Hazardous Materials and Terrorist Incident Response Curriculum Guidelines

Hazardous Materials Specialists

Introduction

Hazardous materials specialist is a defined response competency in OSHA 29 CFR 1910.120 (q)(6)(iv) but is not a defined competency category in NFPA 472, 2006 edition. However, there is a relationship between the OSHA Specialist competency and the competencies in NFPA 472, 2006 edition, for Specialist Employee A and for the Technician Specialties: Tank Car, Cargo Tank, and Intermodal Tank. For this reason, these competencies are grouped together in this section.

Hazardous materials specialists (OSHA) shall be trained to meet all the requirements for the first responder at the awareness level, the first responder at the operations level, and the technician level. In addition, specialists must meet those competencies identified in this section. They also shall meet the training requirements and be provided medical surveillance in accordance with requirements of OSHA, local occupational health and safety regulatory agencies, or the U.S. Environmental Protection Agency (EPA), as appropriate for their jurisdiction.

Definition

Specialists respond to hazardous materials operations and provide support to the incident commander and/or the technician. The duties of specialists, although paralleling those of technicians, require more specific knowledge of hazards common to their area of specialization. They may act as site liaisons with Federal, State, local, and other government authorities, or they may serve as hazardous materials team leader, operations officer or advisor to the incident commander. The specialist's responsibilities may include having to work within the hot zone, and may include performing incident command functions in certain types of incidents.

Training Audience

Specialists may be members of hazardous material response teams, individual consultants, certain site specialist employees, as defined in Title 29 of the Code of Federal Regulations (CFR), or representatives from organizations that provide technical support to the team. Specialists may be broadly titled as hazardous materials specialists (using OSHA 29 CFR 1910.120 nomenclature) or off-site specialists A (using NFPA 472 nomenclature). They may be called something less generic such as product, container, process, or transportation specialists (such as NFPA 472 Technician with a Tank Car Specialty), or they may have a title referring to a very specific function, such as counter-terrorism explosives specialist or ICBM nuclear warhead specialist.

Under the OSHA and EPA rule, hazardous materials specialists initially shall receive at least 24 hours of training equal to the technician level, training equal to the hazardous materials specialist level competencies for the areas of specialty, and annually thereafter receive refresher training of sufficient content and duration and/or demonstrate continued competency in their area of specialization to the level of their expected involvement.

Methodology Recommendations

Training for hazardous materials specialists is best conducted with a varied mix of classroom instruction using traditional lecture and small activity approaches, field exercises involving group

practice in simulated emergencies, and hands-on skill training in doing actual control, confinement, and containment evolutions. 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. For hazardous materials specialists who may be required to command the incident response, field exercises or large group incident scene simulations are optimal for overall command structure practice, to develop effective incident management skills.

Refresher training should focus on practice in the warm and hot zones of a simulated emergency and should include (1) competency retesting of all response skills; (2) technical information updates; (3) critique of operational decision-making using simulated emergencies; and (4) critique of ICS performance and communication skills using simulated emergencies.

Summary:

Audience: Very narrow.

Prospective hazardous materials team leaders or personnel who are designated in response plans as the definitive response resource for specific products or types of hazardous materials emergencies.

Pre-Req:

- 1st Responder Awareness Training
- 1st Responder Operations Training
- Hazardous Materials Technician Training
- Advanced technical expertise in specific area(s) of hazardous materials

Training:

- Classroom and simulator/field instruction, with emphasis on hands-on training
- Competencies:
  - Knowledge of role of specialist within incident command system and responsibilities within employer's emergency response plan and the State emergency response plan.
  - Knowledge of hazardous materials terminology and behavior, and ability to perform in depth hazard and risk assessment
  - Ability to perform specialized control, containment and/or confinement techniques
  - Ability to select and use specialized personal protective equipment
  - Ability to implement decontamination procedures.
  - Ability to develop a site safety and control plan.

Refresher:

- Competency retesting of all response skills
- Technical information updates.
- Incident scene decision-making using simulated emergencies.

Federal Requirements for Hazardous Materials Specialist Training

OSHA establishes the following training requirements for hazardous materials specialists. Length of training and method of testing are not specified, but hazardous materials specialists must have received training at the awareness, operations, and technician levels as well as at the specialist level. Employers are required to ensure that employees demonstrate competency in the skills defined.

HAZARDOUS MATERIALS SPECIALIST

(iv) Hazardous materials specialist. Hazardous materials specialists are individuals who respond with and provide support to hazardous materials technicians. Their duties parallel those of the hazardous materials technician, however, those duties require a more directed or specific knowledge of the various substances they may be called upon to contain. The hazardous materials specialist would also act as the site liaison with Federal, state, local and other government authorities in regards to site activities. Hazardous materials specialists shall have competency in the following areas and the employer shall so certify:

(A) Know how to implement the local emergency response plan

(B) Understand classification, identification and verification of known and unknown materials by using advanced survey instruments and equipment

(C) Know the state emergency response plan

(D) Be able to select and use proper specialized chemical personal protective equipment provided to the hazardous materials specialist

(E) Understand in-depth hazard and risk assessment techniques

(F) Be able to perform specialized control, containment, and/or confinement operations within the capabilities of the resources and personal protective equipment available

(G) Be able to determine and implement decontamination procedures.

(H) Have the ability to develop a site safety and control plan

(I) Understand chemical, radiological and toxicological terminology and behavior

OSHA 29 CFR 1910.120(q)(6)(iv)

OSHA HMSPEC-A	Given a simulated incident involving hazardous materials within the specialist's area of technical expertise, describe the steps to implement the local emergency response plan.
OSHA HMSPEC-B	Given a simulated incident involving hazardous materials within the specialist's area of technical expertise, demonstrate an understanding of the classification, identification and verification of known and unknown materials by using advanced survey instruments and equipment.
OSHA HMSPEC-C	Given a simulated incident involving hazardous materials within the specialist's area of technical expertise, describe the State emergency response plan.
OSHA HMSPEC-D	Given a simulated incident involving hazardous materials, select and demonstrate use of proper specialized chemical personal protective equipment.

OSHA HMSPEC-E	Given a simulated incident involving hazardous materials within the specialist's area of technical expertise, demonstrate an understanding of in-depth hazard and risk assessment techniques, and demonstrate providing technical advice or assistance regarding the hazards of the substance present and potential magnitude of the incident.
OSHA HMSPEC-F	Given a simulated incident involving hazardous materials, containers, and releases within the specialist's area of expertise, demonstrate specialized control, containment, and/or confinement operations.
OSHA HMSPEC-G	Given a simulated incident involving hazardous materials within the specialist's area of technical expertise, demonstrate the ability to determine and implement decontamination procedures.
OSHA HMSPEC-H	Demonstrate the ability to develop a site safety and control plan.
OSHA HMSPEC-I	Define chemical, radiological and toxicological terms and describe chemical, radiological and toxicological materials behavior.

