

Hazardous Materials and Terrorist Incident Response Curriculum Guidelines

Haz Mat Technician

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Introduction

Hazardous materials technicians shall be trained to meet all requirements of the first responder at the awareness and operations level and the technician level of emergency hazardous materials response. In addition, technicians shall meet the training requirements and be provided medical surveillance in accordance with requirements of OSHA, local occupational health and safety regulatory agencies, or EPA, as appropriate for their jurisdiction.

Definition

Technicians are those persons who respond to releases or potential releases of hazardous materials for the purpose of controlling the release. They are more aggressive than first responders at the operations level in that they will approach the point of release to plug, patch, or otherwise stop the release of a hazardous materials substance. They are expected to use specialized chemical protective clothing and specialized control equipment.

Training Audience

Technicians typically are members of hazardous materials response teams, which consist of specifically trained personnel who respond to hazardous materials incidents. The teams perform various response actions including assessment, firefighting, rescue, and containment; they are not responsible for cleanup operations following the incidents. Technicians are employed by various public and private organizations including fire or emergency medical services, law enforcement, public health, utilities, manufacturers, and contractors. By definition, technicians must be well versed in a wide variety of topics. They are expected to respond to most kinds of hazardous materials incidents that would occur in their jurisdictions. Therefore, training managers should be careful not to make this broad-based training too specialized. A community's analysis may suggest modifications. Emphasis should be placed on the most prevalent types of chemicals and incidents.

Equipment, Facilities, and Resources

Hazardous materials technician training requires both classroom and hands-on workspace as well as reference materials, equipment, and props. Consideration must be given to class size, weather conditions, number of instructors or evaluators, and available equipment and props. Because of the time involved in demonstration and performance activities, class size must be limited. A reasonable student-to-teacher ratio is 30:1 for lecture and 10:1 for hands-on activities, although some blocks of instruction (such as work with live chemicals) may require a 5:1 ratio. Extreme cold or heat will affect outdoor activities involving protective clothing, chemicals, and props. If outdoor exercises involving chemical protective clothing or actual chemicals are to be conducted, neighboring residences and facilities must be considered and notified. Arrangements for secured storage must be made to handle the expensive equipment that will have to be located near the classroom and work area.

Methodology Recommendations

Hazardous materials technician training is best conducted with a combination of classroom instruction using traditional lecture and small-group activities, field exercises involving group practice in simulated emergencies, and hands-on skill training in doing actual control, confinement, and containment exercises. Typically, training ranges from 40 to 240 hours. There should be a strong emphasis on hands-on practice and incident decision-making. Content instruction should be synthesized in student activities requiring analysis of incident information to determine plans of action. Skill training should be performed on actual containers with simulated releases, using full protective equipment and proper response tools. Skill training should include instructor modeling, student walk-throughs, and student practice under stress until competency is achieved. Proper critiques and corrective instruction are essential.

Refresher training should include (1) competency retesting of all response skills, (2) technical information updates, and (3) critique of incident scene decision-making using simulated emergencies

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Summary: Hazardous Materials Technician

Audience:	Narrow. Prospective hazardous materials team members and others who are designated in response plans as a general resource to perform advanced defensive/ offensive operations at all anticipated hazardous materials emergencies.
Pre-Req:	1. First Responder Awareness training. 2. First Responder Operations training (min. 24 hours required).
Training:	<ul style="list-style-type: none">• 40-240 hours.• Classroom and simulator/field instruction, with emphasis on hands-on training.• Competencies:<ul style="list-style-type: none">• Knowledge of role of technician within incident command system and responsibilities within employer's emergency response plan.• Knowledge of hazardous materials terminology, behavior, and ability to perform advanced hazard and risk assessment using field survey instruments and equipment.• Ability to perform advanced control, containment and/or confinement techniques.• Ability to select and use specialized personal protective equipment.• Ability to implement decontamination procedures.• Knowledge of termination procedures.
Refresher:	<ul style="list-style-type: none">• Competency retesting of all response skills.• Technical information updates.• Incident scene decision-making using simulated emergencies.

Required Training Objectives

Required Training is specified in the OSHA regulations listed above. For the convenience of course assessment, the requirements are translated directly into the following nine sample principal objectives.

OSHA TECH - A	Given a simulated incident involving hazardous materials, demonstrate implementation of the employer's emergency response plan.
OSHA TECH - B	Using field survey instruments and equipment, classify, identify, and verify known and unknown hazardous materials.
OSHA TECH - C	Given a simulated incident involving hazardous materials, demonstrate functioning within an assigned role in the incident command system.
OSHA TECH - D	Given a simulated incident involving hazardous materials, select and demonstrate use of proper specialized chemical personal protective equipment provided to the hazardous materials technician.
OSHA TECH - E	Identify hazard and risk assessment techniques.
OSHA TECH - F	Given simulated incidents involving different hazardous materials containers and releases, demonstrate advanced control, containment, and/or confinement operations.
OSHA TECH - G	Given a simulated incident involving hazardous materials, identify and demonstrate decontamination procedures.
OSHA TECH - H	List and describe hazardous materials incident termination procedures.
OSHA TECH - I	Define basic chemical and toxicological terms and describe basic chemical and toxicological behavior.

Federal Requirements for Hazardous Materials Technician Training

OSHA establishes the following training requirements for hazardous materials technicians. Methods of testing are not specified. Technicians shall have awareness training and operations training (for a minimum of 24 hours) and training at the technician level. Employers are required to ensure that employees demonstrate competency in the skills defined.

