between small and large spills; conditions that require the use of the ERG Table of Initial Isolation and Protective Action Distances and the isolation distances in the ERG numbered guide; techniques for isolating the hazard area and denying entry to unauthorized persons; how to recognize and protect evidence; and use of approved tools and equipment; (2) basic personal protective actions: staying clear of vapors, fumes, smoke, and spills; keeping vehicle at a safe distance from the scene; approaching from upwind, uphill, and upstream; and (3) types of protective actions and their purpose (e.g., isolate hazard area and deny entry, evacuation, and shelter-in-place); basic factors involved in the choice of protective actions (e.g., hazardous materials/WMD involved, population threatened,</p>	<p>Appendix A: Explanatory Material for 4.3.1</p>

	and weather conditions).	
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Unless otherwise specified, all curriculum references are to NFPA 1072. In some cases, (see, for example, 601-4.2.1), reference is also made under the section number and JPR to similar material in NFPA 472.

601-4.2.1	<p>Recognize and identify the hazardous materials/WMD and hazards involved in a hazardous materials/WMD incident, given a hazardous materials/WMD incident, and approved reference sources, so that the presence of hazardous materials/WMD is recognized and the materials and their hazards are identified.</p> <p style="padding-left: 40px;">Given a hazardous materials/WMD incident, and approved reference sources, awareness level personnel shall recognize those situations where hazardous materials/WMD are present. (472-4.2.1)</p>	<p>Additional reference to NFPA 472</p>
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Skills

NFPA Requisite Skill requirements are addressed in the corresponding Skill Sheets in Chapter 6 of the TCFP Curriculum Skills Manual.

Definitions of Certification Levels

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/WMD, protect themselves, call for trained personnel, and secure the scene. These personnel have met all the performance requirements of Chapter 4 of NFPA 1072, *Standard for Hazardous Materials/Weapons of Mass Destruction Emergency Response Personnel Professional Qualifications*

Operations Level Personnel: Personnel 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. These personnel have met all the performance requirements of Chapter 5 of NFPA 1072, *Standard for Hazardous Materials/Weapons of Mass Destruction Emergency Response Personnel Professional Qualifications*

Operations-Mission Specific Competencies (MSC) Level Personnel: Responders assigned mission-specific responsibilities at hazardous materials/WMD incidents are

those operations level responders designated by the authority having jurisdiction (AHJ) to perform additional tasks to support the AHJ's response mission, expected tasks, equipment, and training in the following areas:

- (1) Personal protection equipment (PPE)
- (2) Mass decontamination
- (3) Technical decontamination
- (4) Evidence preservation and sampling
- (5) Product control
- (6) Detection, monitoring, and public safety sampling
- (7) Victim rescue and recovery
- (8) Illicit laboratories incidents

These personnel have met all the performance requirements of Chapter 5 of NFPA 1072, *Standard for Hazardous Materials/Weapons of Mass Destruction Emergency Response Personnel Professional Qualifications* and have also met the performance requirements of the subchapter(s) of Chapter 6 of NFPA 1072, *Standard for Hazardous Materials/Weapons of Mass Destruction Emergency Response Personnel Professional Qualifications*, to which they are trained and credentialed to perform.

Note: Basic TCFP Structural Fire Fighter certification requires that Structure Fire Fighter personnel meet all performance requirements for:

- *Hazardous Materials Awareness*
- *Hazardous Materials Operations*
- *Hazardous Materials Operations - MSC – 6.2 Personal Protective Equipment*
- *Hazardous Materials Operations - MSC – 6.6 Product Control*

Technician Level Personnel: Persons who respond 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, evaluate progress of the planned response, and assist in terminating the incident. These personnel have met all the performance requirements of Chapter 7 of NFPA 1072, *Standard for Hazardous Materials/Weapons of Mass Destruction Emergency Response Personnel Professional Qualifications*.

Incident Commander Level Personnel: That person, designated by the AHJ, responsible for all incident activities/operations, including the development of strategies and tactics and the ordering and release of resources. These personnel have met all the performance requirements of Chapter 8 of NFPA 1072, *Standard for Hazardous Materials/Weapons of Mass Destruction Emergency Response Personnel Professional Qualifications*.

SECTION 602

HAZARDOUS MATERIALS OPERATIONS

Hazardous Materials Operations Level Personnel are those 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.

Response options for operations level responders are generally limited to nonintervention or defensive actions.

The Hazardous Materials Operations Level Responder must first master all the job performance requirements and knowledge, skills and abilities pertaining to:

- Awareness Level Personnel, and
- The competencies of this chapter

Note: In order to successfully complete the Texas Commission on Fire Protection’s Basic Structure Firefighter curriculum, all the job performance requirements and knowledge, skills and abilities must be mastered pertaining to:

- **Awareness Level Personnel,**
- **Operations Level Responders, and**
- **Hazardous Materials Operations Level – Mission Specific Competencies of:**
 - **Using Personal Protective Equipment, and**
 - **Performing Product Control.**

This is in accordance with the competency requirements of *NFPA 1001: Standard for Fire Fighter Professional Qualifications* 2019 Ed., the *TCFP Standards Manual* and the *TCFP Curriculum Manual*.

602-5.1 General

602-5.1.1 Operations level responders are those 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.

602-5.1.2 Operations level responders shall meet the job performance requirements defined in Sections 601-4.2 through 601-4.4 – Hazardous Materials Awareness-level competencies.

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- 602-5.1.3 Operations level responders shall meet the job performance requirements defined in Sections 602-5.2 through 602-5.6 – Hazardous Materials Operations-level competencies.
- 602-5.1.4 Operations level responders shall have additional competencies that are specific to the response mission and expected tasks as determined by the AHJ.

Instructor Note

TCFP Basic Structural Firefighter certification requires the following Hazardous Materials Operations Mission-Specific competencies:

1. 603-6.2 Hazardous Materials Operations: Mission Specific Competencies – Personal Protective Equipment
2. 603-6.6 Hazardous Materials Operations: Mission Specific Competencies – Product Control

602-5.1.5 General Knowledge Requirements

Role of operations level responders at a hazardous materials/WMD incident; location and contents of AHJ emergency response plan and standard operating procedures for operations level responders, including those response operations for hazardous materials/WMD incidents.

1. Role of operations level responders at a hazardous materials/WMD incident
2. AHJ emergency response plan
 - a. Location
 - b. Contents
3. Standard operating procedures
 - a. Response operations for hazardous materials/WMD incidents

602-5.1.6 General Skills Requirements (Reserved)

602-5.2 Identify Potential Hazards

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Instructor Note

At the operations level, approved information sources should include a minimum of Emergency Response Guidebook (ERG), safety data sheets (SDS), shipping papers, including emergency response information, and other approved reference sources such as CHEMTREC, CANUTEC, and SETIQ; governmental authorities; and manufacturers, shippers, carriers (highway, rail, water, air, and pipeline), and contacts.

602-5.2.1 Identify the scope of the problem at a hazardous materials/WMD incident, given a hazardous materials/WMD incident, an assignment, policies and procedures, and approved reference sources, so that container types, materials, location of any release, and surrounding conditions are identified, hazard information is collected, the potential behavior of a material and its container is identified, and the potential hazards, harm, and outcomes associated with that behavior are identified.

(A) Requisite Knowledge. Definitions of hazard classes and divisions; types of containers; container identification markings, including piping and pipeline markings and contacting information; types of information to be collected during the hazardous materials/WMD incident survey; availability of shipping papers in transportation and of safety data sheets (SDS) at facilities; types of hazard information available from and how to contact CHEMTREC, CANUTEC, and SETIQ, governmental authorities, and manufacturers, shippers, and carriers; how to communicate with carrier representatives to reduce impact of a release; basic physical and chemical properties, including boiling point, chemical reactivity, corrosivity (pH), flammable (explosive) range [LFL (LEL) and UFL (UEL)], flash point, ignition (autoignition) temperature, particle size, persistence, physical state (solid, liquid, gas), radiation (ionizing and nonionizing), specific gravity, toxic products of combustion, vapor density, vapor pressure, and water solubility; how to identify the behavior of a material and its container based on the material's physical and chemical properties and the hazards associated with the identified behavior; examples of potential criminal and terrorist targets; indicators of possible criminal or terrorist activity for each of the following: chemical agents, biological agents, radiological agents, illicit laboratories (i.e., clandestine laboratories, weapons labs, ricin labs), and explosives; additional hazards associated with terrorist or criminal activities, such as secondary devices; and how to determine the likely

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harm and outcomes associated with the identified behavior and the surrounding conditions.

1. Definitions of hazard classes and divisions
 - a. Class 1 – Explosives
 - i. Division 1.1 – Explosives which have a mass explosion hazard
 - ii. Division 1.2 – Explosives which have a projection hazard but not a mass explosion hazard
 - iii. Division 1.3 – Explosives which have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but not a mass explosion hazard
 - iv. Division 1.4 – Explosives which present no significant blast hazard
 - v. Division 1.5 – Very insensitive explosives with a mass explosion hazard
 - vi. Division 1.6 – Extremely insensitive articles which do not have a mass explosion hazard
 - b. Class 2 – Gases
 - i. Division 2.1 – Flammable gases
 - ii. Division 2.2 – Non-flammable, non-toxic gases
 - iii. Division 2.3 – Toxic gases
 - c. Class 3 – Flammable liquids (and Combustible liquids [US])
 - d. Class 4 – Flammable solids; Substances liable to spontaneous combustion; Substances which, on contact with water emit flammable gases
 - i. Division 4.1 – Flammable solids, self-reactive substances and solid desensitized explosives
 - ii. Division 4.2 – Substances liable to spontaneous combustion
 - iii. Division 4.3 – Substances which in contact with water emit flammable gases
 - e. Class 5 – Oxidizing substances and Organic peroxides
 - i. Division 5.1 – Oxidizing substances
 - ii. Division 5.2 – Organic peroxides