Recommended Training Objectives

The following training objectives are recommended for Hazardous Materials Specialist training. The sources for this material are:

1. NFPA 472, Chapter 10: Competencies for Specialist Employees, Section 10.4: Specialist Employee A;
2. NFPA 472, Chapter 12: Competencies for the Technician with a Tank Car Specialty;
3. NFPA 472, Chapter 13: Competencies for the Technician with a Cargo Tank Specialty;
4. NFPA 472, Chapter 14: Competencies for the Technician with an Intermodal Tank Specialty.
5. NFPA 472, Chapter 15: Competencies for the Technician with a Marine Tank Vessel Specialty

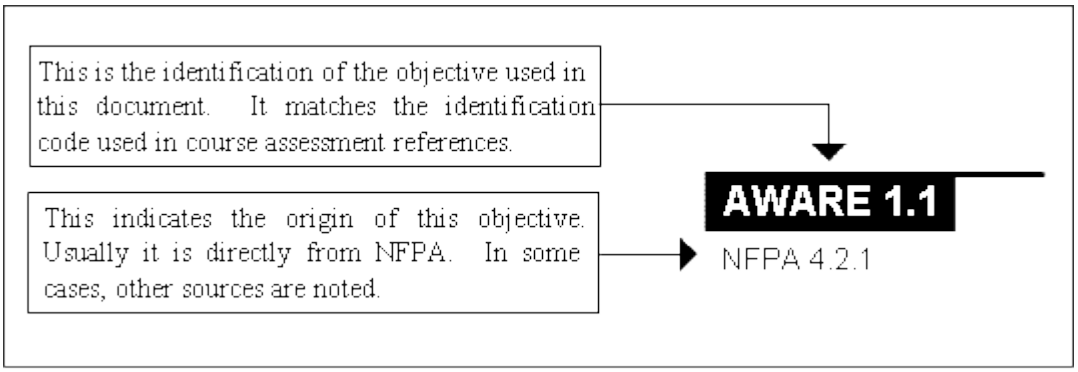
In order to retain the integrity of the NFPA 472 citations, the following identifications are used for the recommended objectives:

SPEC(A)	Specialist Employee A
TANK	Technician with a Tank Car Specialty

CARGO	Technician with a Cargo Tank Specialty
INTML	Technician with an Intermodal Tank Specialty
MARINE	Technician with a Marine Tank Vessel Specialty

In general, these recommended objectives do not constitute an increased level of training from that minimally required by OSHA for Hazardous Materials Specialist. Rather, these recommended objectives provide greater depth of definition of student competency for specific hazards, containers, and/or specific responder roles. To assist in assessing course compliance with OSHA 1910.120(q)(6)(iv), the relationships between these objectives and the OSHA requirements are noted. References to OSHA are abbreviated as noted.

Objective Identification Legend



Specialist Employee A

Specialist employee A is a person who is specifically trained to handle incidents involving chemicals or containers for chemicals used in the organization's area of specialization. Consistent with the emergency response plan and/or standard operating procedures, the specialist employee A is able to analyze an incident involving chemicals within his or her organization's area of specialization,

The specialist employee A can then plan a response to that incident, implement the planned response within the capabilities of the resources available, and evaluate the progress of the planned response.

(Reference: NFPA 472 2006, Section 10.1(3))

The specialist employee A shall be trained to meet the competencies at the specialist employee C level (see HMEP "Specialist Employees" SPEC(C)-1.1 – SPEC(C)-3.2.3, as well as NFPA 472 Chapter 10, "Competencies for Specialist Employees", Section 10.2) and the hazardous materials technician level (see HMEP "Hazardous Materials Technician", as well as NFPA 472, Chapter 8, "Competencies for Hazardous Materials Technicians") relative to the hazardous materials/WMD and containers used in the organization's area of specialization.

(Reference: NFPA 472 2006, Section 10.4.1.1)

SPEC(A) 1. - General

SPEC(A) - 1.1.

NFPA 9.4.1.2.2(1)
OSHA HMSPEC-B,E,I

Analyzing the Incident

Analyze an incident involving hazardous materials/WMD and containers for hazardous materials/WMD used in the organization's area of specialization to determine the magnitude of the incident by completing the following tasks:

SPEC(A) - 1.1.1.

NFPA 9.4.1.2.2(1)a
OSHA HMSPEC-B,E,I

Survey an incident involving hazardous materials/WMD and containers for hazardous materials/WMD including the following:
Identify the containers involved.
Identify or classify unknown materials.
Verify the identity of the hazardous materials/WMD.

SPEC(A) - 1.1.2.

NFPA 9.4.1.2.2(1)b
OSHA HMSPEC-B,E,I

Collect and interpret hazard and response information from printed resources, technical resources, computer databases, and monitoring equipment for hazardous materials/WMD.

SPEC(A) - 1.1.3.

NFPA 9.4.1.2.2(1)c
OSHA HMSPEC-E

Determine the extent of damage to containers of hazardous materials/WMD.

SPEC(A) - 1.1.4.

NFPA 9.4.1.2.2(1)d
OSHA HMSPEC-B,E,I

Predict the likely behavior of the hazardous materials/WMD and containers for hazardous materials/WMD.

SPEC(A) - 1.1.5.

NFPA 9.4.1.2.2(1)e
OSHA HMSPEC-B,E,I

Estimate the potential outcomes of an incident involving hazardous materials/WMD and containers for hazardous materials/WMD.

SPEC(A) - 1.2.

NFPA 9.4.1.2.2(2)
OSHA HMSPEC-A,F,H

Planning the Response

Plan a response (within the capabilities of available resources) to an incident involving hazardous materials/WMD and containers for hazardous materials/WMD used in the organization's area of specialization by completing the following tasks:

SPEC(A) - 1.2.1.

NFPA 9.4.1.2.2(2)a
OSHA HMSPEC-A,F,H

Identify the response objectives for an incident involving hazardous materials/WMD and containers for hazardous materials/WMD.

SPEC(A) - 1.2.2.

NFPA 9.4.1.2.2(2)b
OSHA HMSPEC-D

Identify the potential response options for each response objective for an incident involving hazardous materials/WMD and containers for hazardous materials/WMD.

SPEC(A) - 1.2.3.

NFPA 9.4.1.2.2(2)c
OSHA HMSPEC-D

Select the personal protective equipment required for a given response option for an incident involving hazardous materials/WMD and containers for hazardous materials/WMD.

SPEC(A) - 1.2.4.

NFPA 9.4.1.2.2(2)d
OSHA HMSPEC-G

Select the technical decontamination process for an incident involving hazardous materials/WMD and containers for hazardous materials/WMD.

SPEC(A) - 1.2.5.

NFPA 9.4.1.2.2(2)e
OSHA HMSPEC-A,F,H

Develop an incident action plan (within the capabilities of the available resources), including site safety and control plan, for handling an incident involving hazardous materials/WMD and containers for hazardous materials/WMD consistent with the emergency response plan and/or standard operating procedures.

SPEC(A) - 1.3.

NFPA 9.4.1.2.2(3)
OSHA HMSPEC-F

Implementing the Planned Response

Operating under the Incident Command System, implement the planned response (as developed with the incident commander) to an incident involving hazardous materials/WMD and containers for hazardous materials/WMD used in the organization's area of specialization consistent with the emergency response plan and/or standard operating procedures by completing the following tasks:

SPEC(A) - 1.3.1. NFPA 9.4.1.2.2(3)a *OSHA HMSPEC-D*	Don, work in, and doff correct personal protective equipment for use with hazardous materials/WMD.
SPEC(A) - 1.3.2. NFPA 9.4.1.2.2(3)b *OSHA HMSPEC-F*	Perform containment, control, and product transfer functions, as agreed upon with the incident commander, for hazardous materials/WMD and containers for hazardous materials/WMD.

SPEC(A) 2. - Analyzing, Planning, Implementing and Evaluating

SPEC(A) - 2.1. NFPA 9.4.1.2.2(4) *OSHA HMSPEC-A,F,H*	Analyzing, Planning, Implementing and Evaluating The specialist employee A shall demonstrate competencies at the specialist employee C level (Section 9.2) and hazardous materials technician level (Chapter 7) relative to the hazardous materials/WMD and containers used in the organization's area of specialization.

Technician with a Tank Car Specialty

Technicians with a Tank Car Specialty are those persons who provide technical support pertaining to tank cars, provide oversight for product removal and movement of damaged tank cars, and act as a liaison between technicians and other outside resources. These technicians are expected to use specialized chemical-protective clothing and specialized control equipment.

(Reference: NFPA 472 2006, Chapter 12, "Competencies for Technicians with a Tank Car Specialty", Section 12.1.1.1)

Note that NFPA 472, Chapter 12, "Competencies for Technicians with a Tank Car Specialty" is not intended as a mandate that hazardous materials response teams must include technicians with a tank car specialty in order to perform operations at such incidents. Technicians operating within the bounds of their training, as listed in NFPA 472, Chapter 8, "Competencies for Hazardous Materials Technicians", are able to intervene at railroad incidents. However, the following additional competencies are provided for those jurisdictions or hazardous materials response teams who desire that some or all of their technicians have more complete and in-depth knowledge of tank cars.

TANK 1. - General

TANK - 1.1.