Hazardous materials technicians are individuals who respond to releases or potential releases for the purpose of stopping the release. They assume a more aggressive role than a first responder at the operations level in that they will approach the point of release in order to plug, patch, or otherwise stop the release of a hazardous substance. Hazardous materials technicians shall have received at least 24 hours of training equal to the first responder operations level and in addition have competency in the following area and the employer shall so certify:

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- (A) *Know how to implement the employer's emergency response plan*
- (B) *Know the classification, identification and verification of known and unknown materials by using field survey instruments and equipment*
- (C) *Be able to function within an assigned role in the Incident Command System*
- (D) *Know how to select and use proper specialized chemical personal protective equipment provided to the hazardous materials technician*
- (E) *Understand hazard and risk assessment techniques*
- (F) *Be able to perform advance control, containment, and/or confinement operations within the capabilities of the resources and personal protective equipment available with the unit*
- (G) *Understand and implement decontamination procedures*
- (H) *Understand termination procedures*
- (I) *Understand basic chemical and toxicological terminology and behavior*

OSHA CFR 1910.120 (q)(6)(iii)

Chemical protective clothing. Chemical protective clothing and equipment to be used by organized and designated HAZMAT team members, or to be used by hazardous materials specialists, shall meet the requirements of paragraphs (g)(3) through (5) of this section.

OSHA 29 CFR 1910.120(q)(10)

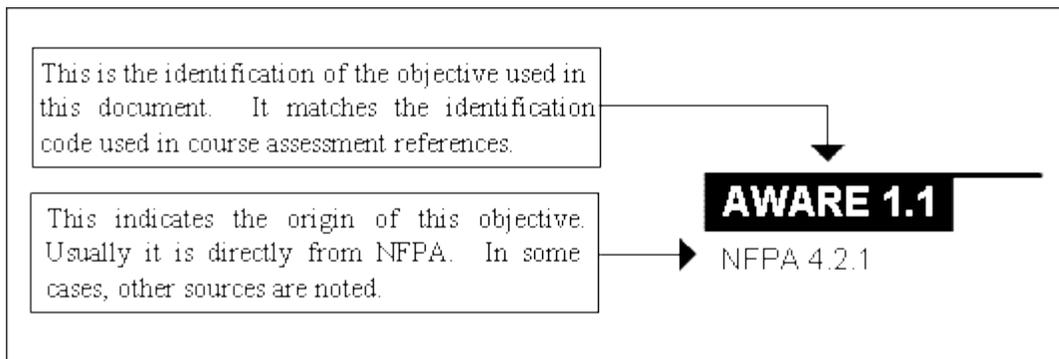
OSHA minimum requirement=24 hours Operations training + Technician training

Recommended Training Objectives

The following training objectives are recommended for hazardous materials technician training. The primary source for this material is NFPA 472, Chapter 7: Hazardous Materials Technician. Training objectives from other sources are noted, with discussion of the rationale for their inclusion to be found in the Special Topics section at the end of the Response Guidelines.

In general, these objectives compare in scope to those minimally required by OSHA. They do not constitute an increased level of training, but rather provide greater depth of definition of student objectives. To assist in assessing course compliance with OSHA 1910.120(q), the relationships between these objectives and the OSHA requirements are noted. References to OSHA 29 CFR 1910.120(q)(6)(iii)(A to I) are abbreviated as OSHA TECH-A to I.

Objective Identification Legend



Haz Mat Technician 1. - Analyzing the Incident

TECH - 1.1. Given a hazardous materials incident scenario, demonstrate an understanding of the role of the hazardous materials technician.

NFPA 7.1.2.2
OSHA TECH-A,B,E

TECH - 1.1.1. Describe the responsibility to analyze the hazardous materials incident and determine the magnitude of the problem in terms of outcomes, and be able to do the following:

NFPA 7.1.2.2 (1)
OSHA TECH B,E,I

TECH - 1.1.1.1. ... (a) Identify the responsibility to survey the hazardous materials incident to identify special containers involved, to identify or classify unknown materials, and to verify the presence and concentrations of hazardous materials through the use of monitoring equipment

NFPA 7.1.2.2 (1) a
OSHA TECH B,E,I

TECH - 1.1.1.2. ... (b) Identify the responsibility to collect and interpret hazard and response information from printed resources, technical resources, computer data bases, and monitoring equipment.

NFPA 7.1.2.2 (1) b
OSHA TECH B,E,I

TECH - 1.1.1.3. ... (c) Identify the responsibility to determine the extent of damage to containers.

NFPA 7.1.2.2 (1) c
OSHA TECH B,E,I

TECH - 1.1.1.4. ... (d) Identify the responsibility to predict the likely behavior of released materials and their containers when multiple materials are involved.

NFPA 7.1.2.2 (1) d
OSHA TECH B,E,I

TECH - 1.1.1.5. ... (e) Identify the responsibility to estimate the size of an endangered area using computer modeling, monitoring equipment, or specialists in this field.

NFPA 7.1.2.2 (1) e
OSHA TECH B,E,I

TECH - 1.1.2. Describe the responsibility to plan a response within the capabilities of available personnel, personal protective equipment, and control equipment, and be able to do the following:

NFPA 7.1.2.2 (2)
OSHA TECH A,
B,C,D,E

TECH - 1.1.2.1. ... (a) Identify the response objectives for hazardous materials incidents.

NFPA 7.1.2.2 (2) a
OSHA TECH A,
B,C,D,E

TECH - 1.1.2.2.

NFPA 7.1.2.2 (2) b
OSHA TECH A,
B,C,D,E

...(b) Identify the potential action options available by response objective

TECH - 1.1.2.3.

NFPA 7.1.2.2 (2) c
OSHA TECH A,
B,C,D,E

...(c) Identify the responsibility to select the personal protective equipment required for a given action option.

TECH - 1.1.2.4.

NFPA 7.1.2.2 (2) d
OSHA TECH A,
B,C,D,E

...(d) Identify the responsibility to select the appropriate decontamination procedures.

TECH - 1.1.2.5.

NFPA 7.1.2.2 (2) e
OSHA TECH A,
B,C,D,E

...(e) Identify the responsibility to develop a plan of action, including safety considerations, consistent with the local emergency response plan and the organization's standard operating procedures, and within the capability of the available personnel, personal protective equipment, and control equipment.