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- f. Class 6 – Toxic substances and Infectious substances
 - i. Division 6.1 – Toxic substances
 - ii. Division 6.2 – Infectious substances
 - g. Class 7 – Radioactive materials
 - h. Class 8 – Corrosive substances
 - i. Class 9 – Miscellaneous dangerous goods/hazardous materials and articles ******(Copied from page 6, ERG Manual)
2. Types of containers
- a. Given examples of the following tank cars, the operations level responder shall identify each tank car by type, as follows:
 - i. Cryogenic liquid tank cars
 - ii. Nonpressure tank cars (general service or low-pressure cars)
 - iii. Pressure tank cars
 - b. Given examples of the following intermodal tanks, the operations level responder shall identify each intermodal tank by type, as follows:
 - i. Nonpressure intermodal tank
 - 1. IM-101 (IMO Type 1)
 - 2. IM-102 (IMO Type 2)
 - ii. Pressure intermodal tanks (Spec 51/IMO Type 5)
 - iii. Specialized intermodal tanks, including the following:
 - 1. Cryogenic intermodal tanks (IMO Type 7)
 - 2. Tube modules
 - c. Given examples of the following cargo tanks, the operations level responder shall identify each cargo tank by type, as follows:
 - i. Compressed gas tube trailers
 - ii. Corrosive liquid tanks
 - 1. DOT 412
 - 2. TC412
 - 3. SCT 312
 - 4. MC 312
 - 5. TC 312

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- iii. Cryogenic liquid tanks
 - 1. MC338
 - 2. TC338
 - 3. SCT 338
 - 4. TC 341
 - 5. CGA 341
- iv. Dry bulk cargo tanks
- v. High pressure tanks
 - 1. MC331
 - 2. TC 331
 - 3. SCT 331
- vi. Low pressure chemical tanks
 - 1. DOT 407
 - 2. TC407
 - 3. SCT 307
 - 4. MC 307
 - 5. TC 307
- vii. Non-pressure liquid tanks
 - 1. DOT 406
 - 2. TC406
 - 3. SCT 306
 - 4. MC 306
 - 5. TC 306

Instructor Note

CGA=Compressed Gas Association, MC= Motor Carrier, TC=Transport Canada, DOT=Dept. of Transportation, SCT=Secretariat of Communications and Transportation [Mexico]

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

- 1. Cryogenic liquid tank
 - a. Refrigerated storage tanks=less than 15 psi
 - b. High pressure cryogenic tanks=greater than 15psi
- 2. Non-pressure tank (Atmospheric pressure=0-0.5 psi)
 - a. Horizontal tank
 - b. Cone roof tank
 - c. Floating roof tank
 - d. Covered floating roof tank

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- e. Floating roof with geodesic dome
 - f. Lifter roof tank
 - g. Vapor dome roof tank
 - h. Underground storage tanks
3. Pressure tank
- a. Low Pressure (0.5-15 psi)
 - i. Vertical dome roof tanks
 - b. High pressure (greater than 15 psi)
 - i. Horizontal pressure vessel
 - ii. Spherical pressure vessel
 - iii. Noded spheroid
 - iv. Underground high pressure

Given examples of the following non-bulk packaging, the operations level responder shall identify each package by type, as follows:

- 1. Bags
- 2. Carboys and Jerricans
- 3. Cylinders
- 4. Drums
 - a. Types
 - i. Open head
 - ii. Closed head
 - b. Construction Materials
 - i. Metal
 - ii. Plastic
 - iii. Fiberboard
 - iv. Other suitable materials
 - c. Fittings
 - i. Bungs
 - ii. Chime ring
- 5. Dewar flask (cryogenic liquids)

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

- 1. Intermediate bulk container (IBC)

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- a. Rigid intermediate bulk containers (RIBCs)
 - b. Flexible intermediate bulk containers (FIBCs)
2. Ton container
- a. Convex
 - b. Concave

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

1. Excepted
2. Industrial
3. Type A
4. Type B
5. Type C

End of Container list.

3. Container identification markings
 - a. DOT placarding/labeling/marketing system
 - i. Placards (bulk containers)
 - ii. Labels (non-bulk containers)
 - iii. Stenciling and markings
 1. Highway transportation vehicles, including cargo tanks
 - a. Company names and logos
 - b. Vehicle identification numbers
 - c. Manufacturers' specification plate
 2. Intermodal equipment, including tank containers
 - a. Reporting marks
 - b. Tank number
 - c. Specification markings
 3. Rail transport vehicles, including tank cars
 - a. Commodity stencils

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- b. Capacity stencils
 - c. Specification markings
 - d. Standard transportation commodity code (STCC)
 - e. Reporting marks
4. Radioactive containers
- a. Radioactive White-I Label
 - i. Radioactive contents (isotope)
 - ii. Activity
 - b. Radioactive Yellow-II Label
 - i. Radioactive contents (isotope)
 - ii. Activity
 - iii. Transportation Index (TI)
 - c. Radioactive Yellow-III Label
 - i. Radioactive contents (isotope)
 - ii. Activity
 - iii. Transportation Index (TI)
 - d. Fissile Label
 - e. UN numbers
 - f. NFPA 704 marking system (fixed facilities)
 - g. Hazardous Materials Identification System (HMIS)
 - h. Hazardous Identification Codes (Intermodal Containers)
 - i. Also known “Hazard Identification Numbers,” or
 - j. Kemler Code (ADR Code)
 - k. Global Harmonization System (GHS) Pictograms
 - l. Military Marking System
 - m. Piping markings
 - n. Facility markings
 - o. Color codes
 - p. Pipeline markings
 - i. Emergency telephone number
 - ii. Owner
 - iii. Product

4. Contacting information

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- a. SDS information
 - b. Shipping papers
 - c. Pipeline markers
 - d. Pesticide labels
 - e. Facility inventory logs
5. Types of information to be collected during the hazardous materials/WMD incident survey
- a. Surrounding conditions
 - i. Topography
 - ii. Land use
 - iii. Accessibility
 - iv. Weather conditions
 - v. Bodies of water
 - vi. Public exposure potential
 - vii. Overhead and underground wires and pipelines
 - viii. Storms and sewer drains
 - ix. Possible ignition sources
 - x. Adjacent land use
 - xi. Nature and extent of injuries
 - xii. Building information
 - xiii. Ventilation ducts
 - xiv. Air returns
 - b. Container information
 - i. Size
 - ii. Shape
 - iii. Condition
 - iv. General Hazardous Materials Behavior Model (GEBMO)
 1. Stresses
 2. Breach
 3. Release
 4. Dispersion/engulf
 5. Exposure/contact
 6. Harm
 - c. Product information
 - i. What are the Hazardous Materials involved?
 1. Hazard class
 2. Quantity
 3. Concentrations
 4. Reactivity

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- ii. Material behavior
 - 1. Solid
 - 2. Liquid
 - 3. Gas
 - 4. Is something burning?
6. Availability of shipping papers in transportation and of safety data sheets (SDS) at facilities
- a. Types of shipping papers
 - i. Bill of Lading or Freight Bill - highway
 - ii. Dangerous Cargo Manifest – maritime
 - iii. Waybill and/or Consist/Train List - railroad
 - iv. Air Bill – aircraft
 - b. Safety Data Sheets (SDS) Information Sections
 - i. Identification
 - ii. Hazard(s) Identification
 - iii. Composition/Information on Ingredients
 - iv. First Aid Measures
 - v. Fire Fighting Measures
 - vi. Accidental Release Measures
 - vii. Handling and Storage
 - viii. Exposure and Controls/Personal Protection
 - ix. Physical and Chemical Properties
 - x. Stability and Reactivity
 - xi. Toxicological Information
 - xii. Ecological Information
 - xiii. Disposal Considerations
 - xiv. Transport Information
 - xv. Regulatory Information
 - xvi. Other Information
 - c. Other transportation and facility information sources
 - i. Chemical inventory list
 - ii. Shipping and receiving documents
 - iii. Inventory records
 - iv. Risk management and hazardous communication plans
 - v. Chemical inventory reports (Tier II reports)
 - vi. Facility pre-plans

7. Types of hazard information available from/how to contact:

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- a. CHEMTREC – 1-800-424-9300
- a. CANUTEC – Canadian Transport Emergency Centre (contact info in ERG)
- c. SETIQ – Emergency Transportation System for the Chemical Industry, Mexico (contact info in ERG)
- d. Governmental authorities
 - i. Federal
 - 1. Environmental Protection Agency (EPA)
 - 2. Department of Transportation (DOT)
 - 3. Nuclear Regulatory Commission (NRC)
 - 4. Department of Energy (DOE)
 - 5. United States Coast Guard (USCG)
 - 6. Occupational Safety and Health Administration (OSHA)
 - 7. Federal Bureau of Investigation (FBI)
 - 8. Department of Homeland Security (DHS)
 - 9. Department of Defense (DoD)
 - ii. State of Texas
 - 1. Texas Commission on Environmental Quality (TCEQ)
 - 2. General Land Office (GLO)
 - 3. Texas Railroad Commission (TRRC)
 - 4. Texas Department of Transportation (TXDOT)
 - 5. Department of State Health Services (DHS)
 - 6. Texas Division of Emergency Management (TDEM)
 - 7. Texas Department of Public Safety (DPS)
 - 8. National Guard Chemical Support Team (CST)
 - iii. Local
 - 1. Department of Health
 - 2. Code Enforcement
 - 3. Local Emergency Planning Commission
 - 4. Fire Department
 - 5. Law Enforcement
 - 6. Emergency Management

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7. Emergency Medical Services

- d. Manufacturers
 - i. Safety Data Sheets
 - ii. Other manufacturer information
 - e. Shippers
 - i. Shipping Papers
 - ii. Cargo manifest
 - f. Carriers
 - i. Highway – Bill of lading
 - ii. Rail – Waybill or consist
 - iii. Water – Dangerous cargo manifest
 - iv. Air – Air bill
 - v. Pipeline – Pipeline marker
1. How to communicate with carrier representatives to reduce impact of a release
 - a. Emergency contact information found in shipping papers and/or SDS
 - b. Unified command
 2. Basic physical and chemical properties
 - a. Boiling point
 - b. Chemical reactivity
 - c. Corrosivity (pH)
 - d. Flammable (explosive) range
 - i. LFL
 - ii. LEL
 - iii. UFL
 - iv. UEL
 - e. Flash point
 - f. Ignition (autoignition) temperature
 - g. Particle size
 - h. Persistence
 - i. Physical state
 - i. Solid
 - ii. Liquid
 - iii. Gas

