12.1.3.2 If a hazardous materials response team decides to train some or all its technicians to have in-depth knowledge of tank cars, this chapter shall set out the required competencies.

12.2 Competencies — Analyzing the Incident.

Δ **12.2.1 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:

(1) Given the specification mark for a tank car and the reference materials, describe the car's basic construction and features, including authorizing agency, class designation, significance of letter after the class designation (A, J, S, and T for nonpressure and pressure tank cars; P and R for DOT-117 tank cars; and A, C, and, D for DOT 113 tank cars), tank test pressure, material of construction, and fittings, linings, and materials as shown in Table 12.2.1.

(2) Given an example of a tank car, identify the "B" end of the car

(3) Given examples of various tank cars, identify each of the following tank car components present, and describe the design and purpose of each component:

(a) Body bolster
(b) Head shield
(c) Heater coils — interior or exterior
(d) Jacket
(e) Lining and cladding
(f) Shelf couplers
(g) Tank
(h) Trucks (pin and bowl assembly)
(i) Underframe — continuous or stub sill
(j) Safety appliances

(4) Given examples of tank cars (jacketed and not jacketed), identify the jacketed tank cars

(5) Describe the difference between insulation and thermal protection on tank cars

(6) Describe the difference between interior and exterior heater coils on tank cars

(7) Given examples of various fittings arrangements for pressure, nonpressure, cryogenic, and carbon dioxide tank cars (including examples of each of the following fittings), identify each fitting present by name, and describe the design, construction, and operation of each of the following fittings:

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

i. Air valve
ii. Bottom outlet nozzle
iii. Bottom outlet valves (top operated with stuffing box, bottom operated — internal or external ball, wafer-sphere, plug)
iv. Quick-fill hole cover
v. Carbon dioxide tank car fittings
vi. Cryogenic liquid tank car fittings
vii. Excess flow valve (product activated)
viii. Excess flow check valve (spring activated)
ix. Flange for manway and valves
x. Liquid valve and vapor valve (ball versus plug type)
xi. Indicator device (needle valve, tricock, and telltale indicator)
xii. Eduction piping

(b) Fittings for pressure relief, including the following:

i. Pressure regulators on carbon dioxide cars and liquefied atmospheric gases in cryogenic liquid tank cars
ii. Pressure relief devices [reclosing pressure relief device (pressure relief valve), nonclosing pressure relief device (safety vent), or a nonclosing pressure relief device used in combination with a reclosing pressure relief device combination pressure relief valve]
iii. Staged pressure relief system for a carbon dioxide car
iv. Vacuum relief valve (negative pressure or vacuum)
v. Breather vent (continuous vent) for hydrogen peroxide tank cars

(c) Fittings for gauging, including the following:

i. Closed gauging devices (e.g., magnetic)
ii. Other gauging devices (T-bar, long pole, short pole)

(d) Miscellaneous fittings, including the following:

i. Manway, hinged and bolted manway cover, manway cover bolts, pressure plates, and protective housing
ii. Sample line
iii. Sump
iv. Thermometer well
v. Washout
vi. GPS transponders

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

(a) Air valve
(b) Bottom outlet nozzle
(c) Bottom outlet valve and top-operated bottom outlet valve (with stuffing box)
(d) Closed gauging devices (e.g., magnetic)
(e) Flange
(f) Liquid valve and vapor valve (ball versus plug type)
(g) Manway, manway cover plate, hinged and bolted manway cover, protective housing
(h) Non-reclosing pressure relief devices (safety vent with rupture disc)
(i) Pressure regulators on carbon dioxide cars and liquefied atmospheric gases in cryogenic liquid tank cars
(j) Quick-fill hole cover
(k) Reclosing pressure relief device (pressure relief valves and combination pressure relief valves)
(l) Sample line
(m) Thermometer well
(n) Vacuum relief valve (negative pressure or vacuum)
(o) Washout

(9) Given examples of each of the following types of tank car damage, identify the type of damage in each example:
   (a) Corrosion
   (b) Crack
   (c) Dent
   (d) Flame impingement
   (e) Puncture
   (f) Score, gouge, wheel burn, rail burn