TECH - 1.1.3.

NFPA 7.1.2.2 (3)
OSHA TECH D,F,G,H

Describe the responsibility to implement the planned response to favorably change the outcomes consistent with the organization's standard operating procedures and safety considerations, and be able to do the following:

TECH - 1.1.3.1.

NFPA 7.1.2.2 (3) a
OSHA TECH D,F,G,H

...(a) Identify the responsibility to perform the duties of an assigned hazardous materials branch position within the local incident management system (IMS).

TECH - 1.1.3.2.

NFPA 7.1.2.2 (3) b
OSHA TECH D,F,G,H

...(b) Identify the responsibility to don, work in, and doff appropriate personal protective clothing, including, but not limited to, both liquid splash- and vapor-protective clothing with appropriate respiratory protection.

TECH - 1.1.3.3.

NFPA 7.1.2.2 (3) c
OSHA TECH D,F,G,H

...(c) Identify the responsibility to perform the control functions identified in the plan of action.

TECH - 1.1.4.

NFPA 7.1.2.2 (4)
OSHA TECH C,F

Describe the responsibility to evaluate the progress of the planned response by evaluating the effectiveness of the control functions.

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TECH - 1.1.5. Describe the responsibility to terminate the incident, and be able to do the following:
NFPA 7.1.2.2 (5)
OSHA TECH H

TECH - 1.1.5.1. ... (a) Identify the responsibility to assist in the incident debriefing.
NFPA 7.1.2.2 (5) a
OSHA TECH C,H

TECH - 1.1.5.2. ... (b) Identify the responsibility to assist in the incident critique.
NFPA 7.1.2.2 (5) b
OSHA TECH C,H

TECH - 1.1.5.3. ... (c) Identify the responsibility to provide reports and documentation of the incident.
NFPA 7.1.2.2 (5) c
OSHA TECH A,H

TECH - 1.2. **Surveying the Hazardous Materials/WMD Incidents**
NFPA 7.2.1
OSHA TECH B,E
Given examples of hazardous materials/WMD incidents, the hazardous materials technician shall identify containers involved and, given the necessary equipment, identify or classify unknown materials involved, verify the identity of the hazardous materials/WMD involved, determine the concentration of hazardous materials, and shall meet the requirements of 7.2.1.1 through 7.2.1.5

TECH - 1.2.1. Given examples of various containers for hazardous materials/WMD, the hazardous materials technician shall identify each container by name and specification and identify the typical contents by name and hazard class.
NFPA 7.2.1.1
OSHA TECH E

TECH - 1.2.1.1. Given examples of the following railroad cars, the hazardous materials technician shall identify the container by name and specification and identify the typical contents by name and hazard class:
NFPA 7.2.1.1.1
OSHA TECH E
Cryogenic liquid tank cars
Nonpressure tank cars
Pneumatically unloaded hopper cars
Pressure tank cars

TECH - 1.2.1.2.

NFPA 7.2.1.1.2
OSHA TECH E

Given examples of the following intermodal tanks, the hazardous materials technician shall identify the container by name and specification and identify the typical contents by name and hazard class:

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

TECH - 1.2.1.3.

NFPA 7.2.1.1.3
OSHA TECH B

Given examples of the following cargo tanks, the hazardous materials technician shall identify the container by name and specification and identify the typical contents by name and hazard class:

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

TECH - 1.2.1.4.

NFPA 7.2.1.1.4
OSHA TECH E

Given examples of the following facility storage tanks, the hazardous materials technician shall identify the container by name and identify the typical contents by name and hazard class:

1. Nonpressure tank
2. Pressure tank
3. Cryogenic liquid tank

TECH - 1.2.1.5.

NFPA 7.2.1.1.5
OSHA TECH E

Given examples of the following nonbulk packaging, the hazardous materials technician shall identify the package by name and identify the typical contents by name and hazard class:

1. Bags
2. Carboys
3. Cylinders
4. Drums

TECH - 1.2.1.6.

NFPA 7.2.1.1.6
OSHA TECH E

Given examples of the following radioactive materials packages, the hazardous materials technician shall identify the container/package by name and identify the typical contents by name:

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

<p>TECH - 1.2.2. NFPA 7.2.1.2 OSHA TECH E</p>	<p>Given three examples of facility and transportation containers, the hazardous materials technician shall identify the approximate capacity of each container.</p>
<p>TECH - 1.2.2.1. NFPA 7.2.1.2.1 OSHA TECH E</p>	<p>Using the markings on the container and other available resources, the hazardous materials technician shall identify the capacity (by weight and/or volume) of the following containers:</p> <ol style="list-style-type: none"> 1. Cargo tanks 2. Tank cars 3. Tank containers
<p>TECH - 1.2.2.2. NFPA 7.2.1.2.2 OSHA TECH E</p>	<p>Using the markings on the container and other available resources, the hazardous materials technician shall identify the capacity (by weight and/or volume) of each of the following facility containers:</p> <ol style="list-style-type: none"> 1. Nonpressure tank (general service or low pressure tank) 2. Pressure tank 3. Cryogenic liquid tank
<p>TECH - 1.2.3. NFPA 7.2.1.3 OSHA TECH B</p>	<p>Given at least three unknown hazardous materials/WMD, one of which is a solid, one a liquid, and one a gas, the hazardous materials technician shall identify or classify by hazard each unknown material.</p>
<p>TECH - 1.2.3.1. NFPA 7.2.1.3.1 OSHA TECH B</p>	<p>The hazardous materials technician shall identify the steps in an analysis process for identifying unknown solid and liquid materials.</p>
<p>TECH - 1.2.3.2. NFPA 7.2.1.3.2 OSHA TECH B</p>	<p>The hazardous materials technician shall identify the steps in an analysis process for identifying an unknown atmosphere.</p>
<p>TECH - 1.2.3.3. NFPA 7.2.1.3.3 OSHA TECH B</p>	<p>The hazardous materials technician shall identify the type(s) of monitoring technology used to determine the following hazards:</p> <ol style="list-style-type: none"> 1. Corrosivity 2. Oxidation potential 3. Oxygen deficiency 4. Radioactivity 5. Toxicity 6. Pathogenicity

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TECH - 1.2.3.4.