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- j. Radiation
 - i. Ionizing
 - ii. Nonionizing
 - k. Specific gravity
 - l. Toxic products of combustion
 - m. Vapor density
 - n. Vapor pressure
 - o. Water solubility
 - p. Viscosity
 - q. Polymerization
 - r. Expansion ratio
 - s. Biological agents and toxins
 - t. Sublimation
3. Identifying material and container behavior based on:
- a. A material's properties
 - i. Physical
 - ii. Chemical

 - b. The hazards associated with an identified behavior
 - i. Thermal
 - ii. Radiation
 - iii. Asphyxiation
 - iv. Chemical (i.e., poison, corrosives)
 - v. Etiological
 - vi. Mechanical
 - vii. Psychological/psychogenic
4. Examples of potential criminal and terrorist targets
- a. Public assembly areas
 - b. Public buildings
 - c. Mass transit systems
 - d. Places with high economic impact
 - e. Telecommunications facilities
 - f. Places with historical or symbolic significance
 - g. Military installations
 - h. Airports
 - i. Industrial facilities
 - j. Critical infrastructure
 - k. Educational sites

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- I. Medical and science facilities
5. Indicators of possible criminal or terrorist activity
 - a. Chemical agents
 - i. The presence of hazardous materials/WMD or laboratory equipment that is not relevant to the occupancy
 - ii. Intentional release of hazardous materials/WMD
 - b. Unexplained patterns of sudden onset of similar, nontraumatic illnesses or deaths (patterns that might be geographic, by employer, or associated with agent dissemination methods)
 - i. The presence of hazardous materials/WMD or laboratory equipment that is not relevant to the occupancy
 - ii. Intentional release of hazardous materials/WMD
 - c. Unexplained odors or tastes that are out of character with the surroundings
 - i. The presence of hazardous materials/WMD or laboratory equipment that is not relevant to the occupancy
 - ii. Intentional release of hazardous materials/WMD
 - d. Multiple individuals exhibiting unexplained signs of skin, eye, or airway irritation
 - i. The presence of hazardous materials/WMD or laboratory equipment that is not relevant to the occupancy
 - ii. Intentional release of hazardous materials/WMD
 - e. explained bomb- or munitions-like material, especially if it contains a liquid
 - i. The presence of hazardous materials/WMD or laboratory equipment that is not relevant to the occupancy
 - ii. Intentional release of hazardous materials/WMD
 - f. Unexplained vapor clouds, mists, and plumes
 - i. The presence of hazardous materials/WMD or laboratory equipment that is not relevant to the occupancy
 - ii. Intentional release of hazardous materials/WMD
 - g. Multiple individuals exhibiting unexplained health problems such as nausea, vomiting, twitching, tightness in chest, sweating,

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- pinpoint pupils (miosis), runny nose (rhinorrhea), disorientation, difficulty breathing, convulsions, or death
- i. The presence of hazardous materials/WMD or laboratory equipment that is not relevant to the occupancy
 - ii. Intentional release of hazardous materials/WMD
- h. Trees, shrubs, bushes, food crops, and/or lawns that are dead, discolored, abnormal in appearance, or withered (not due to a current drought and not just a patch of dead weeds)
- i. The presence of hazardous materials/WMD or laboratory equipment that is not relevant to the occupancy
 - ii. Intentional release of hazardous materials/WMD
- i. Surfaces exhibiting oily droplets/films and unexplained oily film on water surfaces
- i. The presence of hazardous materials/WMD or laboratory equipment that is not relevant to the occupancy
 - ii. Intentional release of hazardous materials/WMD
- j. An abnormal number of sick or dead birds, animals, or fish
- i. The presence of hazardous materials/WMD or laboratory equipment that is not relevant to the occupancy
 - ii. Intentional release of hazardous materials/WMD
- k. Unusual security, locks, bars on windows, covered windows, or barbed wire
- i. The presence of hazardous materials/WMD or laboratory equipment that is not relevant to the occupancy
 - ii. Intentional release of hazardous materials/WMD
- l. Biological agents
- i. Unusual number of sick or dying people or animals (any number of symptoms; time before symptoms are observed dependent on the agent used but usually days to weeks)
 - ii. Healthcare facilities reporting multiple casualties with similar signs or symptoms
 - iii. Unscheduled or unusual spray being disseminated, especially if outdoors during period of darkness
 - iv. Abandoned spray devices (devices with no distinct odors)

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- m. Radiological agents
 - i. Radiation Symbols
 - ii. Unusual metal debris
 - iii. Heat-emitting material
 - iv. Glowing material
 - v. Sick people/animals

- n. Illicit laboratories (i.e., clandestine laboratories, weapons labs, ricin labs)
 - i. Structures with unusual or multiple vents
 - ii. Buildings with heavy security
 - iii. Obscured windows
 - iv. Odd or unusual odors
 - v. May include mobile facilities, i.e., mobile meth labs

- o. Explosives
 - i. Prior warning or threat of attack
 - ii. Unknown explosions
 - iii. Multiple fires or explosions
 - iv. Unattended packages, backpacks and other objects left in high traffic public areas
 - v. Fragmentation damage or injuries
 - vi. Craters
 - vii. Small metal objects, i.e., nuts, bolts, nails used as shrapnel

- 6. Additional hazards associated with terrorist or criminal activities
 - a. Secondary devices ******(roman numerals)
 - i. Containers with unknown liquids or materials
 - ii. Unusual devices or containers with electronic components such as wires, circuit boards, cellular phones, antennas, and other items attached or exposed
 - iii. Devices containing quantities of fuses, fireworks, match heads, black powder, incendiary materials, or other unusual materials
 - iv. Materials attached to or surrounding an item such as nails, bolts, drill bits that could be used for shrapnel
 - v. Ordnance such as blasting caps, detcord, explosives, grenades, etc.

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7. Determining harm/outcomes associated with
 - a. Identified behavior
 - b. Surrounding conditions

Instructor Note

At the operations level, responders should be able to recognize the following containers and identify them by name: rail tank cars (pressure, nonpressure, and cryogenic tank cars); highway cargo tanks (compressed gas tube trailers, corrosive liquid tanks, cryogenic tanks, dry bulk cargo tanks, high-pressure tanks, low-pressure chemical tanks, and nonpressure liquid tanks); UN portable tanks/intermodal tanks (nonpressure, pressure, cryogenic, and tube modules); storage tanks (nonpressure, pressure, and cryogenic storage tanks); piping and pipelines; intermediate bulk containers (IBC) and ton containers; radioactive materials packages (excepted, industrial, Type A, and Type B packages); and nonbulk containers (bags, carboys, cylinders, drums, and Dewar flasks for cryogenic liquids).

To ensure that operations level personnel also understand how to obtain information pertaining to a pipeline-involved incident, line markers or pipeline markers are added to supplement the list of information sources. In a pipeline incident, the pipeline markers would be the source of information used since no shipping papers, placards, UN numbers, or other information would be available.

Hazardous materials incident survey information. This includes location, weather conditions, topography, populated buildings, bodies of water, other buildings, remedial actions taken, container/package, contents, release, container damage, time of day, and other factors that help determine the scope of the problem.

Physical and chemical properties. Predicting the behavior of hazardous materials/WMD relies on understanding certain characteristics of the material. Information identifying the following characteristics should be collected and interpreted: boiling point, chemical reactivity, corrosivity (pH), flammable (explosive) range [LFL (LEL) and UFL(UEL)], flash point, ignition (autoignition) temperature, particle size, persistence, physical state (solid, liquid, gas), radiation (ionizing and nonionizing), specific

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gravity, toxic products of combustion, vapor density, vapor pressure, and water solubility.

Identifying hazards. The process for predicting/identifying the behavior of a hazardous material/WMD and its container under emergency conditions is based on the simple concepts that containers of hazardous materials/WMD under stress can open up and allow the contents to escape. The release of contents will vary in type and speed. A dispersion pattern will be formed by the escaping contents, potentially exposing people, the environment, or property to physical and/or health hazards.

This overall concept for identifying the likely behavior of a container and its contents under emergency conditions is often referred to as a general behavior model. The general behavior model considers the type of stress on the container involved and the potential type of breach, release, dispersion pattern, length of contact, and the health and physical hazards associated with the material and its container, as follows:

- (1) *Stress.* The three types of stress that could cause a container to release its contents are thermal stress, mechanical stress, and chemical stress.
- (2) *Breach.* The five ways in which containers can breach are disintegration, runaway cracking, closures opening up, punctures, and splits or tears.
- (3) *Release.* The four ways in which containment systems can release their contents are detonation, violent rupture, rapid relief, and spill or leak.
- (4) *Dispersion.* Seven dispersion patterns can be created upon release of agents: hemisphere, cloud, plume, cone, stream, pool, and irregular.
- (5) *Contact.* The three general time frames for predicting the length of time that an exposure can be in contact with hazardous materials/WMD in an endangered area are short term (minutes and hours), medium term (days, weeks, and months), and long term (years and generations).

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(6) *Hazards.* The seven health and physical hazards that could cause harm in a hazardous materials/WMD incident are thermal, mechanical, poisonous, corrosive, asphyxiating, radiological, and etiologic.

Identifying outcomes. The process for identifying the potential harm and associated outcomes within an endangered area at a hazardous materials/WMD incident includes identifying the size and shape of the endangered area, the number of exposures (people, property, environment, and major systems) within the endangered area, and the physical, health, and safety hazards within the endangered area as determined from approved resources.

Resources for determining the size of an endangered area of a hazardous materials/WMD incident are the current edition of the ERG and plume dispersion modeling results from facility pre-incident plans.

The factors for determining the extent of physical, health, and safety hazards within an endangered area at a hazardous materials/WMD incident are victim presentation (including nonclinical indicators or clues of a material's presence), surrounding conditions, indication of the behavior of the hazardous material and its container, and the degree of hazard.

(B) Requisite Skills. Identifying container types, materials, location of release, and surrounding conditions at a hazardous materials/WMD incident; collecting hazard information; communicating with pipeline operators or carrier representatives; describing the likely behavior of the hazardous materials or WMD and its container; and describing the potential hazards, harm, and outcomes associated with that behavior and the surrounding conditions.

602-5.3 **Identify Action Options**

Instructor Note

At the operations level, approved information sources should include a minimum of ERG; SDS; CHEMTREC, CANUTEC, or SETIQ; local, state, and governmental authorities; and manufacturers', shippers', and carriers' documents (shipping papers) and contacts.