NFPA 12.1.3.2(1)
OSHA HMSPEC-E

Analyzing the Incident

Analyze a hazardous materials/WMD incident involving tank cars to determine the complexity of the problem in terms of outcomes.

TANK - 1.1.1.

NFPA 12.1.3.2(1)a
OSHA HMSPEC-E

Determine the type and extent of damage to tank cars.

TANK - 1.1.2.

NFPA 12.1.3.2(1)b
OSHA HMSPEC-E

Predict the likely behavior of tank cars and their contents in an emergency.

TANK - 1.2.

NFPA 12.1.3.2(2)
OSHA HMSPEC-A,C,D,E,F

Planning the Response

Plan a response for an emergency involving tank cars within the capabilities and competencies of available personnel, personal protective equipment, and control equipment by determining the response options (offensive, defensive, and nonintervention) for a hazardous materials emergency involving tank cars.

TANK - 1.3.

NFPA 12.1.3.2(3)
OSHA HMSPEC-F

Implementing the Planned Response

Implement or oversee the implementation of the planned response to a hazardous materials/WMD incident involving tank cars.

TANK 2. - Analyzing the Incident

TANK - 2.1.

NFPA 12.2.1
OSHA HMSPEC-B,E

Determining the Type and Extent of Damage to Tank Cars

Given examples of damaged tank cars, technicians with a tank car specialty shall describe the type and extent of damage to each tank car and its fittings and shall complete the following tasks:

TANK - 2.1.1.

NFPA 12.2.1(1)
OSHA HMSPEC-B,E

Given the specification mark for a tank car and the reference materials, describe the car's basic construction and features.

TANK - 2.1.2.

NFPA 12.2.1(2)
OSHA HMSPEC-B,E

Point out the "B" end of the car.

TANK - 2.1.3.

NFPA 12.2.1(3)
OSHA HMSPEC-B,E

Given examples of various tank cars, point out and explain the design and purpose of each of the following tank car components, when present:

- Body bolster
- Head shield
- Heater coils – interior vs. exterior
- Jacket
- Lining/cladding
- Shelf couplers
- Tank, including shell, and head
- Trucks (pin and bowl)
- Underframe – continuous vs. stub sill

TANK - 2.1.4.

NFPA 12.2.1(4)
OSHA HMSPEC-B,E

Given examples of tank cars (some jacketed; some not jacketed), point out the jacketed tank cars.

TANK - 2.1.5.

NFPA 12.2.1(5)
OSHA HMSPEC-B,E

Describe the difference between "insulation" and "thermal protection" on tank cars.

TANK - 2.1.6.

NFPA 12.2.1(6)
OSHA HMSPEC-B,E

Describe the difference between "jacketed" and "sprayed-on" thermal protection on tank cars.

TANK - 2.1.7.

NFPA 12.2.1(7)
OSHA HMSPEC-B,E

Describe the difference between "interior" and "exterior" heater coils on tank cars.

TANK - 2.1.8.

NFPA 12.2.1(8)
OSHA HMSPEC-B,E

Given examples of various fittings arrangements for pressure, nonpressure, cryogenic, and carbon dioxide tank cars (including examples of each of the following fittings), point out and explain the design, construction, and operation of each of the following fittings, when present:

Fittings for loading and unloading tank cars, including the following:

- Air valve
- Bottom outlet nozzle
- Bottom outlet valves (top operated with stuffing box, bottom operated – internal or external ball, wafersphere)
- Carbon dioxide tank car fittings
- Cryogenic liquid tank car fittings
- Excess flow valve
- Flange for manway, valves, and so forth
- Liquid valve/vapor valve (ball vs. plug type)
- Quick fill hole cover
- Fittings for pressure relief, including the following:
- Pressure regulators on carbon dioxide cars and liquefied atmospheric gases in cryogenic liquid tank cars
- Pressure relief devices (pressure relief valve, safety vent, combination pressure relief valve)
- Staged pressure relief system for a carbon dioxide car
- Vacuum relief valve (negative pressure or vacuum)

Fittings for gauging, including the following:

- Closed gauging devices (e.g., magnetic)
- Open gauging devices (e.g., slip tube)
- Other gauging devices (T-bar, long/short pole)

Miscellaneous fittings, including the following:

- Manway, manway cover plate, hinged and bolted manway cover, protective housing
- Sample line
- Sump
- Thermometer well
- Washout

TANK - 2.1.9.

NFPA 12.2.1(9)
OSHA HMSPEC-B,E

Given examples of various fitting arrangements on tank cars (including carbon dioxide and cryogenic liquid tank cars) with the following fittings included, point out the location(s) where each fitting is likely to leak and a reason for the leak:

- Air valve
- Bottom outlet nozzle
- Bottom outlet valve/top-operated bottom outlet valve (with stuffing box)
- Closed gauging devices (e.g., magnetic)
- Combination pressure relief valve
- Flange for manway, valves, and so forth
- Liquid valve/vapor valve (ball vs. plug type)
- Manway, manway cover plate, hinged and bolted manway cover, protective housing
- Open gauging devices (e.g., slip tube)
- Pressure regulators on carbon dioxide cars and liquefied atmospheric gases in cryogenic liquid tank cars
- Quick fill hole cover
- Combination pressure relief valve
- Safety vent (with rupture/frangible) disk
- Sample line
- Thermometer well
- Vacuum relief valve (negative pressure or vacuum)
- Washout

TANK - 2.1.10.

NFPA 12.2.1(10)
OSHA HMSPEC-B,E

Given examples of each of the following types of tank car damage, identify the type of damage:

- Corrosion
- Crack
- Dent
- Flame impingement
- Puncture
- Score, gouge, wheel burn, rail burn

TANK - 2.1.11.

NFPA 12.2.1(11)
OSHA HMSPEC-B,E

Given examples (actual or simulated) of scores, gouges, wheel burns, and rail burns, perform each of the following tasks:

TANK - 2.1.11.1.

NFPA 12.2.1(11)(a)
OSHA HMSPEC-B,E

Use a depth gauge to measure the depth of each score, gouge, wheel burn, and rail burn.

TANK - 2.1.11.2.

NFPA 12.2.1(11)(b)
OSHA HMSPEC-B,E

Point out where each score, gouge, wheel burn, and rail burn crossed a weld, if that condition exists.

TANK - 2.1.11.3.

NFPA 12.2.1(11)(c)
OSHA HMSPEC-B,E

Measure the depth of the weld metal removed for any point where the score, gouge, wheel burn, and rail burn crosses a weld.

TANK - 2.1.11.4.

NFPA 12.2.1(11)(d)
OSHA HMSPEC-B,E

Given examples (actual or simulated) of where a score, gouge, wheel burn, and rail burn crosses a weld, determine if the "heat-affected zone" has been damaged.

TANK - 2.1.12.

NFPA 12.2.1(12)
OSHA HMSPEC-B,E

Given examples (actual or simulated) of dents and rail burns, perform each of the following tasks:

1. Use a dent gauge to measure the radius of curvature for each dent or rail burn
2. Identify those examples that include cracks at the point of minimum curvature

TANK - 2.1.13.

NFPA 12.2.1(13)
OSHA HMSPEC-B,E

Given examples of damaged tank car fittings, describe the extent of damage to those fittings.

TANK - 2.1.14.

NFPA 12.2.1(14)
OSHA HMSPEC-B,E

Given examples of tank car tank damage, describe the extent of damage to the tank car tank.

TANK - 2.1.15.

NFPA 12.2.1(15)
OSHA HMSPEC-B,E

Given a tank car and the applicable equipment and reference material, determine the pressure in the tank car, using either of the following methods:

1. Pressure gauge
2. The temperature of the contents

TANK - 2.1.16.

NFPA 12.2.1(16)
OSHA HMSPEC-B,E

Given a tank car, use the car's gauging device to determine the amount of lading in it.

TANK - 2.2.

NFPA 12.2.2
OSHA HMSPEC-B,E

Predicting the Likely Behavior of the Tank Car and its Contents

Technicians with a tank car specialty shall predict the likely behavior of the tank car and its contents and shall complete the following tasks:

TANK - 2.2.1.