(10) Given examples (actual or simulated) of scores, gouges, wheel burns, and rail burns, perform each of the following tasks:
   (a) Measure the depth of each score, gouge, wheel burn, and rail burn
   (b) Identify where each score, gouge, wheel burn, and rail burn crosses a weld, if that condition exists
   (c) Measure the depth of the weld metal removed at any point where the score, gouge, wheel burn, and rail burn crosses a weld
   (d)* 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

(11) Given examples (actual or simulated) of dents and rail burns, perform each of the following tasks:
   (a) Determine the radius of the curvature of each dent or rail burn]
   (b) Recognize those examples that include cracks at the point of minimum curvature

(12) Given examples of damaged tank car fittings, describe the extent of damage to those fittings

(13) Given examples of tank car tank damage, describe the extent of damage to the tank car tank

(14) Given a tank car, its contents, and the applicable equipment and reference material, determine the pressure in the tank, using either of the following methods:
   (a) Pressure gauge
   (b) Temperature of the contents

(15)* Given a tank car, use the tank car's gauging device to determine the outage in the tank

N **Table 12.2.1 Current Tank Car Specifications**

Tank Car Types	DOT Specifications	AAR Specifications
Nonpressure	DOT-111, DOT-115, DOT-117 *(DOT-103 and DOT-104 are authorized for use, but new construction is not authorized)*	AAR-206, AAR-211 *(AAR-211 is authorized for use, but new construction is not authorized)*
Pressure	DOT-105, DOT-109, DOT-112, DOT-114, DOT-120	
Cryogenic liquid	DOT-113	AAR-204

12.2.2 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:

(1) Given the following types of tank cars, describe the likely breach and release mechanisms associated with each type:
   (a) Cryogenic liquid tank cars
   (b) Nonpressure tank cars
   (c) Pressure tank cars

(2) Describe the difference in the following types of construction materials used in tank cars and their significance in assessing tank damage as shown in Table 12.2.2:
   (a) High-alloy steel plate
   (b) Aluminum alloy plate
   (c) Carbon steel plate
   (d) Nickel plate

(3) Describe the significance of selection of lading for compatibility with tank car construction material

(4) Describe the significance of lining and cladding on tank cars in assessing tank damage

(5) Describe the significance of the jacket on tank cars in assessing tank damage

(6) Describe the significance of insulation and thermal protection on tank cars in assessing tank damage

(7) Describe the significance of jacketed and sprayed-on thermal protection on tank cars in assessing tank damage

(8) Describe the significance of interior and exterior heater coils on tank cars in assessing tank damage

(9) Describe the significance of each of the following types of tank car damage on different types of tank cars in assessing tank damage:
   (a) Corrosion
   (b) Crack
   (c) Dent
   (d) Flame impingement
   (e) Puncture
   (f) Tank thinning caused by a score, gouge, wheel burn, or rail burn

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

(11) Describe the significance of damage to the heat-affected zone of a weld on a tank car in assessing tank damage

(12) Describe the significance of a dent that includes the thinning of tank metal

(13) Given various types of tank cars, describe the significance of pressure increases in assessing tank damage

(14) Given various types of tank cars, describe the significance of the amount of lading in the tank in assessing tank damage

(15) Describe the significance of flame impingement on the vapor space and liquid space as it relates to a tank car

N Table 12.2.2 Tank Car Type and Materials Used in Construction of Tank

Tank Car Types	Materials of Construction of Tank
Nonpressure	Steel plate, aluminum alloy plate, high-alloy steel plate, nickel plate, manganese-molybdenum steel plate
Pressure	Carbon steel plate, aluminum alloy plate, and high-alloy steel plate
Cryogenic liquid	Stainless steel — ASTM A240/A240M, Type 304 or 304L for the inner tank

12.3 Competencies — Planning the Response.

12.3.1 Determining the Response Options. Given the analysis of an incident 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:

(1) 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:
   (a) Flaring liquids and vapors
   (b) Hot and cold tapping
   (c) Transferring liquids and vapors
   (d) Vent and burn
   (e) Venting vapors to atmosphere
   (f) Venting vapors through a treatment (scrubbing) process
(2) Describe the inherent risks associated with, procedures for, equipment required to implement, and safety precautions for controlling leaks from various fittings on various tank cars
(3) Describe the effect flaring or venting gas or liquid has on the pressure in the tank
(4) Describe the inherent risks associated with, procedures for, equipment required to implement, and safety precautions for movement of damaged tank cars
(5) Describe the inherent risks associated with, procedures for, and safety precautions for the following operations:
   (a) Setting and releasing brakes on rail cars
   (b) Shutting off locomotives using the fuel shutoff and the battery disconnect
   (c) Uncoupling rail cars
(6) Describe the hazards associated with working on railroad property during emergencies

12.4 Competencies — Implementing the Planned Response.

12.4.1 Implementing the Planned Response. Given an analysis of an incident involving tank cars and the planned response, technicians with a tank car specialty shall implement or oversee the implementation of the selected response options in a safe and effective manner and shall complete the following tasks:

(1) Given a leaking manway cover plate (loose bolts), control the leak
(2) Given leaking packing on the following tank car fittings, control the leak:
   (a) Gauging device packing nut
   (b) Liquid or vapor valve packing nut
   (c) Top-operated bottom outlet valve packing gland
(3) Given an open bottom outlet valve with a defective gasket in the cap, control the leak
(4) Given a leaking top-operated bottom outlet valve, close valve completely to control the leak
(5) Given leaking fittings on a pressure tank car, repair the leak or use an applicable capping kit to control the leak
(6) Given the following types of leaks on various types of tank cars, plug or patch those leaks:
   (a) Cracks, splits, or tears
   (b) Puncture
(7) Given the following product transfer and recovery equipment demonstrate the safe and correct application and use of the following:
   (a) Portable pumps
   (b) Pressure differential
   (c) Vacuum
(8) Demonstrate the following types of product removal for tank cars:
   (a) Flaring of liquids and vapors
   (b) Transferring of liquids and vapors
   (c) Venting
   (d) Venting vapors and neutralizing them through a scrubbing method
(9) Given the applicable resources, perform the following tasks:
   (a) Set and release the hand brake on rail cars
   (b) Shut off locomotives using the fuel shutoff and the battery disconnect
   (c) Uncouple rail cars
(10)* Demonstrate grounding and bonding procedures for product transfer from tank cars, including the following:
   (a) Selection of equipment
   (b) Establishment of ground field
   (c) Sequence of grounding and bonding connections
   (d) Testing of ground field and grounding and bonding connections

N 12.5 Competencies — Evaluating Progress. (Reserved)

N 12.6 Competencies —— Terminating the Incident. (Reserved)

Chapter 13 Competencies for Hazardous Materials Technicians with a Cargo Tank Specialty

13.1 General.

13.1.1 Introduction.

13.1.1.1 The hazardous materials technician with a cargo tank specialty shall be that person who provides technical support pertaining to cargo tanks, provides oversight for product removal and movement of damaged cargo tanks, and acts as a liaison between technicians and outside resources.

Δ 13.1.1.2 The hazardous materials technician with a cargo tank specialty shall be trained to meet all competencies at the awareness level *(see Chapter 4)*, all competencies at the operations level *(see Chapter 5)*, all competencies at the technician level *(see Chapter 7)*, and all competencies of this chapter.

13.1.1.3 Hazardous materials technicians with a cargo tank specialty shall also receive training to meet governmental response and occupational health and safety regulations.

13.1.2 Goal.

13.1.2.1 The goal of competencies in this chapter shall be to provide the technician with a cargo tank specialty with the knowledge and skills to perform the tasks in 13.1.2.2 in a safe manner.

13.1.2.2 When responding to hazardous materials/WMD incidents, the hazardous materials technician with a cargo tank specialty shall be able to perform the following tasks:

(1) Analyze a hazardous materials/WMD incident involving cargo tanks to determine the complexity of the problem and potential outcomes by completing the following tasks:
   (a) Determine the type and extent of damage to cargo tanks
   (b) Predict the likely behavior of cargo tanks and their contents during an incident
(2) Plan a response for an incident involving cargo tanks within the capabilities and competencies of available personnel, personal protective equipment (PPE), and control equipment by determining the response options (offensive, defensive, or nonintervention) for a hazardous materials/WMD incident involving cargo tanks
(3) Implement or oversee the implementation of the planned response to a hazardous materials/WMD incident involving cargo tanks

13.1.3* Mandating of Competencies. This standard shall not mandate that hazardous materials response teams performing offensive operations on cargo tanks have technicians with a cargo tank specialty.