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602-5.3.1 Identify the action options for a hazardous materials/WMD incident, given a hazardous materials/WMD incident, an assignment, policies and procedures, approved reference sources, and the scope of the problem, so that response objectives, action options, safety precautions, suitability of approved personal protective equipment (PPE) available, and emergency decontamination needs are identified.

(A) Requisite Knowledge. Policies and procedures for hazardous materials/WMD incident operations; basic components of an incident action plan (IAP); modes of operation (offensive, defensive, and nonintervention); types of response objectives; types of action options; types of response information available from the Emergency Response Guidebook (ERG), safety data sheets (SDS), shipping papers with emergency response information, and other resources; types of information available from and how to contact CHEMTREC, CANUTEC, and SETIQ, governmental authorities, and manufacturers, shippers, and carriers (highway, rail, water, air, pipeline); safety procedures; risk analysis concepts; purpose, advantages, limitations, and uses of approved PPE to determine if PPE is suitable for the incident conditions; difference between exposure and contamination; contamination types, including sources and hazards of carcinogens at incident scenes; routes of exposure; types of decontamination (emergency, mass, and technical); purpose, advantages, and limitations of emergency decontamination; and procedures, tools, and equipment for performing emergency decontamination.

1. Policies and procedures for hazardous materials/WMD incident operations
 - a. 29 CFR 1910.120 Hazardous Waste Operations and Emergency Response (HAZWOPER)
 - b. NFPA 475: Recommended Practices for Responding to Hazardous Materials Incidents/Weapons of Mass Destruction
 - c. Local Emergency Response Plans
 - d. AHJ Standard Operating Procedures
2. Basic components of an incident action plan (IAP)
 - a. Site restrictions
 - b. Strategies/incident objectives
 - c. Current and projected weather conditions

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- d. Entry objectives
- e. Resource assignments and needs
- f. On-scene organization and control
- g. Risk assessment
- h. Hazard statement
- i. Selection of personal protective equipment
- j. Site safety plan (ICS 208HM)
- k. Medical plan
- l. Protective measures
- m. Communications procedures/plan
- n. Emergency procedures and personnel accountability
- o. Emergency medical care arrangements
- p. Rehabilitation plan
- q. Decontamination procedures
- r. On-scene work assignments (branches)
- s. Ensure debriefing and critiquing of the incident is conducted once the incident is terminated
 - i. Accomplishments
 - ii. Status of any injuries
- t. Document the plan using:
 - i. Appropriate regulatory agency methods as necessary
 - ii. Department of Homeland Security – National Incident Management System/Incident Command System standardized forms
 - 1. ICS 201 Incident Briefing Form
 - 2. ICS 202 Incident Objectives Worksheet
 - 3. ICS 203 Organization Assignment List
 - 4. ICS 204 Division Assignment List
 - 5. ICS 205 Communications Plan
 - 6. ICS 206 Medical Plan
 - 7. ICS 207 Incident Organization Chart
 - 8. ICS 208 HM Site Safety and Control Plan
 - 9. ICS 211 Incident Check-in List
 - 10. ICS 213 General Message
 - 11. ICS 214 Unit Log
 - 12. ICS 215 Incident Planning Worksheet
 - 13. ICS 215A Incident Action Plan Safety Analysis

3. Modes of operation

- a. Offensive

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- b. Defensive
 - c. Nonintervention
4. Types of response objectives (strategies)
- a. SMART
 - i. Specific
 - ii. Measurable
 - iii. Attainable
 - iv. Realistic
 - v. Timely
 - b. LIPS
 - i. Life safety
 - ii. Incident stabilization
 - iii. Property conservation
 - iv. System restoration
5. Types of action options (tactics)
- a. Actions that enable responders to achieve response objectives
 - b. Examples include but are not limited to:
 - i. Scene size-up
 - ii. Establish control zones
 - iii. Non-intervention
 - 1. Protect exposures
 - 2. Implement public protective actions
 - iv. Intervention
 - 1. Control product release
 - 2. Mitigate
 - 3. Neutralize
6. Types of response information available
- a. Emergency Response Guidebook (ERG)
 - b. Safety Data Sheets (SDS)
 - c. Shipping papers with emergency response information
 - d. Other resources
 - i. NIOSH Pocket Guide
 - ii. NFPA Fire Protection Guide to Hazardous Materials
 - iii. Jane's CBRN Response Handbook
 - iv. Symbol Seeker: Hazard Identification Manual
 - v. Electronic databases (i.e., CAMEO)
 - vi. Mobile applications (i.e., WISER) *

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*NOTE: All mobile applications must be vetted for accuracy of information provided

7. Types of response information available from/how to contact:
 - a. CHEMTREC – 1-800-424-9300
 - b. CANUTEC – Canadian Transport Emergency Centre (contact info in ERG)
 - c. SETIQ – Emergency Transportation System for the Chemical Industry, Mexico (contact info in ERG)
 - d. Governmental authorities
 - i. Federal
 1. Environmental Protection Agency (EPA)
 2. Department of Transportation (DOT)
 3. Nuclear Regulatory Commission (NRC)
 4. Department of Energy (DOE)
 5. United States Coast Guard (USCG)
 6. Occupational Safety and Health Administration (OSHA)
 7. Federal Bureau of Investigation (FBI)
 8. Department of Homeland Security (DHS)
 9. Department of Defense (DoD)
 - ii. State of Texas
 1. Texas Commission on Environmental Quality (TCEQ)
 2. General Land Office (GLO)
 3. Texas Railroad Commission (TRRC)
 4. Texas Department of Transportation (TXDOT)
 5. Department of State Health Services (DHS)
 6. Texas Division of Emergency Management (TDEM)
 7. Texas Department of Public Safety (DPS)
 8. National Guard Chemical Support Team (CST)
 - iii. Local
 1. Department of Health
 2. Code Enforcement
 3. Local Emergency Planning Commission
 4. Fire Department
 5. Law Enforcement
 6. Emergency Management
 7. Emergency Medical Services

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- e. Manufacturers
 - i. Safety Data Sheets
 - ii. Other manufacturer information
 - f. Shippers
 - i. Shipping Papers
 - ii. Cargo manifest
 - g. Carriers
 - i. Highway – Bill of lading
 - ii. Rail – Waybill or consist
 - iii. Water – Dangerous cargo manifest
 - iv. Air – Air bill
 - v. Pipeline – Pipeline marker
1. Safety procedures
 2. Risk analysis concepts
 - a. Risk vs. reward
 - b. Cost benefit analysis
 3. Uses of approved PPE to determine if PPE is suitable for the incident
(See 602-5.4.1(8))
 - a. Purpose
 - b. Advantages
 - c. Limitations
 4. Difference between exposure and contamination
 5. Contamination types: sources and hazards
 - a. Carcinogens
 - b. Biological/etiological
 - c. Chemical
 - d. Radiological
 - e. Irritants
 - f. Sensitizers
 - g. Dust/particulates (i.e., silica and asbestos)
 6. Routes of exposure
 - a. Absorption
 - b. Inhalation
 - c. Ingestion

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- d. Injection
- 7. Types of decontamination (See 602-5.5.1)
 - a. Emergency
 - b. Mass
 - c. Gross
 - d. Technical
- 8. Emergency decontamination
 - a. Purpose
 - b. Advantages
 - c. Limitations
- 9. Performing emergency decontamination
 - a. Procedures
 - b. Tools
 - c. Equipment

Instructor Note

Modes of operation are offensive, defensive, and nonintervention and include the following:

- (1) Common response objectives, for example, product control; fire control; protection of people, the environment, and property; identification and isolation; evidence protection; rescue; recovery; and termination
- (2) Common response options, for example, spill control, leak control, foam, control exposures, evacuation, isolation, shelter-in-place, and establishment of product control zones
- (3) Contamination types: primary, secondary, and tertiary.

(B) Requisite Skills. Identifying response objectives and action options based on the scope of the problem and available resources; identifying whether approved PPE is suitable for the incident conditions; and identifying emergency decontamination needs based on the scope of the problem.

602-5.4 Action Plan Implementation

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Instructor Note

Operations level responders should be able to identify their role during hazardous materials/WMD incidents as specified in the emergency response plan and/or standard operating procedures; the levels of hazardous materials/WMD incidents as defined in the emergency response plan; the purpose, need, benefits, and elements of the incident command system for hazardous materials/WMD incidents; the duties and responsibilities of the incident safety officer and hazardous materials branch or group; considerations for determining the location of the incident command post; procedures for requesting additional resources; and the role and response objectives of other responding agencies.

Executive Summary – Field Decon

Over the past decade, research has been published linking higher rates of cancer in fire service personnel to repeated, chronic exposure to the by-products of smoke and particulates from structure fires. Various studies have proven that fire fighters are experiencing higher rates of certain types of cancers and that they are more likely to have rare forms of cancers than the general population. See NIOSH Study of Cancer among U.S. Fire Fighters at <https://www.cdc.gov/niosh/firefighters/>.

602-5.4.1 Perform assigned tasks at a hazardous materials/WMD incident, given a hazardous materials/WMD incident; an assignment with limited potential of contact with hazardous materials/WMD, policies and procedures, the scope of the problem, approved tools, equipment, and PPE, so that protective actions and scene control are established and maintained, on-scene incident command is described, evidence is preserved, approved PPE is selected and used in the proper manner; exposures and personnel are protected; safety procedures are followed; hazards are avoided or minimized; assignments are completed; and gross decontamination of personnel, tools, equipment, and PPE is conducted in the field.

(A) Requisite Knowledge. Scene control procedures; procedures for protective actions, including evacuation and sheltering-in-place; procedures for ensuring coordinated communications between responders and to the public; evidence recognition and preservation procedures; incident command organization; purpose, importance, benefits, and

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organization of incident command at hazardous materials/WMD incidents; policies and procedures for implementing incident command at hazardous materials/WMD incidents; capabilities, limitations, inspection, donning, working in, going through decontamination while wearing, doffing approved PPE; signs and symptoms of thermal stress; safety precautions when working at hazardous materials/WMD incidents; purpose, advantages, and limitations of gross decontamination; the need for gross decontamination in the field based on the task(s) performed and contamination received, including sources and hazards of carcinogens at incident scenes; gross decontamination procedures for personnel, tools, equipment, and PPE; and cleaning, disinfecting, and inspecting tools, equipment, and PPE.