NFPA 12.2.2(1)
OSHA HMSPEC-B,E

Given the following types of tank cars, describe the likely breach/release mechanisms associated with each type.

- Cryogenic liquid tank cars
- Nonpressure tank cars
- Pneumatically unloaded covered hopper cars
- Pressure tank cars

TANK - 2.2.2.

NFPA 12.2.2(2)
OSHA HMSPEC-B,E

Describe the difference in the following types of construction materials used in tank cars and their significance in assessing tank damage:

- Alloy steel
- Aluminum
- Carbon steel

TANK - 2.2.3.

NFPA 12.2.2(3)
OSHA HMSPEC-B,E

Discuss the significance of selection of lading for compatibility with tank car construction material.

TANK - 2.2.4.

NFPA 12.2.2(4)
OSHA HMSPEC-B,E

Describe the significance of “lining” and “cladding” on tank cars in assessing tank damage.

TANK - 2.2.5.

NFPA 12.2.2(5)
OSHA HMSPEC-B,E

Describe the significance of the jacket on tank cars in assessing tank damage.

TANK - 2.2.6.

NFPA 12.2.2(6)
OSHA HMSPEC-B,E

Describe the significance of “insulation” and “thermal protection” on tank cars in assessing tank damage.

TANK - 2.2.7.

NFPA 12.2.2(7)
OSHA HMSPEC-B,E

Describe the significance of “jacketed” and “sprayed-on” thermal protection on tank cars in assessing tank damage.

TANK - 2.2.8.

NFPA 12.2.2(8)
OSHA HMSPEC-B,E

Describe the significance of “interior” and “exterior” heater coils on tank cars in assessing tank damage.

TANK - 2.2.9.

NFPA 12.2.2(9)
OSHA HMSPEC-B,E

Describe the significance of each of the following types of tank car damage on different types of tank cars in assessing tank damage:

- Corrosion
- Crack
- Dent
- Flame impingement
- Puncture
- Score, gouge, wheel burn, rail burn

TANK - 2.2.10.

NFPA 12.2.2(10)
OSHA HMSPEC-B,E

Describe the significance of the depth of scores, gouges, wheel burns, and rail burns on tank cars in assessing tank damage.

TANK - 2.2.11.

NFPA 12.2.2(11)
OSHA HMSPEC-B,E

Describe the significance of scores, gouges, wheel burns, and rail burns crossing a weld on a pressure tank car in assessing tank damage.

TANK - 2.2.12.

NFPA 12.2.2(12)
OSHA HMSPEC-B,E

Describe the significance of damage to the “heat affected” zone of a weld on a tank car in assessing tank damage.

TANK - 2.2.13.

NFPA 12.2.2(12)
OSHA HMSPEC-B,E

Describe the significance of a condemning dent of a tank car in assessing tank damage.

TANK - 2.2.14.

NFPA 12.2.2(14)
OSHA HMSPEC-B,E

Given various types of tank cars, describe the significance of pressure increases in assessing tank damage.

TANK - 2.2.15.

NFPA 12.2.2(15)
OSHA HMSPEC-B,E

Given various types of tank cars, describe the significance of the amount of lading in the tank in assessing tank damage.

TANK - 2.2.16.

NFPA 12.2.2(16)
OSHA HMSPEC-B,E

the significance of flame impingement on a tank car.

TANK - 2.2.17.

TANK 3. - Planning the Response

TANK - 3.1.

NFPA 12.3.1
OSAH HMSPEC-F

Determining the Response Options

Given the analysis of an emergency involving tank cars, technicians with a tank car specialty shall determine the response options for each tank car involved and shall complete the following tasks:

TANK - 3.1.1.

NFPA 12.3.1(1)
OSAH HMSPEC-D,F

Describe the purpose of, potential risks associated with, procedures for, equipment required to implement, and safety precautions for the following product removal techniques for tank cars:

- Flaring liquids and vapors
- Hot and cold tapping
- Transferring liquids and vapors
- Vent and burn
- Venting

TANK - 3.1.2.

NFPA 12.3.1(2)
OSAH HMSPEC-F

Describe the inherent risks associated with, procedures for, equipment required to implement, and safety precautions for leak control techniques on various tank car fittings.

TANK - 3.1.3.

NFPA 12.3.1(3)
OSAH HMSPEC-F

Describe the effect flaring or venting gas or liquid has on the pressure in the tank (flammable gas or flammable liquid product).

TANK - 3.1.4.

NFPA 12.3.1(4)
OSAH HMSPEC-F

Describe the inherent risks associated with, procedures for, equipment required to implement, and safety precautions for lifting of tank cars.

TANK - 3.1.5.

NFPA 12.3.1(5)
OSAH HMSPEC-F

Describe the inherent risks associated with, procedures for, and safety precautions for the following operations:

1. Setting and releasing brakes on rail cars
2. Shutting off locomotives using the fuel shutoff and the battery disconnect
3. Uncoupling rail cars

TANK - 3.1.6.

NFPA 12.3.1(6)
OSAH HMSPEC-F

Describe the hazards associated with working on railroad property during emergencies.

TANK 4. - Implementing the Planned Response

TANK - 4.1.

NFPA 12.4.1
OSAH HMSPEC-F

Implementing the Planned Response

Given an analysis of an emergency involving tank cars and the planned response, technicians with a tank car specialty shall implement or oversee the implementation of the selected response options safely and effectively and shall complete the following tasks:

TANK - 4.1.1.

NFPA 12.4.1(1)
OSAH HMSPEC-F

Given a leaking manway cover plate (loose bolts), control the leak.

TANK - 4.1.2.

NFPA 12.4.1(2)
OSAH HMSPEC-F

Given leaking packing on the following tank car fittings, control the leak:

- Gauging device packing nut
- Liquid or vapor valve packing nut
- Top-operated bottom outlet valve packing gland

TANK - 4.1.3.

NFPA 12.4.1(3)
OSAH HMSPEC-F

Given an open bottom outlet valve with a defective gasket in the cap, control the leak.

TANK - 4.1.4.

NFPA 12.4.1(4)
OSAH HMSPEC-F

Given a leaking top-operated bottom outlet valve, close valve completely to control leak.

TANK - 4.1.5.

NFPA 12.4.1(5)
OSAH HMSPEC-F

Given leaking fittings on a chlorine tank car, use the Chlorine C kit to control the leak.

TANK - 4.1.6.

NFPA 12.4.1(6)
OSAH HMSPEC-F

Given the following types of leaks on various types of tank cars, plug or patch those leaks:

- Cracks, splits, or tears
- Irregular-shaped hole
- Puncture

TANK - 4.1.7.

NFPA 12.4.1(7)
OSAH HMSPEC-F

Given the applicable equipment and resources, demonstrate the following:

- Flaring of liquids and vapors
- Transferring of liquids and vapors
- Venting

TANK - 4.1.8.

NFPA 12.4.1(8)
OSAH HMSPEC-F

Given the applicable resources, perform the following tasks:

- Set and release brakes on rail cars
- Shut off locomotives using the fuel shutoff and the battery disconnect
- Uncouple rail cars

TANK - 4.1.9. NFPA 12.4.1(9) *OSAH HMSPEC-F*	Demonstrate bonding and grounding procedures for the transfer of flammable and combustible products from tank cars, or other products that can give off flammable gases or vapors when heated or contaminated, including the following: 1. Selection of proper equipment 2. Sequence of bonding and grounding connections 3. Testing of bonding and grounding connections
TANK - 4.1.10. NFPA 12.4.1(10) *OSAH HMSPEC-F*	Given an example of a flammable liquid spill from a tank car, describe the procedures for site safety and fire control during cleanup and removal operations.

Technician with a Cargo Tank Specialty

Technicians with a cargo tank specialty are those persons who provide technical support pertaining to cargo tanks, provide oversight for product removal and movement of damaged cargo tanks, and act as a liaison between technicians and other outside resources.