NFPA 7.2.1.3.4
OSHA TECH B

The hazardous materials technician shall identify the capabilities and limiting factors associated with the selection and use of the following monitoring equipment, test strips, and reagents:

1. Biological immunoassay indicators
2. Chemical agent monitors (CAM)
3. Colorimetric indicators [colorimetric detector tubes, indicating paper (pH paper and meters), reagents, test strips]
4. Combustible gas indicators
5. DNA fluoroscopy
6. Electrochemical cells (carbon monoxide meter, oxygen meter)
7. Flame ionization detector
8. Gas chromatograph/mass spectrometer (GC/MS)
9. Infrared spectroscopy
10. Ion mobility spectroscopy
11. Mass channel analyzer
12. Metal oxide sensor
13. Photoionization detectors
14. Polymerase chain reaction (PCR)
15. Radiation detection and measurement instruments
16. Raman spectroscopy
17. Surface acoustical wave (SAW)
18. Wet chemistry

TECH - 1.2.3.5.

NFPA 7.2.1.3.5
OSHA TECH B

Given three hazardous materials/WMD, one of which is a solid, one a liquid, and one a gas, and the following monitoring equipment, test strips, and reagents, the hazardous materials technician shall select the equipment and demonstrate the correct techniques to identify the hazards (corrosivity, flammability, oxidation potential, oxygen deficiency, radioactivity, toxicity, and pathogenicity) using the following equipment:

1. Carbon monoxide meter
2. Colorimetric tubes
3. Combustible gas indicator
4. Oxygen meter
5. Passive dosimeters
6. pH indicators and/or pH meters
7. Photoionization and/or flame ionization detectors
8. Radiation detection instruments
9. Reagents
10. Test Strips
11. WMD detectors (chemical and biological)
12. Other equipment provided by the AHJ

TECH - 1.2.3.6.

NFPA 7.2.1.3.6
OSHA TECH B

Given monitoring equipment, test strips, and reagents provided by the AHJ, the hazardous materials technician shall demonstrate the field maintenance and testing procedures for these items.

TECH - 1.2.4. Given a label for a radioactive material, the hazardous materials technician shall identify the type or category of label, contents, activity, transport index, and criticality safety index as applicable, then describe the radiation dose rates associated with each label.
 NFPA 7.2.1.4
 OSHA TECH B

TECH - 1.2.5. The hazardous materials technician shall demonstrate a method for collecting samples of the following:
 NFPA 7.2.1.5
 OSHA TECH B

1. Gas
2. Liquid
3. Solid

TECH - 1.3. **Collecting and Interpreting Hazard and Response Information**
 NFPA 7.2.2
 OSHA TECH B,E

Given access to printed resources, technical resources, computer databases, and monitoring equipment, the hazardous materials technician shall collect and interpret hazard and response information not available from the current edition of the Emergency Response Guidebook or a (MSDS), and shall meet the requirements of 7.2.2.1 through 7.2.2.6.

TECH - 1.3.1. The hazardous materials technician shall identify and interpret the types of hazard and response information available from each of the following resources and explain the advantages and disadvantages of each resource:
 NFPA 7.2.2.1
 OSHA TECH B,E

1. Hazardous materials databases
2. Monitoring equipment
3. Reference manuals
4. Technical information centers (i.e., CHEMTREC/CANUTEC/SETIQ) (5) Technical information centers (i.e., CHEMTREC/CANUTEC/SETIQ)
5. Technical information specialists

TECH - 1.3.2. The hazardous materials technician shall describe terms related to chemistry and toxicity terms (ref. NFPA 7.2.2.2) and explain their significance in the risk assessment process:
 NFPA 7.2.2.2
 OSHA TECH ,E

TECH - 1.3.3. The hazardous materials technician shall describe the heat transfer processes that occur as a result of a cryogenic liquid spill.
 NFPA 7.2.2.3
 OSHA TECH ,E

TECH - 1.3.4. Given five hazardous materials/WMD scenarios and the associated reference materials, the hazardous materials technician shall identify the signs and symptoms of exposure to each material and the target organ effects of exposure to that material.
 NFPA 7.2.2.4
 OSHA TECH ,E

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TECH - 1.3.5.

NFPA 7.2.2.5
OSHA TECH ,E

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

TECH - 1.3.6.

NFPA 7.2.2.6
OSHA TECH B,E

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

TECH - 1.4.

NFPA 7.2.3
OSHA TECH ,E

Describing the Condition of the Container Involved in the Incident
Given examples of container damage, the hazardous materials technician shall describe the damage and shall meet the related requirements of 7.2.3.1 through 7.2.3.5.

TECH - 1.4.1.

NFPA 7.2.3.1
OSHA TECH ,E

Given three examples of containers, including the DOT specification markings for nonbulk and bulk packaging, and the associated reference guide, identify the basic design and construction features of each container.

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TECH - 1.4.1.1.