13.1.3.1 Hazardous materials technicians operating within the scope of their training as listed in Chapter 7 shall be able to intervene in cargo tank incidents.

13.1.3.2 If a hazardous materials response team elects to train some or all of its hazardous materials technicians to have in-depth knowledge of cargo tanks, this chapter shall set out the required competencies.

13.2 Competencies — Analyzing the Incident.

13.2.1 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:

(1) Given the specification mark for a cargo tank and the reference materials, describe the tank's basic construction and features
(2) Given examples of cargo tanks (jacketed and not jacketed), identify the jacketed cargo tanks
(3) Given examples of the following types of cargo tank damage, identify the type of damage in each example:
   (a) Corrosion (internal and external)
   (b) Crack
   (c) Dent
   (d) Flame impingement
   (e) Puncture
   (f) Scrape, score, gouge, or loss of metal
(4) Given examples of damage to an MC-331 cargo tank, determine the extent of damage to the heat-affected zone
(5)* Given an MC-331 cargo tank containing a compressed liquefied gas, determine the amount of liquid in the tank
(6) Given MC-306/DOT-406, MC-307/DOT-407, and MC-312/DOT-412 cargo tanks, identify and describe the design, construction, and operation of each of the following safety devices:
   (a) Dome cover design
   (b) Emergency remote shutoff device
   (c) Internal stop valve or external valve with accident protection, including method of activation (pneumatic, mechanical, and hydraulic)
   (d) Pressure and vacuum relief protection devices
   (e) Shear-type breakaway valves and piping
   (f) Fusible caps, plugs, links, and nuts
(7) Given MC-331 and MC-338 cargo tanks, point out and explain the design, construction, and operation of each of the following safety devices:
   (a) Emergency remote shutoff device
   (b) Excess flow valve
   (c) Fusible link and nut assemblies
   (d) Internal self-closing stop valve or external valve with accident protection, including method of activation (pneumatic, cable, and hydraulic)
   (e) Pressure relief protection devices
(8) Given an MC-306/DOT-406 cargo tank, identify and describe the following normal methods of loading and unloading:
   (a) Bottom loading
   (b) Top loading
   (c) Vapor recovery system
   (d) Tank monitoring (Scully)
(9) Given the following types of cargo tank and tube trailers, identify and describe the normal methods of loading and unloading:
   (a) MC-307/DOT-407
   (b) MC-312/DOT-412
   (c) MC-331
   (d) MC-338
   (e) Compressed gas tube trailer
   (f) Noncode trailers
(10) Describe the normal and emergency methods of activation for the following types of cargo tank valve systems:
   (a) Pneumatic
   (b) Mechanical
   (c) Hydraulic
(11) Given a cargo tank involved in an incident, identify the factors to be evaluated as part of the cargo tank damage assessment process, including the following:
   (a) Amount of product released and amount remaining in the cargo tank
   (b) Stress applied to the cargo tank
   (c) Nature of the incident (e.g., rollover, vehicle accident, struck by object)
   (d) Number of compartments
   (e) Pressurized or nonpressurized
   (f) Type and nature of tank damage (e.g., puncture, dome cover leak, valve failure)
   (g) Type of cargo tank (MC, DOT, noncode specification)
   (h) Material of construction (e.g., aluminum, steel, composites)

13.2.2 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:

(1) Given the following types of cargo tanks, describe the likely breach and release mechanisms:
   (a) MC-306/DOT-406 cargo tanks
   (b) MC-307/DOT-407 cargo tanks
   (c) MC-312/DOT-412 cargo tanks
   (d) MC-331 cargo tanks
   (e) MC-338 cargo tanks
   (f) Compressed gas tube trailer
(2) Describe the difference in types of construction materials used in cargo tanks and their significance in assessing tank damage
(3) Describe the significance of the cargo tank jacket in assessing tank damage
(4) Describe the significance of each of the following types of damage on cargo tanks during damage assessment:
   (a) Corrosion (internal and external)
   (b) Crack
   (c) Dent
   (d) Flame impingement
   (e) Puncture
   (f) Scrape, score, gouge, or other reduction in tank shell thickness
(5) Given examples of damage to the heat-affected zone on an MC-331 cargo tank, describe its significance

13.3 Competencies — Planning the Response.

13.3.1 Determining the Response Options. Given the analysis of an incident 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:

(1) Given an incident involving a cargo tank, describe the methods, procedures, risks, safety precautions, and equipment required to implement spill and leak control procedures
(2) Given an overturned cargo tank, describe the factors to be evaluated for uprighting the overturned tank, including the following:
   (a) Condition and weight of the cargo tank
   (b) Lifting capabilities of wreckers and cranes
   (c) Preferred lifting points
   (d) Selection of lifting straps and air bags
   (e) Site safety precautions
   (f) Type and nature of stress applied to the cargo tank
   (g) Type of cargo tank and material of construction

13.4 Competencies — Implementing the Planned Response.

13.4.1 Implementing the Planned Response. Given an analysis of an incident involving a cargo tank and the planned response, technicians with a cargo tank specialty shall implement or oversee the implementation of the selected response in a safe and effective manner and shall complete the following tasks:

(1) 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):
   (a) Dome cover leak
   (b) Pressure relief devices (e.g., vents, rupture disc)
   (c) Puncture
   (d) Split or tear
   (e) Valves and piping
(2) Describe the methods for containing the following leaks in MC-331 and MC-338 cargo tanks:
   (a) Crack
   (b) Failure of pressure relief device (e.g., relief valve, rupture disc)
   (c) Valves and piping
   (d) Puncture
   (e) Split or tear
(3)* Demonstrate grounding and bonding procedures for product transfer from cargo tanks, including the following:
   (a) Selection of equipment
   (b) Establishment of ground field
   (c) Sequence of grounding and bonding connections
   (d) Testing of ground field and grounding and bonding connections
(4) Given the following product transfer and recovery equipment, demonstrate the safe application and use of each:
   (a) Portable pumps (air, electrical, gasoline, and diesel)
   (b) Compressors or compressed gas
   (c) Vacuum trucks
   (d) Vehicles with power-takeoff (PTO) driven pumps
(5) 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:
   (a) Drilling
   (b) Internal self-closing stop valve
   (c) Unloading lines
   (d) Vapor recovery lines
(6) Given a scenario involving an overturned MC-307/DOT-407 cargo tank, demonstrate the safe procedures for the following methods of product removal and transfer:
   (a) Cleanout cap
   (b) Product loading and unloading outlet
   (c) Product lines
(7) Given a scenario involving an overturned MC-331 cargo tank, demonstrate the safe procedures for product removal and transfer:
   (a) Vapor line
   (b) Liquid line
   (c) Hot tap
(8) Given the necessary resources, demonstrate the flaring of an MC-331 flammable gas cargo tank

Chapter 14 Competencies for Hazardous Materials Technicians with an Intermodal Tank Specialty

14.1 General.

14.1.1 Introduction.

14.1.1.1 The hazardous materials technician with an intermodal tank specialty shall be that person who provides technical support pertaining to intermodal tanks, provides oversight for product removal and movement of damaged intermodal tanks, and acts as a liaison between the technicians and outside resources.

Δ **14.1.1.2** The hazardous materials technician with an intermodal tank specialty shall be trained to meet all competencies at

the awareness level *(see Chapter 4)*, all competencies at the operations level *(see Chapter 5)*, all competencies at the technician level *(see Chapter 7)*, and all competencies of this chapter.

14.1.1.3 Hazardous materials technicians with an intermodal tank specialty shall also receive training to meet governmental response and occupational health and safety regulations.

14.1.2 Goal.

14.1.2.1 The goal of the competencies in this chapter shall be to provide the technician with an intermodal tank specialty with the knowledge and skills to perform the tasks in 14.1.2.2 in a safe manner.