1. Scene control procedures
 - a. Establish initial isolation perimeter
 - b. Establish control zones (i.e., hot, warm, cold)

2. Procedures for protective actions
 - a. Evacuation
 - b. Sheltering-in-place

3. Coordinated communications
 - a. Between responders
 - b. To the public

4. Evidence recognition and preservation procedures
 - a. Identification
 - b. Secure and isolate the scene
 - c. Coordinate with law enforcement
 - d. AHJ – SOP

5. Incident command organization (NFPA 472 5.4.3)
 - a. Identify the role of the operations level responder during hazardous materials/WMD incidents as specified in the emergency response plan and/or standard operating procedures.
 - b. Identify the levels of hazardous materials/WMD incidents as defined in the emergency response plan.

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- c. Identify the purpose, need, benefits, and elements of the incident command system for hazardous materials/WMD incidents.
- d. Identify the duties and responsibilities of the following functions within the incident management system:
 - i. Incident Safety Officer
 - 1. Obtains briefing from:
 - a. Incident Commander; or
 - b. Incident Safety Officer; and
 - c. Hazard Branch Director or Hazard Division/Group Supervisor
 - 2. Participates in:
 - a. Preparation of incident safety plan
 - b. Implementation of the incident safety plan
 - c. Medical monitoring of entry team personnel before and after entry
 - 3. Advises Incident Commander or Hazard Branch Director or Hazard Division/Group Supervisor of:
 - a. Deviations from the incident safety plan
 - b. Dangerous or unsafe activities
 - 4. Alters, suspends, or terminates any operation that is considered unsafe
 - ii. Hazardous materials branch or group
 - 1. Decon Team
 - 2. Site Access
 - a. Safe Refuge Area
 - 3. Entry Team
 - 4. Technician
 - 5. Assistant Safety Officer Hazmat
- e. Identify the considerations for determining the location of the incident command post for a hazardous materials/WMD incident.
- f. Identify the procedures for requesting additional resources at a hazardous materials/WMD incident.
- g. Describe the role and response objectives of other agencies that respond to hazardous materials/WMD incidents.

- 1. Incident command at hazardous materials/WMD incidents
 - a. Purpose
 - b. Importance

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- c. Benefits
 - d. Organization
 - i. Incident Commander
 - ii. Incident Safety Officer
 - iii. Operation Section Chief
 - iv. Hazmat Group Supervisor
 - 1. Decon Team Leader
 - 2. Site Access Specialist
 - a. Safe Refuge Area Manager
 - 3. Entry Team Leader
 - 4. Technician Specialist
 - 5. Assistant Safety Officer Hazmat
2. Implementing incident command at hazardous materials/WMD incidents
- a. Policies
 - b. Procedures
 - c. Single Command vs. Unified Command
 - d. AHJ/SOP
3. Capabilities, limitation, inspection, donning, working in, going through decontamination while wearing, and doffing approved PPE
- a. Structural Firefighting Protective Ensemble (NFPA 1971)
 - b. High Temperature Protective Clothing
 - i. Proximity Suits (ARFF) (NFPA 1971)
 - ii. Fire Entry Suits
 - c. Chemical Protective Clothing (CPC)
 - i. Vapor Protective Clothing (NFPA 1991)
 - ii. Splash Protective and Support Garments (NFPA 1992)
 - iii. CBRNE Garments (NFPA 1994)
 - d. Using Personal Protective Equipment (NFPA 472 5.4.4)
 - i. Given the personal protective equipment provided by the AHJ, the operations level responder shall describe considerations for the use of personal protective equipment provided by the AHJ, and shall meet the following requirements:
 - 1. Identify the importance of the buddy system
 - 2. Identify the importance of the backup personnel

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3. Identify the safety precautions to be observed when approaching and working at hazardous materials/WMD incidents
 4. Identify the signs and symptoms of heat and cold stress (thermal stress) and procedures for their control
 5. Identify the capabilities and limitations of personnel working in the personal protective equipment provided by the AHJ
 6. Identify the procedures for cleaning, disinfecting, and inspecting personal protective equipment provided by the AHJ
 7. Describe the maintenance, testing, inspection, and storage procedures for personal protective equipment provided by the AHJ according to the manufacturer's specifications and recommendations
- e. Determining the suitability of Personal Protective Equipment (NFPA 472 5.3.3)
- i. Identify the respiratory protection required for a given response option and the following:
 1. Describe the advantages, limitations, uses, and operational components of the following types of respiratory protection at hazardous materials/WMD incidents:
 - a. Positive pressure self-contained breathing apparatus (SCBA)
 - b. Positive pressure air-line respirator with required escape unit
 - c. Closed-circuit SCBA
 - d. Powered air-purifying respirator (PAPR)
 - e. Air-purifying respirator (APR)
 - f. Particulate respirator
 - ii. Identify the required physical capabilities and limitations of personnel working in respiratory protection.
 - f. Identify the personal protective clothing required for a given option and the following:
 - i. Identify skin contact hazards encountered at hazardous materials/WMD incidents.
 1. Burns
 2. Rash
 3. Absorption

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- ii. Identify the purpose, advantages, and limitations of the following types of protective clothing at hazardous materials/WMD incidents:
 1. Chemical-protective clothing: liquid splash-protective clothing and vapor-protective clothing
 2. High temperature-protective clothing: proximity suits and entry suits
 3. Structural fire-fighting protective clothing
4. Safety precautions at hazardous materials/WMD incidents
 - a. Resist rushing in
 - b. Approach cautiously from upwind, uphill or upstream
 - c. Secure the scene
 - d. Identify the hazards
 - e. Assess the situation
 - f. Obtain help
 - g. Respond cautiously and appropriately
 - h. Do not assume that gases and vapors are harmless because they lack a smell
5. Gross decontamination
 - a. Purpose
 - b. Advantages
 - c. Limitations
6. The need for gross decontamination in the field based on the task(s) performed/contamination received
7. Carcinogens at incident scenes
 - a. Sources
 - b. Hazards (of)
8. Gross decontamination procedures
 - a. Personnel
 - b. Tools
 - c. Equipment
 - d. PPE

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9. Cleaning, disinfecting, and inspecting
 - a. Tools
 - b. Equipment
 - c. PPE

Instructor Note

Evidence preservation. Preservation of evidence is essential to the integrity and credibility of an incident investigation. Preservation techniques must be acceptable to the law enforcement agency having jurisdiction; therefore, it is important to get that agency's input ahead of time on the techniques specified in the AHJ emergency response plan or the organization's standard operating procedures.

General procedures for preserving evidence include the following:

- (1) Secure and isolate any incident area where evidence is located. This can include discarded personal protection equipment, specialized packaging (shipping or workplace labels and placards), biohazard containers, glass or metal fragments, containers (e.g., plastic, pipes, cylinders, bottles, fuel containers), and other materials that appear relevant to the occurrence, such as roadway flares, electrical components, fluids, and chemicals.
- (2) Leave fatalities and body parts in place and secure the area in which they are located.
- (3) Isolate any apparent source location of the event (e.g., blast area, spill release point).
- (4) Leave in place any explosive components or housing materials.
- (5) Place light-colored tarpaulins on the ground of access and exit corridors, decontamination zones, treatment areas, and rehabilitation sectors to allow possible evidence that might drop during decontamination and doffing of clothes to be spotted and collected.
- (6) Secure and isolate all food vending locations in the immediate area. Contaminated food products will qualify as primary or secondary evidence in the event of a chemical or biological incident.

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The collection (as opposed to preservation) of evidence is usually conducted by law enforcement personnel, unless other protocols are in place. If law enforcement personnel are not equipped or trained to enter the hot zone, hazardous materials technicians should be trained to collect samples in such a manner as to maintain the integrity of the samples for evidentiary purposes and to document the chain of evidence.

Safety precautions. Safety precautions should include buddy systems, backup systems, accountability systems, safety briefing, and evacuation/escape procedures. The following items should be considered in a safety briefing prior to allowing personnel to work at hazardous materials/WMD incidents:

- (1) Preliminary evaluation
- (2) Hazard identification
- (3) Description of the site
- (4) Task(s) to be performed
- (5) Length of time for task(s)
- (6) Required PPE
- (7) Monitoring requirements
- (8) Notification of identified risk

(B) **Requisite Skills.** Establishing and maintaining scene control; recognizing and preserving evidence; inspecting, donning, working in, going through decontamination while wearing, and doffing approved PPE; isolating contaminated tools, equipment, and PPE; conducting gross decontamination of contaminated personnel, tools, equipment, and PPE in the field; and cleaning, disinfecting, and inspecting approved tools, equipment, and PPE.

Instructor Note

The operations level responder should implement the incident command system as required by the AHJ by completing the following requirements:

- (1) Identify the role of the operations level responder during hazardous materials/WMD incidents as specified in the emergency response plan and/or standard operating procedures

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- (2) Identify the levels of hazardous materials/WMD incidents as defined in the emergency response plan
- (3) Identify the purpose, need, benefits, and elements of the incident command system for hazardous materials/WMD incidents
- (4) Identify the duties and responsibilities of the following functions within the incident management system:
 - (a) Incident safety officer
 - (b) Hazardous materials branch or group
- (5) Identify the considerations for determining the location of the incident command post for a hazardous materials/WMD incident
- (6) Identify the procedures for requesting additional resources at a hazardous materials/WMD incident
- (7) Describe the role and response objectives of other agencies that respond to hazardous materials/WMD incidents.

602-5.5 **Emergency Decontamination**

602-5.5.1 Perform emergency decontamination at a hazardous materials/WMD incident, given a hazardous materials/WMD incident that requires emergency decontamination; an assignment; scope of the problem; policies and procedures; and approved tools, equipment, and PPE for emergency decontamination, so that emergency decontamination needs are identified, approved PPE is selected and used, exposures and personnel are protected, safety procedures are followed, hazards are avoided or minimized, emergency decontamination is set up and implemented, and victims and responders are decontaminated.

(A) Requisite Knowledge. Contamination, cross contamination, and exposure; contamination types; routes of exposure; types of decontamination (emergency, mass, and technical); purpose, advantages, and limitations of emergency decontamination; policies and procedures for performing emergency decontamination; approved tools and equipment for emergency decontamination; and hazard avoidance for emergency decontamination.