NFPA 7.2.3.1.1
OSHA TECH ,E

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

1. Cargo tanks:
 - a. Compressed gas tube trailers
 - b. Corrosive liquid tanks
 - c. Cryogenic liquid tanks
 - d. Dry bulk cargo tanks
 - e. High-pressure chemical tanks
 - f. Low-pressure chemical tanks
 - g. Nonpressure liquid tanks
2. Fixed facility tanks:
 - a. Cryogenic liquid tank
 - b. Nonpressure tank
 - c. Pressure tank
3. Intermodal bulk containers (also known as tote tanks):
4. Intermodal tanks
 - a. Nonpressure intermodal tanks:
 - i. IM- 101 portable tank (IMO Type 1 Internationally)
 - ii. IM-102 portable tank (Imo Type 2 Internationally)
 - b. Pressure intermodal tanks (DOT Specification 51; IMO Type 5 Internationally)
 - c. Specialized intermodal tanks:
 - i. Cryogenic intermodal tanks (DOT Specification 51; IMO Type 7 Internationally)
 - ii. Tube modules
5. One-ton containers (pressure drums)
6. Pipelines
7. Railroad cars:
 - a. Cryogenic liquid tank cars
 - b. Nonpressure tank cars
 - c. Pneumatically unloaded hopper cars
 - d. Pressure tank cars

TECH - 1.4.1.2.

NFPA 7.2.3.1.2
OSHA TECH ,E

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

- Bags
- Carboys
- Drums
- Cylinders

TECH - 1.4.1.3.

NFPA 7.2.3.1.3
OSHA TECH ,E

Identify the basic design and construction features of the following radioactive materials containers:

- Expected
- Industrial
- Type A
- Type B
- Type C

TECH - 1.4.1.4.

NFPA 7.2.3.2

The hazardous materials technician shall identify the basic design features and testing requirements on the following radioactive materials packages.

TECH - 1.4.2.

NFPA 6.2.3.2
OSHA TECH ,E

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

TECH - 1.4.3.

NFPA 7.2.3.3
OSHA TECH ,E

Given an example of a pipeline, the hazardous materials technician shall identify the following:
Ownership of the line
Procedures for checking for gas migration
Procedure for shutting down the line or controlling the leak
Type of product in the line

TECH - 1.4.4.

NFPA 7.2.3.4
OSHA TECH ,E

Identify the types of damage that a pressure container could incur.

TECH - 1.4.5.

NFPA 7.2.3.5
OSHA TECH ,E

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

TECH - 1.5.

NFPA 7.2.4
OSHA TECH ,E

Predicting Likely Behavior of Materials and Their Containers When Multiple Materials are Involved

Given examples of hazardous materials/WMD incidents involving multiple hazardous materials or WMD, the hazardous materials technician shall predict the likely behavior of the material in each case and meet the requirements of 7.2.4.1 through 7.2.4.3.

TECH - 1.5.1.

NFPA 7.2.4.1
OSHA TECH ,E

The hazardous materials technician shall identify at least three resources available that indicate the effects of mixing various hazardous materials.

TECH - 1.5.2.

NFPA 7.2.4.2
OSHA TECH ,E

The hazardous materials technician shall identify the impact of the following fire and safety features on the behavior of the products during an incident at a bulk storage facility and explain their significance in the risk assessment process:

1. Fire protection systems
2. Monitoring and detection systems
3. Pressure relief and vacuum relief protection
4. Product spillage and control (impoundment and diking)
5. Tank spacing
6. Transfer operations

Response Training Considerations

Awareness

Operations
Core
Mission-Specific

Hazardous Materials Technician

Specialist Employee

Hazardous Materials Specialist

Incident Commander

Hazardous Materials Officer

Safety Officer

BLS Responder

ALS Responder

Hospital First Receiver

Appendix A: Related Standards

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Appendix C: Special Topics

TECH - 1.5.3.

NFPA 7.2.4.3
OSHA TECH ,E

The hazardous materials technician shall identify the impact of the following fire and safety features on the behavior of the products during an incident at a bulk gas facility and explain their significance in the analysis process:

1. Fire protection systems
2. Monitoring and detection systems
3. Pressure relief protection
4. Transfer operations

TECH - 1.6.

NFPA 7.2.5
OSHA TECH ,E

Estimating the Likely Size of an Endangered Area

Given examples of hazardous materials/WMD, the hazardous materials technician shall estimate the likely size, shape, and concentrations associated with the release of materials involved in the incident by using computer modeling, monitoring equipment, or specialists in this field, and shall meet the requirements of 7.2.5.1 through 7.2.5.4.

TECH - 1.6.1.

NFPA 7.2.5.1
OSHA TECH ,E

Given the emergency response plan, the hazardous materials technician shall identify local resources for dispersion pattern prediction and modeling including computers, monitoring equipment, or specialists in the field.

TECH - 1.6.2.

NFPA 7.2.5.2
OSHA TECH ,E

Given the quantity, concentration, and release rate of a material, the hazardous materials technician shall identify the steps for determining the likely extent of the physical, safety, and health hazards within the endangered area of a hazardous materials/WMD incident.

TECH - 1.6.2.1.

NFPA 7.2.5.2.1
OSHA TECH

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

1. Counts per minute (cpm) and kilocounts per minute (kcpm)
2. Immediate dangerous to life and health (IDLH) value
3. Infectious dose
4. Incubation period
5. Lethal concentrations (LC50)
6. Lethal dose (LC50)
7. Parts per billion (ppb)
8. Parts per million (ppm)
9. Permissible exposure limit (PEL)
10. Radiation absorbed dose (rad)
11. Roentgen equivalent Man (Rem); Millirem (mrem), micromem (µrem)
12. Threshold limit value time-weighted average (TLV-TWA)
13. Threshold limit value short-term exposure limit (TLV-STEL)
14. Threshold limit value ceiling (TLV-C)

TECH - 1.6.2.2.

NFPA 7.2.5.2.2
OSHA TECH E, I

The hazardous materials technician shall identify two methods for predicting the areas of potential harm within the endangered area of a hazardous materials incident.

TECH - 1.6.3.

NFPA 7.2.5.3
OSHA *TECH E, I*

The hazardous materials technician shall identify a method for estimating the outcomes within an endangered area of a hazardous materials/WMD incident.