14.1.2.2 When responding to a hazardous materials/WMD incident, the hazardous materials technician with an intermodal tank specialty shall be able to perform the following tasks:

(1) Analyze a hazardous materials/WMD incident involving an intermodal tank to determine the complexity of the problem and potential outcomes by completing the following tasks:
   (a) Determine the type and extent of damage to an intermodal tank
   (b) Predict the likely behavior of an intermodal tank and its contents in an emergency
(2) Plan a response for an incident involving an intermodal tank within the capabilities and competencies of available personnel, PPE, and control equipment by determining the response options (offensive, defensive, or nonintervention) for the incident
(3) Implement or oversee the implementation of the planned response to a hazardous materials/WMD incident involving intermodal tanks

14.1.3 Mandating of Competencies. This standard shall not mandate that hazardous materials response teams performing offensive operations on intermodal tanks have technicians with an intermodal tank specialty.

14.1.3.1 Hazardous materials technicians operating within the scope of their training as listed in Chapter 7 shall be able to intervene in intermodal tank incidents.

14.1.3.2 If a hazardous materials response team elects to train some or all its hazardous materials technicians to have in-depth knowledge of intermodal tanks, this chapter shall set out the minimum required competencies.

14.2 Competencies — Analyzing the Incident.

14.2.1 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:

(1) Given the specification mark for an intermodal tank and the reference materials, describe the tank's basic construction and features
(2) Given examples of intermodal tanks (jacketed and not jacketed), identify the jacketed intermodal tanks
(3) Given examples of various intermodal tanks, identify and describe the design and purpose of each of the following intermodal tank components, when present:
   (a) Corner casting
   (b) Data plate
   (c) Heater coils (steam and electric)
   (d) Insulation
   (e) Jacket
   (f) Refrigeration unit
   (g) Supporting frame
(4) 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, where present, in air line connections:
   (a) Bottom outlet valve
   (b) Gauging device
   (c) Liquid or vapor valve
   (d) Thermometer
   (e) Manhole cover
   (f) Pressure gauge
   (g) Sample valve
   (h) Spill box
   (i) Thermometer well
   (j) Top outlet
(5) 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:
   (a) Emergency remote shutoff device
   (b) Excess flow valve
   (c) Fusible link/nut assemblies
   (d) Regulator valve
   (e) Rupture disc
   (f) Pressure relief valve
(6) Given the following types of intermodal tank damage, identify the type of damage in each example and explain its significance:
   (a) Corrosion (internal and external)
   (b) Crack
   (c) Dent
   (d) Flame impingement
   (e) Metal loss (gouge and score)
   (f) Puncture
(7) 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
(8) Given an intermodal tank involved in an incident, identify the factors to be evaluated as part of the intermodal tank damage assessment process, including the following:
   (a) Amount of product released and amount remaining in the intermodal tank
   (b) Container stress applied to the intermodal tank
   (c) Nature of the incident
   (d) Number of compartments
   (e) Pressurized or nonpressurized
   (f) Type and nature of tank damage
   (g) Type of intermodal tank
   (h) Type of tank metal
(9)* Given a pressurized intermodal tank containing a liquefied gas, determine the amount of liquid in the tank
(10)* Given examples of damage to a pressurized intermodal tank, determine the extent of damage to the heat-affected zone

14.2.2 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:

(1) Given the following types of intermodal tanks, describe the likely breach/release mechanisms:
   (a) IMO Type 1/IM-101
   (b) IMO Type 2/IM-102
   (c) IMO Type 5/DOT-51
   (d) DOT-56
   (e) DOT-57
   (f) DOT-60
   (g) Cryogenic (IMO Type 7)

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

14.3 Competencies — Planning the Response.

Δ **14.3.1 Determining the Response Options.** Given the analysis of an incident 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:

(1) 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:
   (a) Flaring liquids and vapors
   (b) Hot tapping
   (c) Transferring liquids and vapors (pressure and pump)
   (d) Venting to atmosphere
   (e) Venting vapors through a treatment (scrubbing) process