Note that NFPA 472, Chapter 13, "Competencies for Technicians with a Cargo Tank Specialty", is not intended as a mandate that hazardous materials response teams must include technicians with a cargo tank specialty in order to perform operations at such incidents. Technicians operating within the bounds of their training as listed in NFPA 472, Chapter 7, are able to intervene at cargo tank incidents. However, the following additional competencies are provided for those jurisdictions or hazardous materials response teams who desire that some or all of their technicians have more complete and in-depth knowledge of cargo tanks.

The hazardous materials technician with a cargo tank specialty shall be trained to meet all competencies for the awareness, operations, and technician levels and the competencies listed in this section. They shall also receive training to meet governmental occupational health and safety regulations.

(Reference: NFPA 472 2006, Chapter 13, "Competencies for Technicians with a Cargo Tank Specialty")

CARGO 1. - General

CARGO - 1.1.

NFPA 13.1.3.2(1)
OSHA HMSPEC-E

Analyze a hazardous materials/WMD incident involving cargo tanks to determine the complexity of the problem and potential outcomes.

CARGO - 1.1.1.

NFPA 13.1.3.2(1)(a)
OSHA HMSPEC-E

Determine the type and extent of damage to cargo tanks.

CARGO - 1.1.2.

NFPA 13.1.3.2(1)(b)
OSHA HMSPEC-E

Predict the likely behavior of cargo tanks and their contents in an emergency.

CARGO - 1.2.

NFPA 13.1.3.2(2)
OSHA HMSPEC-A,C,D,E,F

Plan a response for an emergency involving cargo tanks within the capabilities and competencies of available personnel, personal protective equipment, and control equipment by determining the response options (offensive, defensive, and nonintervention) for a hazardous materials emergency involving cargo tanks.

CARGO - 1.3.

NFPA 13.1.3.2(3)
OSHA HMSPEC-A,C,D,E,F

Implement or oversee the implementation of the planned response to a hazardous materials/WMD incident involving cargo tanks.

CARGO 2. - Analyzing the Incident

CARGO - 2.1.

NFPA 13.2.1
OSHA HMSPEC-B,E

Determining the Type and Extent of Damage to Cargo Tanks
Given examples of damaged cargo tanks, technicians with a cargo tank specialty shall describe the type and extent of damage to each cargo tank and its fittings and shall complete the following tasks:

CARGO - 2.1.1.

NFPA 13.2.1(1)
OSHA HMSPEC-B,E

Given the specification mark for a cargo tank and the reference materials, describe the tank's basic construction and features.

CARGO - 2.1.2.

NFPA 13.2.1(2)
OSHA HMSPEC-B,E

Given examples of cargo tanks (some jacketed and some not jacketed), point out the jacketed cargo tanks.

CARGO - 2.1.3.

NFPA 13.2.1(3)
OSHA HMSPEC-B,E

Given examples of the following types of cargo tank damage, identify the type of damage in each example:

- Corrosion
- Crack
- Dent
- Flame impingement
- Puncture
- Scrape, score, gouge, or loss of metal

CARGO - 2.1.4.

NFPA 13.2.1(4)
OSHA HMSPEC-B,E

Given examples of damage to an MC-331 cargo tank, determine the extent of damage to the heat-affected zone.

CARGO - 2.1.5.

NFPA 13.2.1(5)
OSHA HMSPEC-B,E

Given an MC-331 cargo tank containing a liquefied gas, determine the amount of liquid in the tank.

CARGO - 2.1.6.

NFPA 13.2.1(6)
OSHA HMSPEC-B,E

Given an MC-306/DOT-406, MC-307/DOT-407, and MC-312/DOT-412 cargo tanks, point out and explain the design, construction, and operation of each of the following safety devices:

1. Dome cover design
2. Emergency remote shutoff device
3. Internal safety valve or external valve with accident protection, including method of activation (air, cable, hydraulic)
4. Pressure and vacuum relief protection devices
5. Shear-type breakaway piping

CARGO - 2.1.7.

NFPA 13.2.1(7)
OSHA HMSPEC-B,E

Given an MC-331 and MC-338 cargo tank, point out and explain the design, construction, and operation of each of the following safety devices:

1. Emergency remote shutoff device
2. Excess flow valve
3. Fusible link and nut assemblies
4. Internal safety valve or external valve with accident protection, including method of activation (air, cable, hydraulic)
5. Pressure relief protection devices

CARGO - 2.1.8.

NFPA 13.2.1(8)
OSHA HMSPEC-B,E

Given an MC-306/DOT-406 cargo tank, identify and describe the following normal methods of loading and unloading:

1. Bottom loading
2. Top loading
3. Vapor recovery system

CARGO - 2.1.9.

NFPA 13.2.1(9)
OSHA HMSPEC-B,E

Given the following types of cargo tank trucks and tube trailer, identify and describe the normal methods of loading and unloading:

- MC-307/DOT-407
- MC-312/DOT-412
- MC-331
- MC-338
- Compressed gas tube trailer

CARGO - 2.1.10.

NFPA 13.2.1(10)
OSHA HMSPEC-B,E

Describe the normal and emergency methods of activation for the following types of cargo tank truck valve systems:

- Air
- Cable
- Hydraulic

CARGO - 2.1.11.

NFPA 13.2.1(11)
OSHA HMSPEC-B,E

Given a cargo tank involved in an emergency, identify the factors to be evaluated as part of the cargo tank damage assessment process, including the following:

1. Amount of product both released and remaining in the cargo tanks
2. Container stress applied to the cargo tank
3. Nature of the emergency (e.g., rollover, vehicle accident, struck by object)
4. Number of compartments
5. Pressurized or nonpressurized
6. Type and nature of tank damage (e.g., puncture, dome cover leak, valve failure,)
7. Type of cargo tank (MC or DOT specification)
8. Type of tank metal (e.g., aluminum vs. stainless steel)

CARGO - 2.2.

NFPA 13.2.2
OSHA HMSPEC-B,E

Predicting the Likely Behavior of the Cargo Tank and its Contents

Technicians with a cargo tank specialty shall predict the likely behavior of the cargo tank and its contents and shall complete the following tasks:

CARGO - 2.2.1.

NFPA 13.2.2(1)
OSHA HMSPEC-B,E

Given the following types of cargo tanks (including a tube trailer), describe the likely breach/release mechanisms:

- MC-306/DOT-406 cargo tanks
- MC-307/DOT-407 cargo tanks
- MC-312/DOT-412 cargo tanks
- MC-331 cargo tanks
- MC-338 cargo tanks
- Compressed gas tube trailer

CARGO - 2.2.2.

NFPA 13.2.2(2)
OSHA HMSPEC-B,E

Describe the difference in types of construction materials used in cargo tanks and their significance in assessing tank damage.

CARGO - 2.2.3.

NFPA 13.2.2(3)
OSHA HMSPEC-B,E

Describe the significance of the jacket on cargo tanks in assessing tank damage.

CARGO - 2.2.4.

NFPA 13.2.2(4)
OSHA HMSPEC-B,E

Describe the significance of each of the following types of damage on different types of cargo tanks in assessing tank damage:

1. Corrosion (internal/external)
2. Crack
3. Dent
4. Flame impingement
5. Puncture
6. Scrape, score, gouge, or loss of metal

CARGO - 2.2.5.

NFPA 13.2.2(5)
OSHA HMSPEC-B,E

Given examples of damage to the heat-affected zone on a MC-331 cargo tank, describe the significance of the damage in assessing tank damage.

CARGO 3. - Planning the Response

CARGO - 3.1.

NFPA 13.3.1
OSHA HMSPEC-F

Determining the Response Options

Given the analysis of an emergency involving cargo tanks, technicians with a cargo tank specialty shall determine the response options for each cargo tank involved and shall complete the following tasks:

CARGO - 3.1.1.

NFPA 13.3.1(1)
OSHA HMSPEC-D,F

Given an incident involving a cargo tank, describe the methods, procedures, risks, safety precautions, and equipment that are required to implement spill and leak control procedures.

CARGO - 3.1.2.