Haz Mat Technician 2. - Planning the Response

TECH - 2.1.

NFPA 7.3.1.1
OSHA *TECH F*

Identifying Response Objectives

Given scenarios involving hazardous materials/WMD incidents, the hazardous materials technician shall describe the response objectives for each problem.

TECH - 2.1.1.

NFPA 7.3.1.2
OSHA *TECH F*

Given an analysis of a hazardous materials/WMD incident, the hazardous materials technician shall be able to describe the steps for determining response options (defensive, offensive, nonintervention).

TECH - 2.2.

NFPA 7.3.2
OSHA *TECH F*

Identifying the Potential Action Options

Given scenarios involving hazardous materials/WMD incidents, the hazardous materials technician shall identify the possible response options (defensive, offensive, and nonintervention) by response objective for each problem.

TECH - 2.2.1.

NFPA 7.3.2.2
OSHA *TECH F*

The hazardous materials technician shall be able to identify the possible options to accomplish a given response objective.

TECH - 2.3.

NFPA 7.3.3
OSHA *TECH D*
OSHA *1.C-B.2*

Selecting Personal Protective Equipment

Given scenarios of hazardous materials/WMD incidents with known and unknown hazardous materials/WMD, the hazardous materials technician shall determine the personal protective equipment for the response options specified in the incident action plan in each situation and shall meet the requirements of 7.3.3.1 through 7.3.3.4.73

TECH - 2.3.1.

NFPA 7.3.3.1
OSHA *TECH D*

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

<p>TECH - 2.3.2.</p> <p>NFPA 7.3.3.2 OSHA <i>TECH D</i> OSHA 1.C-C.1</p>	<p>The hazardous materials technician shall identify and describe personal protective equipment options available for the following hazards:</p> <ul style="list-style-type: none"> • Thermal • Radiological • Asphyxiating • Chemical (liquids and vapors) • Etiological (biological) • Mechanical (explosives)
<p>TECH - 2.3.2.1.</p> <p>NFPA 7.3.3.2.1 OSHA <i>TECH D</i> OSHA 1.C-B.2,C.1</p>	<p>The hazardous materials technician shall identify the process to be considered in selecting respiratory protection for a specified action option.</p>
<p>TECH - 2.3.3.</p> <p>NFPA 7.3.3.4 OSHA <i>TECH D</i> OSHA 1.C-B.2, C.1</p>	<p>The hazardous materials technician shall identify the factors to be considered in selecting the proper chemical-protective clothing for a specified action option.</p>
<p>TECH - 2.3.3.1.</p> <p>NFPA 7.3.3.4.1 OSHA <i>TECH D, J</i></p>	<p>The hazardous materials technician shall describe the following terms and explain their impact and significance on the selection of chemical-protective clothing:</p> <ol style="list-style-type: none"> 1. Degradation 2. Penetration 3. Permeation
<p>TECH - 2.3.3.2.</p> <p>NFPA 7.3.3.4.2 OSHA <i>TECH D, J</i></p>	<p>The hazardous materials technician shall identify at least three indications of material degradation of chemical-protective clothing.</p>
<p>TECH - 2.3.3.3.</p> <p>NFPA 7.3.3.4.3 OSHA <i>TECH D, J</i></p>	<p>The hazardous materials technician shall identify the different designs of vapor-protective and splash-protective clothing and describe the advantages and disadvantages of each type.</p>
<p>TECH - 2.3.3.4.</p> <p>NFPA 7.3.3.4.4 OSHA <i>TECH D</i></p>	<p>The hazardous materials technician shall identify the relative advantages and disadvantages of the following heat exchange units used for the cooling of personnel in chemical-protective clothing:</p> <ol style="list-style-type: none"> 1. Air cooled 2. Ice cooled 3. Water cooled 4. Phase change cooling technology

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Mission-Specific
Operations
Hazardous Materials Technician
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TECH - 2.3.3.5.

NFPA 7.3.3.4.5
OSHA TECH D
OSHA 1.C-B.2, C.1

The hazardous materials technician shall identify the process for selecting protective clothing at hazardous materials/WMD incidents.

TECH - 2.3.3.6.

NFPA 7.3.3.4.6
OSHA TECH D
OSHA 1.C-B.2

Given three examples of various hazardous materials, the hazardous materials technician shall determine the appropriate protective clothing construction materials for a given action option using chemical compatibility charts.

TECH - 2.3.3.7.

NFPA 7.3.3.4.7
OSHA TECH D
OSHA 1.C-C

The hazardous materials technician shall identify the physical and psychological stresses that can affect users of specialized protective clothing.

TECH - 2.4.

NFPA 7.3.4
OSHA TECH A, G

Selecting Decontamination Procedures

Given a scenario involving a hazardous materials/WMD incident, the hazardous materials technician shall select a decontamination procedure that will minimize the hazard, determine the equipment required to implement that procedure, and shall complete the following tasks:

1. Describe the advantages and limitations of each of the following decontamination methods:
 - a. Absorption
 - b. Adsorption
 - c. Chemical degradation
 - d. Dilution
 - e. Disinfecting
 - f. Evaporation
 - g. Isolation and disposal
 - h. Neutralization
 - i. Sterilization
 - j. Solidification
 - k. Vacuuming
 - l. Washing
2. Identify three sources of information for determining the applicable decontamination procedure and identify how to access those resources in a hazardous materials/WMD incident.

TECH - 2.5.

NFPA 7.3.5
OSHA TECH F
OSHA 1.C-A, B, C, D

Developing a Plan of Action

Given scenarios involving hazardous materials/WMD incidents, the hazardous materials technician shall develop a plan of action including site safety and control plan that is consistent with the emergency response plan and standard operating procedures and within the capability of available personnel, personal protective equipment, and control equipment for that incident, and shall meet the requirements of 7.3.5.1 through 7.3.5.5:

Response
Training
Considerations

Awareness

Core	Operations
Mission-Specific	

Hazardous
Materials
Technician

Specialist
Employee

Hazardous
Materials
Specialist

Incident
Commander

Hazardous
Materials
Officer

Safety
Officer

BLS
Responder

ALS
Responder

Hospital
First
Receiver

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Standards

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TECH - 2.5.1.