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1. Contamination, cross-contamination, and exposure
 - a. Contamination
 - b. Cross-contamination
 - c. Exposure

2. Contamination types
 - a. Primary
 - b. Secondary
 - c. Tertiary

3. Routes of exposure
 - a. Absorption
 - b. Inhalation
 - c. Injection
 - d. Ingestion

4. Types of decontamination
 - a. Decon options
 - i. Wet decon
 - ii. Dry decon
 - iii. Chemical decon options
 - iv. Physical decon options
 - b. Emergency
 - c. Mass
 - d. Technical
 - i. Absorption
 - ii. Adsorption
 - iii. Vacuuming
 - iv. Washing
 - v. Chemical degradation
 - vi. Dilution
 - vii. Disinfection
 - viii. Evaporation
 - ix. Neutralization
 - x. Solidification
 - xi. Sterilization
 - xii. Isolation and disposal

5. Emergency decontamination
 - a. Purpose

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- b. Advantages
 - c. Limitations
- 6. Performing emergency decontamination
 - a. Policies
 - b. Procedures
 - 7. Approved tools and equipment
 - 8. Hazard avoidance for emergency decon
 - a. Establish control zones
 - b. Establish entry and exit corridors
 - c. Supervise the decon being performed (extra eyes)

(B) Requisite Skills. Selecting an emergency decontamination method; setting up emergency decontamination in a safe area; using PPE in the proper manner; implementing emergency decontamination; preventing spread of contamination; and avoiding hazards during emergency decontamination.

602-5.6 **Progress Evaluation and Reporting**

Instructor Note

All responders should understand why their efforts must be evaluated. If they are not making progress, the plan must be re-evaluated to determine why. The evaluation should include what changes have occurred with the circumstances of the incident (behavior of container or its contents).

To decide whether the actions being taken at an incident are effective and the objectives are being achieved, the responder must determine whether the incident is stabilizing or increasing in intensity. Factors to be considered include reduction of potential impact to persons or the environment and status of resources available to manage the incident. The evaluation should take place upon initiation of the IAP, and the IC/unified command and general staff should constantly monitor the status of the incident. The actions taken should be leading to a desirable outcome, with minimal loss of life and property. Changes in the status of

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the incident should influence the development of the IAP for the next operational period.

602-5.6.1 Evaluate and report the progress of the assigned tasks for a hazardous materials/WMD incident, given a hazardous materials/WMD incident, an assignment, policies and procedures, status of assigned tasks, and approved communication tools and equipment, so that the effectiveness of the assigned tasks is evaluated and communicated to the supervisor, who can adjust the IAP as needed.

(A) Requisite Knowledge. Components of progress reports; policies and procedures for evaluating and reporting progress; use of approved communication tools and equipment; signs indicating improving, static, or deteriorating conditions based on the objectives of the action plan; and circumstances under which it would be prudent to withdraw from a hazardous materials/WMD incident.

1. Components of progress reports
2. Evaluating/reporting progress
 - a. Policies
 - b. Procedures
 - c. AHJ/SOP
3. Approved communication tools and equipment
 - a. Hazardous area classifications
 - i. National electric code (NEC)
 - ii. Underwriters Laboratories (UL)
 - iii. NFPA 70 – National Electrical Code
 - b. Explosion-proof vs. intrinsically safe
4. Signs indicating improving, static, or deteriorating conditions based on the objectives of the action plan
 - a. Hand and arm signals
 - b. Air horn signals (i.e., emergency evacuation)
 - c. E-notifications (i.e., TPASS)
 - d. Radio emergency alert

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5. When to withdraw from a hazardous material/WMD incident

Instructor Note

Remaining in the immediate vicinity of an incident when nothing can be done to mitigate it and the situation is about to deteriorate is pointless. If flames are impinging on an LP-Gas vessel, for example, and providing the necessary volume of water to cool it is impossible, it would be prudent to withdraw to a safe distance. ICs should always evaluate the benefit of operations against the risk. Refer to the ERG or other references to determine appropriate action to be taken under the circumstances.

(B) Requisite Skills. Determining incident status; determining whether the response objectives are being accomplished; using approved communications tools and equipment; and communicating the status of assigned tasks.

Instructor Note

The proper methods for communicating the status of the planned response lie within the guidelines of the ICS and are dictated by the incident specific IAP. The ICS identifies two types of communication at an incident, formal and informal. Formal communication should be used for all policy related communication, using the ICS principles of unity of command and chain of command, while maintaining span of control. Ideally, all critical information should be communicated face-to-face.

The format for communications within the ICS must be established by the IC/unified command with input from the general staff.

A procedure should be established to allow responders to notify the IC immediately when conditions become critical and personnel are threatened. For example, the notification could take the form of a pre-established emergency radio message or tone that signifies danger, or it might be repeated blasts on an air horn. The message should not be delayed while responders try to locate a specific person in the chain of command.

CERTIFICATION CURRICULUM MANUAL – CHAPTER SIX

HAZARDOUS MATERIALS TECHNICIAN

REFERENCE LIST FOR THE HAZARDOUS MATERIALS TECHNICIAN CURRICULUM

This Reference List is provided as a general guide for both instructors and students to locate information pertaining to the specific objectives in the TCFP Curriculum. This list is **not** all-inclusive and does not in any way limit TCFP development and use of questions to test the objectives of the curriculum:

Required References

Texts

Certification Curriculum Manual. Texas Commission on Fire Protection. (Most current edition). Austin, TX: Texas Commission on Fire Protection.

Code of Federal Regulations, Title 29 Part 1910.120, Appendix A. United States. U.S. Department of Labor, Occupational Safety & Health Administration.
http://edocket.access.gpo.gov/cfr_2007/julqtr/pdf/29cfr1910.120.pdf

Emergency Response Guidebook. United States. (Most current edition). Washington, DC: U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration.

Hazardous Materials: Managing the Incident, 4th edition. Noll, G. G., Hildebrand, M. S., Schnepf, R. & Rudner, G.D. (2014). Burlington, MA: Jones and Bartlett.

Hazardous Materials Technician, 2nd edition. (2017) Stillwater, OK: International Fire Service Training Association.

Hazardous Materials/Weapons of Mass Destruction Response Handbook, /2018 edition. McGowan, T. (2018). Quincy, MA: National Fire Protection Association.

NFPA 472: Standard for Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents. (2018 ed.). Quincy, MA: NFPA Publications. National Fire Protection Association.

NFPA 1072: Standard for Hazardous Materials/Weapons of Mass Destruction Emergency Response Personnel Professional Qualifications. (2017 ed.). Quincy, MA: NFPA Publications. National Fire Protection Association.

NIOSH Pocket Guide to Chemical Hazards. National Institute for Occupational Safety and Health. (Most current edition). Cincinnati, OH: US Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health.

Standards Manual for Fire Protection Personnel. Texas Commission on Fire Protection. (Most current edition). Austin, TX: Texas Commission on Fire Protection.

Recommended References

The most current edition of the following publications and media are recommended (not required) supplemental material for program use.

Texts

Bretherick's Handbook of Reactive Chemical Hazards. Urben, P. G., Pitt, M. J., & Bretherick, L. (2007). Amsterdam: Elsevier.

Field Guide to Tank Cars. Bureau of Explosives. (2010). Pueblo, Colorado: Association of American Railroads.

Fire Fighter's Handbook of Hazardous Materials, 7th edition. Baker, Charles T., (2006). Sudbury, MA: Jones and Bartlett.

Fire Protection Guide to Hazardous Materials. National Fire Protection Association. (2010 edition). Quincy, MA: National Fire Protection Association.

Hawley's Condensed Chemical Dictionary. Lewis, R. J., & Hawley, G. G. (2007). West Sussex, England: Wiley.

Hazardous Materials: Managing the Incident: Field Operations Guide. Bevelacqua, A. 2nd Edition (2013). MD: Jones and Bartlett Publishing

Hazardous Materials Technician. Weber, Chris (2013). Upper Saddle River, NJ: Pearson Education, Inc.

Media

Chlorine Emergencies: An Overview for First Responders. Chlorine Institute. (2007). Arlington, VA: The Chlorine Institute.

Hazardous Materials Containment Series. Action Training Systems. [4 Disc DVD Set] Hazardous materials containment - series of 4 titles. Seattle, WA: Action Training Systems.

Hazardous Materials: Managing the Incident DVD Series. Massingham, G., Noll, G. G., Hildebrand, M. S., & Noll, G. G. (2005). [8 Disc DVD Set] Edgartown, MA: Emergency Film Group.

How to Use the Chlorine Institute Emergency Kit "A" for 100 lb. and 150 lb. Chlorine Cylinders. Chlorine Institute. (Sept. 2013). New York, NY: The Chlorine Institute. [DVD + pamphlet]

How to Use the Chlorine Institute Emergency Kit "B" for Chlorine Ton Containers. New Chlorine Institute. (Dec. 2013). York, NY: The Chlorine Institute. [DVD + pamphlet]

How to Use the Chlorine Institute Emergency Kit "C" for Chlorine Tank Cars and Tank Trucks. Chlorine Institute. (Feb. 2014). New York, NY: The Chlorine Institute. [DVD + pamphlet]

Intermodal Containers. Noll, G. G., Hildebrand, M. S., & Donahue, M. L. (2002). [DVD]
Edgartown, MA: Emergency Film Group.

Petroleum Storage Tanks. Hildebrand, M. S., & Noll, G. G. (2003). [DVD] Edgartown, MA:
Emergency Film Group.

**CHAPTER 6
SECTION 604
HAZARDOUS MATERIALS TECHNICIAN
CURRICULUM OUTLINE**

SECTION	SUBJECT	RECOMMENDED HOURS
604-7.1	General - Introduction - Laws, Regulations, and National Consensus Standards	4
604-7.2	Analyze the Incident	24
604-7.3	Response Planning	24
604-7.4	Action Plan Implementation	16
604-7.5	Evaluating and Reporting	6
604-7.6	Terminating the Incident	6
	TOTAL RECOMMENDED HOURS	80

The recommended hours include time for skills evaluation and are based on 12 students. Hours needed depend on the actual number of students.