NFPA 13.3.1(2)
OSHA HMSPEC-F

Given an overturned cargo tank, describe the factors to be evaluated for up-righting, including the following:

- Condition and weight of the cargo tank
- Lifting capabilities of the wreckers and cranes
- Preferred lifting points
- Selection of lifting straps and/or air bags
- Site safety precautions
- Type and nature of stress applied to the cargo tank
- Type of cargo tank and material of construction

CARGO 4. - Planning the Response

CARGO - 4.1.

NFPA 13.4.1
OSHA HMSPEC-F

Implementing the Planned Response

Given an analysis of an emergency involving a cargo tank and the planned response, technicians with a cargo tank specialty shall implement or oversee the implementation of the selected response options safely and effectively and shall complete the following tasks:

CARGO - 4.1.1.

NFPA 13.4.1(1)
OSHA HMSPEC-F

Demonstrate the methods for containing the following leaks on liquid cargo tanks (e.g., MC-306/DOT-406, MC-307/DOT-407, and MC-312/DOT-412):

- Dome cover leak
- Irregular-shaped hole
- Pressure relief devices (e.g., vents, burst disc)
- Puncture
- Split or tear
- Valves and piping

CARGO - 4.1.2.

NFPA 13.4.1(2)
OSHA HMSPEC-F

Describe the methods for containing the following leaks in MC-331 and MC-338 cargo tanks:

- Crack
- Failure of pressure relief device (e.g., relief valve, burst disc)
- Piping failure

CARGO - 4.1.3.

NFPA 13.4.1(3)
OSHA HMSPEC-F

Demonstrate bonding and grounding procedures for the transfer of flammable and combustible products from cargo tanks, or other products that can give off flammable gases or vapors when heated or contaminated, including the following:

- Selection of proper equipment
- Sequence of bonding and grounding connections
- Proper testing of bonding and grounding connections

CARGO - 4.1.4.

NFPA 13.4.1(4)
OSHA HMSPEC-F

Given the following product transfer and recovery equipment, demonstrate the safe application and use of each of the following:

- Portable pumps (air, electrical, gasoline/diesel)
- Pressure transfer
- Vacuum trucks
- Vehicles with power-take-off (PTO) driven pumps

CARGO - 4.1.5.

NFPA 13.4.1(5)
OSHA HMSPEC- F

Given a scenario involving an overturned MC-306/DOT-406 cargo tank, demonstrate the safe procedures for the following methods of product removal and transfer:

1. Drilling
2. Internal safety valve
3. Unloading lines
4. Vapor recovery lines

CARGO - 4.1.6.

NFPA 13.4.1(6)
OSHA HMSPEC-F

Given a scenario involving an overturned MC-307/DOT-407 cargo tank, demonstrate the safe procedures for product removal and transfer.

CARGO - 4.1.7.

NFPA 13.4.1(7)
OSHA HMSPEC-F

Given a scenario involving an overturned MC-331 cargo tank, demonstrate the safe procedures for product removal and transfer.

CARGO - 4.1.8.

NFPA 13.4.1(8)
OSHA HMSPEC-F

Given the necessary resources, demonstrate the flaring of a MC-331 flammable gas cargo tank.

CARGO - 4.1.9.

NFPA 13.4.1(9)
OSHA HMSPEC-F

Given a scenario involving a flammable liquid spill from a cargo tank, describe the procedures for site safety and fire control during cleanup and removal operations.

Technician with an Intermodal Tank Specialty

Technicians with an intermodal tank specialty are those persons who provide technical support pertaining to intermodal tanks, provide oversight for product removal and movement of damaged intermodal tanks, and act as a liaison between technicians and other outside resources.

Note that NFPA 472, Chapter 14, “Competencies for Technicians with an Intermodal Tank Specialty”, is not intended as a mandate that hazardous materials response teams must include technicians with an intermodal tank specialty in order to perform operations at such incidents. Technicians operating within the bounds of their training as listed in NFPA 472, Chapter 7, are able to intervene at railroad incidents. However, the following additional competencies are provided for those jurisdictions or hazardous materials response teams who desire that some or all of their technicians have more complete and in-depth knowledge of intermodal tanks.

The hazardous materials technician with an intermodal tank specialty shall be trained to meet all competencies for the awareness, operations, and technician levels and the competencies of this chapter. They shall also receive training to meet governmental occupational health and safety regulations.

INTML 1. - General

INTML - 1.1.

NFPA 14.1.3.2(1)
OSHA HMSPEC-E

Analyzing the Incident

Analyze a hazardous materials/WMD incident involving an intermodal tank to determine the complexity of the problem and potential outcomes.

INTML - 1.1.1.

NFPA 14.1.3.2(1)a
OSHA HMSPEC-E

Determine the type and extent of damage to an intermodal tank.

INTML - 1.1.2.

NFPA 14.1.3.2(1)b
OSHA HMSPEC-E

Predict the likely behavior of an intermodal tank and its contents in an emergency.

INTML - 1.2.

NFPA 14.1.3.2(2)
OSHA HMSPEC-E

Planning the Response

Plan a response for an emergency involving an intermodal tank within the capabilities and competencies of available personnel, personal protective equipment, and control equipment by determining the response options (offensive, defensive, and nonintervention) for a hazardous materials emergency involving intermodal tanks

INTML - 1.3.

NFPA 14.1.3.2(3)
OSHA HMSPEC-A,C,D,E,F

Implementing the Planned Response

Implement or oversee the implementation of the planned response to a hazardous materials/WMD incident involving intermodal tanks.

INTML 2. - Analyzing the Incident

INTML - 2.1.

NFPA 14.2.1
OSHA HMSPEC-B, E

Determining the Type and Extent of Damage to Intermodal Tanks

Given examples of damaged intermodal tanks, the hazardous materials technician with an intermodal tank specialty shall describe the type and extent of damage to each intermodal tank and its fittings and shall complete the following tasks:

INTML - 2.1.1.

NFPA 14.2.1 (1)
OSHA HMSPEC-B, E

Given the specification mark for an intermodal tank and the reference materials, describe the tank's basic construction and features.

INTML - 2.1.2.

NFPA 14.2.1 (2)
OSHA HMSPEC-B, E

Given examples of intermodal tanks (some jacketed and some not jacketed), point out the jacketed intermodal tanks.

INTML - 2.1.3.

NFPA 14.2.1 (3)
OSHA HMSPEC-B, E

Given examples of various intermodal tanks, point out and explain the design and purpose of each of the following intermodal tank components, where present:

- Corner casting
- Data plate
- Heater coils (steam/electric)
- Insulation
- Jacket
- Refrigeration unit
- Supporting frame

INTML - 2.1.4.

NFPA 14.2.1 (4)
OSHA HMSPEC-B, E

Given examples of various fittings arrangements for pressure, nonpressure, and cryogenic intermodal tanks, point out and explain the design, construction, and operation of each of the following fittings, when present:

- Air line connection
- Bottom outlet valve
- Gauging device
- Liquid or vapor valve
- Thermometer
- Manhole cover
- Pressure gauge
- Sample valve
- Spill box
- Thermometer well
- Top outlet

INTML - 2.1.5.

NFPA 14.2.1 (5)
OSHA HMSPEC-B, E

Given examples of various safety devices for pressure, nonpressure, and cryogenic intermodal tanks, point out and explain the design, construction, and operation of each of the following safety devices, where present:

- Emergency remote shutoff device
- Excess flow valve
- Fusible link/nut assemblies
- Regulator valve
- Rupture disc
- Pressure relief valve

INTML - 2.1.6.

NFPA 14.2.1 (6)
OSHA HMSPEC-B, E

Given the following types of intermodal tank damage, identify the type of damage in each example and explain its significance:

- Corrosion (internal/external)
- Crack
- Dent
- Flame impingement
- Metal loss (gouge/score)
- Puncture

INTML - 2.1.7.

NFPA 14.2.1 (7)
OSHA HMSPEC-B, E

Given three examples of damage to the framework of intermodal tanks, describe the damage in each example and explain its significance in the analysis process.

INTML - 2.1.8.