NFPA 7.3.5.1
OSHA TECH F

The hazardous materials technician shall describe the purpose of, procedures for, equipment required, and safety precautions used with the following techniques for hazardous materials/WMD control:

1. Absorption
2. Adsorption
3. Blanketing
4. Covering
5. Damming
6. Diking
7. Dilution
8. Diversion
9. Dispersion
10. Fire suppression
11. Neutralization
12. Overpacking
13. Patching
14. Plugging
15. Pressure isolation and reduction (flaring; venting; vent and burn; isolation of valves, pumps, or energy sources)
16. Retention
17. Solidification
18. Transfer
19. Vapor control: dispersion, suppression

TECH - 2.5.2.

NFPA 7.3.5.2
OSHA TECH F

Given a scenario involving a hazardous materials/WMD incident, the hazardous materials technician shall develop the site safety and control plan that must be included as part of the Incident Action Plan:

1. The hazardous materials technician shall list and describe the safety considerations to be included.
2. The hazardous materials technician shall identify the points that should be made in a safety briefing prior to working at the scene.

TECH - 2.5.3.

NFPA 7.3.5.3
OSHA TECH F
OSHA HMSPEC-H

The hazardous materials technician shall identify the atmospheric and physical safety hazards associated with hazardous materials/WMD incidents involving confined spaces.

TECH - 2.5.4.

NFPA 7.3.5.4
OSHA TECH F
OSHA HMSPEC-H

The hazardous materials technician shall identify the pre-entry activities to be performed.

TECH - 2.5.5.

NFPA 7.3.5.5
OSHA TECH F
OSHA HMSPEC-H

The hazardous materials technician shall identify the procedures, equipment, and safety precautions for preserving and collecting legal evidence at hazardous materials/WMD incidents.

Haz Mat Technician 3. - Implementing the Planned Response

TECH - 3.1.

NFPA 7.4.1
OSHA TECH C, H

Performing Incident Management Duties

Given the emergency response plan and/or standard operating procedures and a scenario involving a hazardous materials/WMD incident, the hazardous materials technician shall demonstrate the duties of an assigned function in the hazardous materials branch/group within the incident command system and shall identify the role of the hazardous materials technician during hazardous materials/WMD incidents.

TECH - 3.2.

NFPA 7.4.2
OSHA TECH D

Using Protective Clothing and Respiratory Protection

The hazardous materials technician shall demonstrate the ability to don, work in, and doff liquid splash, vapor-protective, and chemical-protective clothing and any other specialized personal protective equipment provided by the AHJ, including respiratory protection, and shall complete the following tasks:

TECH - 3.2.1.

NFPA 7.4.2.1
OSHA TECH D

Describe three safety procedures for personnel working in chemical protective clothing.

TECH - 3.2.2.

NFPA 7.4.2.2
OSHA TECH D

Describe three emergency procedures for personnel working in chemical protective-clothing

TECH - 3.2.3.

NFPA 7.4.2.3
OSHA TECH D

Demonstrate the ability to don, work in, and doff self-contained breathing apparatus in addition to any other respiratory protection provided by the AHJ.

TECH - 3.3.

NFPA 7.4.3
OSHA TECH F

Performing Control Functions Identified in Plan of Action

Given scenarios involving hazardous materials/WMD incidents, the hazardous materials technician shall select the tools, equipment, and materials for the control of hazardous materials/WMD incidents and identify the precautions for controlling releases from those packaging/containers and shall complete the following tasks:

TECH - 3.3.1.	Given a pressure vessel, select the material or equipment and demonstrate a method(s) to contain leaks from the following locations:
NFPA 7.4.3 (1) OSHA TECH F	<ol style="list-style-type: none"> 1. Fusible plug 2. Fusible plug threads 3. Side wall of cylinder 4. Valve blowout 5. Valve gland 6. Valve inlet threads 7. Valve seat 8. Valve stem assembly blowout
TECH - 3.3.2.	Given the fittings on a pressure container, demonstrate the ability to perform the following:
NFPA 7.4.3 (2) OSHA TECH F	<ol style="list-style-type: none"> 1. Close valves that are open 2. Replace missing plugs 3. Tighten loose plugs
TECH - 3.3.3.	Given a 208 L (55 gal) drum and applicable tools and materials, demonstrate the ability to contain the following types of leaks using the following:
NFPA 7.4.3 (3) OSHA TECH F	<ol style="list-style-type: none"> 1. Bung leak 2. Chime leak 3. Forklift puncture 4. Nail puncture
TECH - 3.3.4.	Given a 208 L (55 gal) drum and an overpack drum, demonstrate the ability to place the 208 L drum into the overpack drum using the following methods:
NFPA 7.4.3 (4) OSHA TECH F	<ol style="list-style-type: none"> 1. Rolling slide-in 2. Slide-in 3. Slip-over
TECH - 3.3.5.	Identify the maintenance and inspection procedures for the tools and equipment provided for the control of hazardous materials releases according to the manufacturer's specifications and recommendations.
NFPA 7.4.3 (5) OSHA TECH F	
TECH - 3.3.6.	Identify three considerations for assessing a leak or spill inside a confined space without entering the area.
NFPA 7.4.3 (6) OSHA TECH F	
TECH - 3.3.7.	Identify three safety considerations for product transfer operations.
NFPA 7.4.3 (7) OSHA TECH F	

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TECH - 3.3.8.

NFPA 7.4.3 (8)
OSHA TECH F

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

TECH - 3.3.9.

NFPA 7.4.3 (9)
OSHA TECH F

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

TECH - 3.3.10.