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Course Instructor Information
Hazardous Materials
Technician

Overview

The Hazardous Materials curricula are designed to provide clear guidance that ensures adequate presentation of the information required to meet the Job Performance Requirements (JPRs) of National Fire Protection Association (NFPA) 1072, *Standard for Hazardous Materials/Weapons of Mass Destruction Emergency Response Personnel Professional Qualifications*, 2017 edition.

The Hazardous Materials curricula is found in Chapter 6 of the TCFP Curriculum Manual.

Certification Level	TCFP Section Number	NFPA 1072 Chapter
Awareness	601	4
Operations	602	5
Operations-Mission Specific Competencies (MSC)	603	6
*Technician	604	7
*Incident Commander	605	8

Layout

The NFPA numbering sequence is mirrored to allow easy correlation between this document and the NFPA Standard. For example, 601-4.1.2 identifies the section in Awareness that corresponds to NFPA section 4.1.2.

When a section references information from “Annex A Explanatory Material” in the NFPA Standard, it is identified by a boxed Instructor Note. For example, the boxed Instructor Note listed in 601-4.2.1 and that immediately follows the Requisite Knowledge section corresponds to the NFPA Annex A information for NFPA 1072 section 4.2.1.

* Asterisks by Technician and Incident Commander above indicate that both are voluntary (non-mandatory) certifications. Therefore, **a formal “curriculum outline” is not provided**. Please use chapters 7 and 8, respectively, of NFPA 1072 as a guide when creating your own course curricula or selecting a prepared instructional curriculum package from a publisher/vendor for Technician and Incident Commander.

TCFP Standards Manual

It is critical that you review the chapters in the TCFP Standards Manual that apply to this curriculum. Of primary importance are the following two chapters: Chapter 423, which defines the course of study, documentation, and medical requirements necessary

for Awareness and Operations certification (required) and Chapter 453, which covers certification requirements for Technician and Incident Commander (voluntary). Additionally, instructors are expected to review the following chapters as they pertain to the instructional, examination, certification processes:

- Chapter 421, Standards for Certification
- Chapter 427, Training Facility Certification
- Chapter 435, Fire Fighter Safety
- Chapter 437, Fees
- Chapter 439, Examinations for Certification
- Chapter 441, Continuing Education

These chapters do not address every issue that could impact this curriculum; therefore, you are encouraged to become familiar with the TCFP Standards Manual.

Instructor Qualifications

Hazardous Materials courses must be taught by an instructor meeting the requirements described in Chapter 427.307 of the TCFP Standards Manual.

Supplemental Information

Instructors are expected to provide supplemental information if the main reference text does not provide adequate information to ensure successful completion of the Job Performance Requirements as listed in the curriculum.

Components of the Curricula

Each section of a curriculum identifies the NFPA Job Performance Requirement (JPR) and subdivides the requisite knowledge requirements into learning components. For example:

View within the Curriculum	Explanation
<p>601-4.3.1 Isolate the hazard area and deny entry at a hazardous materials/WMD incident, given a hazardous materials/WMD incident, policies and procedures, and approved reference sources, so that the hazard area is isolated and secured, personal safety procedures are followed, hazards are avoided or minimized, and additional people are not exposed to further harm.</p>	<p>Section Number and NFPA JPR</p>
<p>Requisite Knowledge: Use of the ERG, SDS, shipping papers with emergency response information, and other approved reference sources to identify precautions to be taken to</p>	<p>Requisite Knowledge Statement</p>

<p>protect responders and the public; policies and procedures for isolating the hazard area and denying entry; and the purpose of and methods for isolating the hazard area and denying entry.</p>	
<p>(1) Use of the ERG, SDS, shipping papers with emergency response information, and other approved reference sources to identify precautions to be taken to protect responders and the public</p>	<p>First part of Requisite Knowledge</p>
<p>Identify precautions to be taken to protect responders/the public using ERG, SDS, shipping papers with emergency response information, other approved reference sources</p> <p>Identify the hazard</p> <ol style="list-style-type: none"> a. Isolate the hazard area b. Deny entry c. Call for trained personnel d. Secure the scene 	<p>Associated learning components</p>
<p>(2) Policies and procedures for isolating the hazard area and denying entry</p>	<p>Second part of Requisite Knowledge</p>
<p>Policies and procedures, per AHJ/SOP</p> <ol style="list-style-type: none"> a. Isolating the hazard area b. Denying entry 	<p>Associated learning components</p>
<p>(3) And the purpose of and methods for isolating the hazard area and denying entry</p>	<p>Third part of Requisite Knowledge</p>
<p>Purpose/methods</p> <ol style="list-style-type: none"> a. Isolating the hazard area <ol style="list-style-type: none"> i. Establish perimeter ii. Erect barriers b. Denying entry <ol style="list-style-type: none"> i. Restrict hazard area access to 	<p>Associated learning components</p>

<p>appropriately trained personnel only</p> <p>ii. Maintain perimeter</p>		
<p>Requisite Skills: Use of the ERG, SDS, shipping papers with emergency response</p>		<p>Requisite Skills Statement</p>
	<p>Instructor Note</p> <p>Recommended precautions found on numbered guides in the ERG include public safety issues; recommended protective clothing; evacuation; emergency response to fire, spill, and leak; and first aid sections.</p> <p>Examples of required knowledge include (1) precautions for providing emergency medical care to victims; typical ignition sources; ways hazardous materials/WMD are harmful to people, the environment, and property; general routes of entry for human exposure; emergency action (fire, spill, or leak; first aid); actions recommended not to be performed (e.g., closing of pipeline valves); protective actions (isolation of area and denial of entry, evacuation, shelter-in-place); size and shape of recommended initial isolation and protective action distances; difference between small and large spills; conditions that require the use of the ERG Table of Initial Isolation and Protective Action Distances and the isolation distances in the ERG numbered guide; techniques for isolating the hazard area and denying entry to unauthorized persons; how to recognize and protect evidence; and use of approved tools and equipment; (2) basic personal protective actions: staying clear of vapors, fumes, smoke, and spills; keeping vehicle at a safe distance from the scene; approaching from upwind, uphill, and upstream; and (3) types of protective actions and their purpose (e.g., isolate hazard area and deny entry, evacuation, and shelter-in-place); basic factors involved in the choice of protective actions (e.g., hazardous materials/WMD involved, population threatened,</p>	<p>Appendix A: Explanatory Material for 4.3.1</p>

	and weather conditions).	
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Unless otherwise specified, all curriculum references are to NFPA 1072. In some cases, (see, for example, 601-4.2.1), reference is also made under the section number and JPR to similar material in NFPA 472.

601-4.2.1	<p>Recognize and identify the hazardous materials/WMD and hazards involved in a hazardous materials/WMD incident, given a hazardous materials/WMD incident, and approved reference sources, so that the presence of hazardous materials/WMD is recognized and the materials and their hazards are identified.</p> <p style="padding-left: 40px;">Given a hazardous materials/WMD incident, and approved reference sources, awareness level personnel shall recognize those situations where hazardous materials/WMD are present. (472-4.2.1)</p>	<p>Additional reference to NFPA 472</p>
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Skills

NFPA Requisite Skill requirements are addressed in the corresponding Skill Sheets in Chapter 6 of the TCFP Curriculum Skills Manual.

Definitions of Certification Levels

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/WMD, protect themselves, call for trained personnel, and secure the scene. These personnel have met all the performance requirements of Chapter 4 of NFPA 1072, *Standard for Hazardous Materials/Weapons of Mass Destruction Emergency Response Personnel Professional Qualifications*

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those operations level responders designated by the authority having jurisdiction (AHJ) to perform additional tasks to support the AHJ's response mission, expected tasks, equipment, and training in the following areas:

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- (2) Mass decontamination
- (3) Technical decontamination
- (4) Evidence preservation and sampling
- (5) Product control
- (6) Detection, monitoring, and public safety sampling
- (7) Victim rescue and recovery
- (8) Illicit laboratories incidents

These personnel have met all the performance requirements of Chapter 5 of NFPA 1072, *Standard for Hazardous Materials/Weapons of Mass Destruction Emergency Response Personnel Professional Qualifications* and have also met the performance requirements of the subchapter(s) of Chapter 6 of NFPA 1072, *Standard for Hazardous Materials/Weapons of Mass Destruction Emergency Response Personnel Professional Qualifications*, to which they are trained and credentialed to perform.

Note: Basic TCFP Structural Fire Fighter certification requires that Structure Fire Fighter personnel meet all performance requirements for:

- *Hazardous Materials Awareness*
- *Hazardous Materials Operations*
- *Hazardous Materials Operations - MSC – 6.2 Personal Protective Equipment*
- *Hazardous Materials Operations - MSC – 6.6 Product Control*

Technician Level Personnel: Persons who respond 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, evaluate progress of the planned response, and assist in terminating the incident. These personnel have met all the performance requirements of Chapter 7 of NFPA 1072, *Standard for Hazardous Materials/Weapons of Mass Destruction Emergency Response Personnel Professional Qualifications*.

Incident Commander Level Personnel: That person, designated by the AHJ, responsible for all incident activities/operations, including the development of strategies and tactics and the ordering and release of resources. These personnel have met all the performance requirements of Chapter 8 of NFPA 1072, *Standard for Hazardous Materials/Weapons of Mass Destruction Emergency Response Personnel Professional Qualifications*.

CERTIFICATION CURRICULUM MANUAL – CHAPTER SIX

HAZARDOUS MATERIALS INCIDENT COMMANDER

REFERENCE LIST FOR THE HAZARDOUS MATERIALS INCIDENT COMMANDER CURRICULUM

This Reference List is provided as a general guide for both instructors and students to locate information pertaining to the specific objectives in the TCFP Curriculum. This list is **not** all-inclusive and does not in any way limit TCFP development and use of questions to test the objectives of the curriculum:

Required References

Texts

Certification Curriculum Manual. Texas Commission on Fire Protection. (Most current edition). Austin, TX: Texas Commission on Fire Protection.

Code of Federal Regulations, Title 29 Part 1910.120, Appendix A. United States. U.S. Department of Labor, Occupational Safety & Health Administration.
http://edocket.access.gpo.gov/cfr_2007/julqtr/pdf/29cfr1910.120.pdf

Emergency Response Guidebook. United States. (Most current edition). Washington, DC: U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration.