NFPA 14.2.1 (8)
OSHA HMSPEC-B, E

Given an intermodal tank involved in an emergency, identify the factors to be evaluated as part of the intermodal tank damage assessment process, including the following:

1. Amount of product both released and remaining in the intermodal tank
2. Container stress applied to the intermodal tank
3. Nature of the emergency
4. Number of compartments
5. Pressurized or nonpressurized
6. Type and nature of tank damage
7. Type of intermodal tank
8. Type of tank metal

INTML - 2.1.9.

NFPA 14.2.1 (9)
OSHA HMSPEC-B, E

Given a pressurized intermodal tank containing a liquefied gas, determine the amount of liquid in the tank.

INTML - 2.1.10.

NFPA 14.2.1 (10)
OSHA HMSPEC-B, E

Given examples of damage to a pressurized intermodal tank, determine the extent of damage to the heat-affected zone.

INTML - 2.2.

NFPA 14.2.2
OSHA HMSPEC-B, E

Predicting the Likely Behavior of the Intermodal Tank and its Contents

Technicians with an intermodal tank specialty shall predict the likely behavior of the intermodal tank and its contents and shall complete the following tasks:

INTML - 2.2.1.

NFPA 14.2.2 (1)
OSHA HMSPEC-B, E

Given the following types of intermodal tanks, describe the likely breach/release mechanisms:

- IMO Type 1/IM-101
- IMO Type 2/IM-102
- IMO Type 5/DOT-51
- DOT-56
- DOT-57
- DOT-60
- Cryogenic (IMO Type 7)

INTML - 2.2.2.

NFPA 14.2.2 (2)
OSHA HMSPEC-B, E

Describe the difference in types of construction materials used in intermodal tanks relative to assessing tank damage.

INTML 3. - Planning the Response

INTML - 3.1.

NFPA 14.3.1
OSHA HMSPEC-F

Determining the Response Options

Given the analysis of an emergency involving intermodal tanks, technicians with an intermodal tank specialty shall determine the response options for each intermodal tank involved and shall complete the following tasks:

INTML - 3.1.1.

NFPA 14.3.1 (1)
OSHA HMSPEC-F

Describe the purpose of, potential risks associated with, procedures for, equipment required to implement, and safety precautions for the following product removal techniques for intermodal tanks:

1. Flaring liquids and vapors
2. Hot tapping
3. Transferring liquids and vapors (pressure/pump)

INTML - 3.1.2.

NFPA 14.3.1 (2)
OSHA HMSPEC-F

Describe the purpose of, procedures for, and risks associated with controlling leaks from various fittings on intermodal tanks, including equipment needed and safety precautions.

INTML 4. - Implementing the Planned Response

INTML - 4.1.

NFPA 14.4
OSHA HMSPEC-F

Implementing the Planned Response

Given an analysis of an emergency involving intermodal tanks and the planned response, technicians with an intermodal tank specialty shall implement or oversee the implementation of the selected response options safely and effectively and shall complete the following tasks:

INTML - 4.1.1.

NFPA 14.4(1)
OSHA HMSPEC-F

Given leaks from the following fittings on intermodal tanks, control the leaks using approved methods and procedures:

- Bottom outlet
- Liquid/vapor valve
- Manway cover
- Pressure relief device
- Tank

INTML - 4.1.2.

NFPA 14.4 (2)
OSHA HMSPEC-F

Demonstrate approved procedures for the following types of emergency product removal:

- Gas/liquid transfer (pressure/pump)
- Flaring
- Venting

INTML - 4.1.3.

NFPA 14.4 (3)
OSHA HMSPEC-F

Demonstrate bonding and grounding procedures for the transfer of flammable and combustible products from an intermodal tank, or other products that can give off flammable gases or vapors when heated or contaminated, including the following:

1. Selection of proper equipment
2. Sequence of bonding and grounding connections
3. Testing of bonding and grounding connections

INTML - 4.1.4.

NFPA 14.4 (4)
OSHA HMSPEC-F

Demonstrate the methods for containing the following leaks on liquid intermodal tanks (e.g., IM-101 and IM-102):

1. Dome cover leak
2. Irregular-shaped hole
3. Pressure relief devices (e.g., vents, burst disc)
4. Puncture
5. Split or tear
6. Valves and piping

INTML - 4.1.5.

NFPA 14.4 (5)
OSHA HMSPEC-F

Describe the methods for containing the following leaks in pressure intermodal tanks:

- Crack
- Failure of pressure relief device (e.g., relief valve, burst disc)
- Piping failure

INTML - 4.1.6.

NFPA 14.4 (6)
OSHA HMSPEC-F

Given the following product transfer and recovery equipment, demonstrate the safe and correct application and use of the following:

1. Portable pumps (air, electrical, gasoline/diesel)
2. Pressure transfer
3. Vacuum trucks
4. Vehicles with power-take-off driven pumps

INTML - 4.1.7.

NFPA 14.4 (7)
OSHA HMSPEC-F

Given a scenario involving an overturned liquid intermodal tank, demonstrate the safe procedures for product removal and transfer.

INTML - 4.1.8.

NFPA 14.4 (9)
OSHA HMSPEC-F

Given the necessary resources, demonstrate the flaring of a pressure flammable gas intermodal tank.

INTML - 4.1.9.

NFPA 14.4 (10)
OSHA HMSPEC-F

Given a scenario involving a flammable liquid spill from an intermodal tank, describe the procedures for site safety and fire control during cleanup and removal operations.

INTML - 4.1.10.

Technician with a Marine Tank Vessel Specialty

Technicians with a marine tank vessel specialty are those persons who provide technical support pertaining to marine tank vessels, provide oversight for product removal and movement of damaged marine tank vessels, and act as liaisons between technicians and other outside resources.

Note that NFPA 472, Chapter 15, "Competencies for Technicians with a Marine Tank Vessel Specialty", is not intended as a mandate that hazardous materials response teams must include technicians with a marine tank vessel specialty in order to perform operations at such incidents. Technicians operating within the bounds of their training as listed in NFPA 472, Chapter 7, are able to intervene at marine tank vessel incidents. However, the following additional competencies are provided for those jurisdictions or hazardous materials response teams who desire that some or all of their technicians have more complete and in-depth knowledge of marine vessel tanks.

The hazardous materials technician with a marine tank vessel specialty shall be trained to meet all competencies for the awareness, operations, and technician levels and the competencies of this chapter. They shall also receive training to meet governmental occupational health and safety regulations.

(Reference: NFPA 472 2006, Chapter 15, "Competencies for Technicians with a Marine Tank Vessel Specialty")

MARINE 1. - General

MARINE - 1.1.

NFPA 15.1.3.2(1)

Analyzing the Incident

Analyze a hazardous materials incident involving a marine tank vessel to determine the magnitude of the problem in terms of outcomes by completing the following tasks:

MARINE - 1.1.1.

NFPA 15.1.3.2(1)(a)

Determine the type and extent of damage to a marine tank vessel and its cargo systems.

MARINE - 1.1.2.

NFPA 15.1.3.2(1)(b)

Predict the likely behavior of a marine tank vessel and its contents in an emergency.

MARINE - 1.1.3.

NFPA 15.1.3.2(1)(c)

Establish initial approved controls.

MARINE - 1.2.

NFPA 15.1.3.2(2)

Planning the Response

Plan a response for an emergency involving marine tank vessels within the capabilities and competencies of available personnel, personal protective equipment, and control equipment by completing the following tasks:

MARINE - 1.2.1.

NFPA 15.1.3.2(2)(a)

Determine the response options (offensive, defensive, and nonintervention) for a hazardous materials emergency involving marine tank vessels

MARINE - 1.2.2.

NFPA 15.1.3.2(2)(b)

Ensure that the options are within the capabilities and competencies of available personnel, personal protective equipment, and control equipment.

MARINE - 1.3.

NFPA 15.1.3.2(3)

Implementing the Planned Response

Implement the planned response to a hazardous materials incident involving marine tank vessels.

MARINE 2. - Analyzing the Incident

MARINE - 2.1.