NFPA 7.4.3 (10)
OSHA TECH F

Describe at least one method for containing each of the following types of leaks in MC-306/DOT-406, MC-307/DOT-407, and MC-312/DOT-412 cargo tanks:

1. Dome cover leak
2. Irregular-shaped hole
3. Puncture
4. Split or tear

TECH - 3.3.11.

NFPA 7.4.3 (11)
OSHA TECH F

Describe three product removal and transfer considerations for overturned MC-306/DOT-406, MC-307/DOT-407, MC-312/DOT-412, MC-331, and MC-338 cargo tanks.

TECH - 3.3.12.

NFPA 7.4.4
OSHA TECH A, E, F

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

TECH - 3.4.

NFPA 7.4.5
OSHA TECH A, E, F

Performing Decontamination Operations Identified in Incident Action Plan

The hazardous materials technician shall demonstrate the ability to set up and implement the following types of decontamination operations:

- Technical decontamination operations in support of entry operations
- Technical decontamination operations involving ambulatory and nonambulatory victims
- Mass decontamination operations involving ambulatory and nonambulatory victims

Haz Mat Technician 4. - Evaluating Progress

TECH - 4.1.

NFPA 7.5.1
OSHA TECH A, E, F

Evaluating the Effectiveness of the Control Functions

Given scenarios involving hazardous materials/WMD incidents and the incident action plan, the hazardous materials technician shall evaluate the effectiveness of any control functions identified in the incident action plan.

Response
Training
Considerations

TECH - 4.2.

Evaluating the Effectiveness of the decontamination process

NFPA 7.5.2
OSHA TECH A, E, F

Given an incident action plan for a scenario involving a hazardous materials/WMD incident, the hazardous materials technician shall evaluate the effectiveness of any decontamination procedures identified in the incident action plan.

Awareness

Operations
Core
Mission-Specific

Haz Mat Technician 5. - Terminating the Incident

TECH - 5.1.

Assisting in the Debriefing

NFPA 7.6.1
OSHA TECH H

Given a scenario involving a hazardous materials/WMD incident, the hazardous materials technician shall participate in the debriefing of the incident and shall meet the following requirements:

Hazardous
Materials
Technician

Specialist
Employee

TECH - 5.1.1.

Describe three components of an effective debriefing.

NFPA 7.6.1 (1)
OSHA TECH H

Hazardous
Materials
Specialist

TECH - 5.1.2.

Describe the key topics of an effective debriefing.

NFPA 7.6.1 (2)
OSHA TECH H

Incident
Commander

TECH - 5.1.3.

Describe when a debriefing should take place.

NFPA 7.6.1 (3)
OSHA TECH H

Hazardous
Materials
Officer

TECH - 5.1.4.

Describe who should be involved in a debriefing.

NFPA 7.6.1 (4)
OSHA TECH H

Safety
Officer

TECH - 5.2.

Assisting in the Incident Critique

NFPA 7.6.2
OSHA TECH H

Given a scenario involving a hazardous materials/WMD incident, the hazardous materials technician shall provide the operational observations of the activities that were performed in the hot and warm zones during the incident and shall complete the following tasks:

BLS
Responder

ALS
Responder

Hospital
First
Receiver

TECH - 5.2.1.

Describe three components of an effective critique.

NFPA 7.6.2 (1)
OSHA TECH H

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TECH - 5.2.2.

Describe who should be involved in a critique.

NFPA 7.6.2 (2)
OSHA TECH H

TECH - 5.2.3.

Describe why an effective critique is necessary after a hazardous materials/WMD incident.

NFPA 7.6.2 (3)
OSHA TECH H

TECH - 5.2.4.

Describe which written documents should be prepared as a result of the critique.

NFPA 7.6.2 (4)
OSHA TECH H

TECH - 5.3.

Reporting and Documenting the Incident

NFPA 7.6.3
OSHA TECH A, H

Given a scenario involving a hazardous materials/WMD incident, the hazardous materials technician shall complete the reporting and documentation requirements consistent with the emergency response plan and/or standard operating procedures and shall meet the following requirements:

TECH - 5.3.1.

Identify the reports and supporting documentation required by the emergency response plan and/or standard operating procedures.

NFPA 7.6.3 (1)
OSHA TECH A, H

TECH - 5.3.2.

Demonstrate completion of the reports required by the emergency response plan and/or standard operating procedures.

NFPA 7.6.3 (2)
OSHA TECH A, H

TECH - 5.3.3.

Describe the importance of personnel exposure records.

NFPA 7.6.3 (3)
OSHA TECH A, H

TECH - 5.3.4.

Describe the importance of debriefing records.

NFPA 7.6.3 (4)
OSHA TECH A, H

TECH - 5.3.5.

Describe the importance of critique records.

NFPA 7.6.3 (5)
OSHA TECH A, H

TECH - 5.3.6.	Identify the steps in keeping an activity log and exposure records.
NFPA 7.6.3 (6) OSHA TECH A, H	
TECH - 5.3.7.	Identify the steps to be taken in compiling incident reports that meet federal, state, local, and organizational requirements.
NFPA 7.6.3 (7) OSHA TECH A, H	
TECH - 5.3.8.	Identify the requirements for compiling hot zone entry and exit logs.
NFPA 7.6.3 (8) OSHA TECH A, H	
TECH - 5.3.9.	Identify the requirements for compiling personal protective equipment logs.
NFPA 7.6.3 (9) OSHA TECH A,	
TECH - 5.3.10.	Identify the requirements for filing documents and maintaining records.
NFPA 7.6.3 (10) OSHA TECH A, H	

Response Training Considerations

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Hazardous Materials Technician

Specialist Employee

Hazardous Materials Specialist

Incident Commander

Hazardous Materials Officer

Safety Officer

BLS Responder

ALS Responder

Hospital First Receiver

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