Hazardous Materials Awareness and Operations, 3rd Edition. Schnepf (2019). Sudbury, MA: Jones & Bartlett.

Hazardous Materials for First Responders, 5th edition (2017). Stillwater, OK: Fire Protection Publications, Oklahoma State University.

Hazardous Materials: Managing the Incident. Chester Noll, G. G., Hildebrand, M. S., Rudner, G., & Schnepf, R. (2014). Burlington, MA: Jones & Bartlett.

Hazardous Materials/Weapons of Mass Destruction Response Handbook. McGowan, T. (2018). Quincy, MA: National Fire Protection Association.

NFPA 472: Standard for Competence of Responders to Hazardous Materials Incidents/Weapons of Mass Destruction. (2018 ed.). Quincy, MA: NFPA Publications. National Fire Protection Association

NIOSH Pocket Guide to Chemical Hazards. Cincinnati National Institute for Occupational Safety and Health. (Most current edition). OH: US Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health. <http://www.cdc.gov/niosh/npg/>

Standards Manual for Fire Protection Personnel. Texas Commission on Fire Protection. (Most current edition). Austin, TX: Texas Commission on Fire Protection.

Recommended References

The most current edition of the following publications and media are recommended (not required) supplemental material for program use.

Texts

Bretherick's Handbook of Reactive Chemical Hazards. Urben, P. G., Pitt, M. J., & Bretherick, L. (2007). Amsterdam: Elsevier.

Chlorine Emergencies: An Overview for First Responders. Chlorine Institute. (2007). Arlington, VA: The Chlorine Institute.

CHRIS: Chemical Hazards Response Information System. United States. (1992). COMDTINST, M16465.11B. Washington, DC: U.S. Dept. of Transportation, U.S. Coast Guard.

Dangerous Properties of Industrial and Consumer Chemicals. Cheremisinoff, N. P., King, J. A., & Boyko, R. (1994). New York, NY: M. Dekker.

Emergency Care for Hazardous Materials Exposure. Currance, P., Bronstein, A. C., & Clements, B. (2005). St. Louis, MO: Mosby.

Emergency Handling of Hazardous Materials in Surface Transportation. Association of American Railroads. (2009). Washington, DC: Association of American Railroads.

Fire Protection Guide to Hazardous Materials. National Fire Protection Association. (2001). Quincy, MA: National Fire Protection Association.

Hazardous Materials: Managing the Incident: Field Operations Guide. Chester Bevelacqua, A. S., Hildebrand, M. S., & Noll, G. G. (2007). MD: Red Hat Publishing, Inc.

Hawley's Condensed Chemical Dictionary. Lewis, R. J., & Hawley, G. G. (2007). West Sussex, England: Wiley.

Symbol Seeker: Hazard Identification Manual. Burns, P. P. (2002). Preston, England: Symbol Seeker.

Media

Hazardous Materials Containment Series. Action Training Systems. [4 Disc DVD Set]. Hazardous materials containment - series of 4 titles. Seattle, WA: Action Training Systems.

Hazardous Materials: Managing the Incident DVD Series. Massingham, G., Noll, G. G., Hildebrand, M. S., & Noll, G. G. (2005). [8 Disc DVD Set]. Edgartown, MA: Emergency Film Group.

**CHAPTER 6
SECTION 605
HAZARDOUS MATERIALS INCIDENT COMMANDER
CURRICULUM OUTLINE**

SECTION	SUBJECT	RECOMMENDED HOURS
605-8.1	General - Introduction - Laws, Regulations, and National Consensus Standards	1
605-8.2	Analyze the Incident	4
605-8.3	Plan the Response	9
605-8.4	Implement the Incident Action Plan (IAP)	4
605-8.5	Evaluate Progress and Adjust IAP	2
605-8.6	Termination	4
	TOTAL RECOMMENDED HOURS	24

The recommended hours include time for skills evaluation and are based on 12 students. Hours needed depend on the actual number of students.

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Course Instructor Information
Hazardous Materials
Incident Commander

Overview

The Hazardous Materials curricula are designed to provide clear guidance that ensures adequate presentation of the information required to meet the Job Performance Requirements (JPRs) of National Fire Protection Association (NFPA) 1072, *Standard for Hazardous Materials/Weapons of Mass Destruction Emergency Response Personnel Professional Qualifications*, 2017 edition.

The Hazardous Materials curricula is found in Chapter 6 of the TCFP Curriculum Manual.

Certification Level	TCFP Section Number	NFPA 1072 Chapter
Awareness	601	4
Operations	602	5
Operations-Mission Specific Competencies (MSC)	603	6
*Technician	604	7
*Incident Commander	605	8

Layout

The NFPA numbering sequence is mirrored to allow easy correlation between this document and the NFPA Standard. For example, 601-4.1.2 identifies the section in Awareness that corresponds to NFPA section 4.1.2.

When a section references information from “Annex A Explanatory Material” in the NFPA Standard, it is identified by a boxed Instructor Note. For example, the boxed Instructor Note listed in 601-4.2.1 and that immediately follows the Requisite Knowledge section corresponds to the NFPA Annex A information for NFPA 1072 section 4.2.1.

* Asterisks by Technician and Incident Commander above indicate that both are voluntary (non-mandatory) certifications. Therefore, **a formal “curriculum outline” is not provided**. Please use chapters 7 and 8, respectively, of NFPA 1072 as a guide when creating your own course curricula or selecting a prepared instructional curriculum package from a publisher/vendor for Technician and Incident Commander.

TCFP Standards Manual

It is critical that you review the chapters in the TCFP Standards Manual that apply to this curriculum. Of primary importance are the following two chapters: Chapter 423, which defines the course of study, documentation, and medical requirements necessary

for Awareness and Operations certification (required) and Chapter 453, which covers certification requirements for Technician and Incident Commander (voluntary). Additionally, instructors are expected to review the following chapters as they pertain to the instructional, examination, certification processes:

- Chapter 421, Standards for Certification
- Chapter 427, Training Facility Certification
- Chapter 435, Fire Fighter Safety
- Chapter 437, Fees
- Chapter 439, Examinations for Certification
- Chapter 441, Continuing Education

These chapters do not address every issue that could impact this curriculum; therefore, you are encouraged to become familiar with the TCFP Standards Manual.

Instructor Qualifications

Hazardous Materials courses must be taught by an instructor meeting the requirements described in Chapter 427.307 of the TCFP Standards Manual.

Supplemental Information

Instructors are expected to provide supplemental information if the main reference text does not provide adequate information to ensure successful completion of the Job Performance Requirements as listed in the curriculum.

Components of the Curricula

Each section of a curriculum identifies the NFPA Job Performance Requirement (JPR) and subdivides the requisite knowledge requirements into learning components. For example:

View within the Curriculum	Explanation
<p>601-4.3.1 Isolate the hazard area and deny entry at a hazardous materials/WMD incident, given a hazardous materials/WMD incident, policies and procedures, and approved reference sources, so that the hazard area is isolated and secured, personal safety procedures are followed, hazards are avoided or minimized, and additional people are not exposed to further harm.</p>	<p>Section Number and NFPA JPR</p>
<p>Requisite Knowledge: Use of the ERG, SDS, shipping papers with emergency response information, and other approved reference sources to identify precautions to be taken to</p>	<p>Requisite Knowledge Statement</p>

<p>protect responders and the public; policies and procedures for isolating the hazard area and denying entry; and the purpose of and methods for isolating the hazard area and denying entry.</p>	
<p>(1) Use of the ERG, SDS, shipping papers with emergency response information, and other approved reference sources to identify precautions to be taken to protect responders and the public</p>	<p>First part of Requisite Knowledge</p>
<p>Identify precautions to be taken to protect responders/the public using ERG, SDS, shipping papers with emergency response information, other approved reference sources</p> <p>Identify the hazard</p> <ul style="list-style-type: none"> a. Isolate the hazard area b. Deny entry c. Call for trained personnel d. Secure the scene 	<p>Associated learning components</p>
<p>(2) Policies and procedures for isolating the hazard area and denying entry</p>	<p>Second part of Requisite Knowledge</p>
<p>Policies and procedures, per AHJ/SOP</p> <ul style="list-style-type: none"> a. Isolating the hazard area b. Denying entry 	<p>Associated learning components</p>
<p>(3) And the purpose of and methods for isolating the hazard area and denying entry</p>	<p>Third part of Requisite Knowledge</p>
<p>Purpose/methods</p> <ul style="list-style-type: none"> a. Isolating the hazard area <ul style="list-style-type: none"> i. Establish perimeter ii. Erect barriers b. Denying entry <ul style="list-style-type: none"> i. Restrict hazard area access to 	<p>Associated learning components</p>

<p style="text-align: center;">appropriately trained personnel only</p> <p>ii. Maintain perimeter</p>	
<p>Requisite Skills: Use of the ERG, SDS, shipping papers with emergency response</p>	<p>Requisite Skills Statement</p>
<p>Instructor Note</p> <p>Recommended precautions found on numbered guides in the ERG include public safety issues; recommended protective clothing; evacuation; emergency response to fire, spill, and leak; and first aid sections.</p> <p>Examples of required knowledge include (1) precautions for providing emergency medical care to victims; typical ignition sources; ways hazardous materials/WMD are harmful to people, the environment, and property; general routes of entry for human exposure; emergency action (fire, spill, or leak; first aid); actions recommended not to be performed (e.g., closing of pipeline valves); protective actions (isolation of area and denial of entry, evacuation, shelter-in-place); size and shape of recommended initial isolation and protective action distances; difference between small and large spills; conditions that require the use of the ERG Table of Initial Isolation and Protective Action Distances and the isolation distances in the ERG numbered guide; techniques for isolating the hazard area and denying entry to unauthorized persons; how to recognize and protect evidence; and use of approved tools and equipment; (2) basic personal protective actions: staying clear of vapors, fumes, smoke, and spills; keeping vehicle at a safe distance from the scene; approaching from upwind, uphill, and upstream; and (3) types of protective actions and their purpose (e.g., isolate hazard area and deny entry, evacuation, and shelter-in-place); basic factors involved in the choice of protective actions (e.g., hazardous materials/WMD involved, population threatened,</p>	<p>Appendix A: Explanatory Material for 4.3.1</p>

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