NFPA 15.2.1

Determining the Type and Extent of Damage to Marine Tank Vessels

Given examples of damaged marine tank vessels, hazardous materials technicians with a marine tank vessel specialty shall describe the type and extent of damage to each marine tank vessel and its cargo systems and shall complete the following tasks:

MARINE - 2.1.1.

NFPA 15.2.1(1)

Given examples of marine tank vessels, describe a marine tank vessel's basic construction and arrangement features.

MARINE - 2.1.2.

NFPA 15.2.1(2)

Given examples of various marine tank vessels, point out and explain the design and purpose of each of the various types of marine tank vessel cargo compartment design, structure and components, where present.

MARINE - 2.1.3.

NFPA 15.2.1(3)

Given examples of various fittings arrangements for marine tank vessels, point out and explain the design, construction, and operation of each.

MARINE - 2.1.4.

NFPA 15.2.1(4)

Given a barge or tank ship, identify and describe the normal methods of cargo transfer.

MARINE - 2.1.5.

NFPA 15.2.1(5)

Given a barge or tank ship, describe the following systems/processes used during cargo transfer:

1. Vapor recovery system
2. Vapor balancing
3. Pressuring cargo
4. Vacuum systems
5. Padding tanks
6. Inert gas system (tank ship only)

MARINE - 2.1.6.

NFPA 15.2.1(6)

Given the following types of cargo compartment damage on marine tank vessels, identify the type of damage in each example and explain its significance:

- Crack, puncture, slit, or tear
- Dent
- Flame impingement
- Over- or underpressurization
- Brittle fracture
- Pinhole or corrosion

MARINE - 2.1.7.

NFPA 15.2.1(7)

Given examples of the types of emergency situations a marine tank vessel can experience that might result in damage to the vessel or its cargo transfer system, describe the following types of marine tank vessel emergencies and explain their significance related to the vessel's seaworthiness and cargo containment:

1. Grounding
2. Stranding
3. Allision/collision
4. Foundering
5. Heavy weather damage
6. Fire
7. Explosion/BLEVE

MARINE - 2.1.8.

NFPA 15.2.1(8)

Given a marine vessel involved in an emergency, identify the factors to be evaluated as part of the marine tank vessel damage assessment process, including the following:

- Type of marine tank vessel
- Pressurized or nonpressurized cargo system
- Number of cargo compartments
- Type of cargoes in the damaged cargo system
- Type of other cargoes on the marine tank vessel (outside the damaged area)
- Cargo compatibility (and incompatibility)
- Stability and stresses applied to the marine tank vessel
- Type and nature of cargo system damage
- Amount of product both released and remaining in the cargo compartment

MARINE - 2.1.9.

NFPA 15.2.1(9)

Given a cargo system containing a bulk liquid, determine the amount of liquid in the cargo tank.

MARINE - 2.2.

NFPA 15.2.2

Predicting the Likely Behavior of the Marine Tank Vessel and Its Contents.

Hazardous materials technicians with a marine tank vessel specialty shall understand the likely behavior of the marine tank vessel and its contents and shall complete the following tasks:

MARINE - 2.2.1.

NFPA 15.2.2(1)

Given the following types of marine tank vessels, provide examples of probable causes of releases:

- Chemical ships
- Product/chemical tank ships
- Sophisticated parcel chemical ships
- Specialized chemical ships
- Liquefied gas ships
- Fully pressurized tank ships
- Semi-pressurized tank ships
- Ethylene (LPG and chemical gas) ships
- Fully refrigerated tank ships
- Liquefied natural gas (LNG) ships
- Barges

MARINE - 2.2.2.

NFPA 15.2.2(1)

Describe the significance of “lining” and “cladding” on cargo compartments in assessing marine tank vessel damage.

MARINE - 2.2.3.

NFPA 15.2.2(1)

Describe the significance of “coated” and “uncoated” cargo compartments in assessing marine tank vessel damage.

MARINE - 2.2.4.

NFPA 15.2.2(1)

Describe the significance of “insulation” or “thermal protection” on cargo compartments in assessing marine tank vessel damage.

MARINE - 2.2.5.

NFPA 15.2.2(1)

Describe the significance of heating or refrigeration coils in cargo compartments in assessing marine tank vessel damage.

MARINE - 2.2.6.

NFPA 15.2.2(1)

Given the following examples of damage to the cargo compartments and cargo transfer systems on marine tank vessels, describe their significance in the risk analysis process:

- Cargo spills or releases
- Tank leakage within the vessel
- Vacuum damage (liquefied gases highly soluble in water)

MARINE - 2.2.7.

NFPA 15.2.2(1)

Describe the significance of the following types of internal and external forces on a marine tank vessel's stability in assessing marine tank vessel damage:

1. Wind, waves, tides, and currents
2. Movement of nearby vessels
3. Shifting, adding, or removing weight
4. Reduction of reserve buoyancy
5. Free surface effects
6. Free communication effects in a flooded compartment

MARINE 3. - Planning the Response

MARINE - 3.1.

NFPA 15.3.1

Determining the Response Options

Given the analysis of an emergency involving marine tank vessels, hazardous materials technicians with a marine tank vessel specialty shall determine the response options for each marine tank vessel involved and shall complete the following tasks:

MARINE - 3.1.1.

NFPA 15.3.1(1)

Given an incident involving a marine tank vessel, describe the methods, procedures, risks, safety precautions, and equipment that are required to implement hazardous cargo spill, release, and leak control procedures.

MARINE - 3.1.2.

NFPA 15.3.1(2)

Describe the purpose of, potential risks associated with, procedures for, equipment required to implement, and safety precautions for the following product removal techniques for hazardous liquids and gases:

1. Vessel-to-shore transfer
2. Vessel-to-vessel transfer
3. Vessel-to-tank truck transfer
4. Vessel-to-rail car transfer
5. Internal transfer within the vessel
6. Other types of transfers [e.g., portable liquid storage tanks (frac tanks)]

MARINE - 3.1.3.

NFPA 15.3.1(3)

Describe the purpose of, procedures for, and risks associated with controlling leaks from various fittings on marine tank vessel cargo systems, including equipment needed and safety precautions.

MARINE 4. - Implementing the Planned Response

MARINE - 4.1.

NFPA 15.4

Implementing the Planned Response

Given an analysis of an emergency involving marine tank vessels and the planned response, hazardous materials technicians with a marine tank vessel specialty shall implement or oversee the implementation of the selected response options safely and effectively and shall complete the following tasks:

MARINE - 4.1.1.

NFPA 15.4(1)

Given leaks from the following fittings on marine tank vessels, describe approved methods and procedures for controlling the leaks:

- Tank hatch/expansion trunk
- Liquid/vapor valve or fitting
- Cargo compartment vent
- Pressure relief device
- Cargo system manifold or pipeline

MARINE - 4.1.2.

NFPA 15.4(2)

Describe approved procedures for the following types of emergency cargo removal:

- Gas/liquid transfer (pressure/pump)
- Flaring
- Venting

MARINE - 4.1.3.

NFPA 15.4(3)

Describe the importance of bonding and grounding procedures for the transfer of flammable and combustible cargoes from a marine tank vessel or other products that can give off flammable gases or vapors when heated or contaminated.

MARINE - 4.1.4.

NFPA 15.4(4)

Demonstrate the methods for containing the following leaks on marine tank vessels:

1. Puncture
2. Irregular-shaped hole
3. Split or tear
4. Dome cover leak
5. Valves and piping failure
6. Pressure relief devices (e.g., vents, burst disc)

MARINE - 4.1.5.

NFPA 15.4(5)

Given the following product transfer and recovery equipment, describe the safe and correct application and use of the following:

- Portable pumps (air, electrical, hydraulic, gasoline/diesel)
- Vehicles with power-take-off-driven pumps
- Pressure transfer
- Vacuum trucks

MARINE - 4.1.6.

NFPA 15.4(6)

Given the necessary resources, describe the flaring of a pressure flammable gas from a liquefied gas tank vessel (ship or barge as applicable).

MARINE - 4.1.7.

NFPA 15.4(7)

Given a scenario involving flammable liquid spill from a marine tank vessel, describe the procedures for site safety and fire control during cleanup and removal operations.