(2) Describe the inherent risks associated with, procedures for, equipment required to implement, and safety precautions for controlling leaks from various fittings on intermodal tanks

Δ **14.4 Competencies — Implementing the Planned Response.** Given an analysis of an incident involving intermodal tanks and the planned response, technicians with an intermodal tank specialty shall implement or oversee the implementation of the selected response options in a safe and effective manner and shall complete the following tasks:

(1) Given leaks from the following fittings on intermodal tanks, control the leaks using approved methods and procedures:
   (a) Bottom outlet
   (b) Liquid/vapor valve
   (c) Manway cover
   (d) Pressure relief device
   (e) Tank

(2) Given the applicable equipment and resources, demonstrate the following:
   (a) Flaring of liquids and vapors
   (b) Transferring of liquids and vapors
   (c) Venting

(3) Demonstrate approved procedures for the following types of emergency product removal:
   (a) Gas and liquid transfer (pressure and pump)
   (b) Flaring
   (c) Venting

(4)* Demonstrate grounding and bonding procedures for the product transfer from intermodal tanks, including the following:
   (a) Selection of equipment
   (b) Establishment of ground field
   (c) Sequence of grounding and bonding connections
   (d) Testing of ground field and grounding and bonding connections

(5) Demonstrate the methods for containing the following leaks on liquid intermodal tanks (e.g., IM-101 and IM-102):
   (a) Manway cover leak
   (b) Irregular-shaped hole
   (c) Pressure relief devices (e.g., vents, rupture disc)
   (d) Puncture
   (e) Split or tear
   (f) Valves and piping

(6) Describe the methods for containing the following leaks in pressure intermodal tanks:
   (a) Crack
   (b) Failure of pressure relief device (e.g., relief valve, rupture disc)
   (c) Valves and piping

(7) Given the following product transfer and recovery equipment, demonstrate the safe and correct application and use of the following:
   (a) Portable pumps (air, electrical, gasoline, and diesel)
   (b) Pressure transfers
   (c) Vacuum trucks
   (d) Vehicles with power-takeoff driven pumps

(8)* Given a scenario involving an overturned liquid intermodal tank, demonstrate the safe procedures for product removal and transfer

(9)* Given a scenario involving an overturned pressure intermodal tank, demonstrate the safe procedures for product removal and transfer

(10)* Given the necessary resources, demonstrate the flaring of a pressure flammable gas intermodal tank

Chapter 15 Competencies for Hazardous Materials Technicians with a Marine Tank and Non-Tank Vessel Specialty

15.1 General.

15.1.1* Introduction.

15.1.1.1 Technicians with a marine tank and non-tank vessel specialty shall be trained to meet all competencies of the first responder awareness, operational, and hazardous materials technician levels, and the competencies of this chapter.

15.1.1.2* The technician with a marine tank and non-tank vessel specialty also shall receive any additional training to meet applicable USCG, DOT, EPA, OSHA, and other governmental occupational health and safety regulatory requirements.

15.1.1.3 Hazardous materials technicians with a marine tank vessel specialty shall also receive training to meet governmental response and occupational health and safety regulations.

15.1.2 Goal.

15.1.2.1 The goal of the competencies in this chapter shall be to provide the hazardous materials technician with a marine tank and non-tank vessel specialty with the knowledge and skills to perform the tasks in 15.1.2.2 in a safe manner.

15.1.2.2 In addition to being competent at the hazardous materials technician level, the technician with a marine tank and non-tank vessel specialty shall be able to perform the following tasks:

(1) Analyze a hazardous materials incident involving marine tank and non-tank vessels to determine the magnitude of the problem in terms of outcomes by completing the following tasks:
   (a) Determine the type and extent of damage to marine tank and non-tank vessels and its cargo systems
   (b)* Predict the likely behavior of marine tank and non-tank vessels and its contents in an emergency
   (c)* Establish initial appropriate controls
(2) 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:
   (a) Determine the response options (offensive, defensive, and nonintervention) for a hazardous materials emergency involving marine tank vessels
   (b) Ensure that the options are within the capabilities and competencies of available personnel, personal protective equipment, and control equipment
(3) Implement the planned response to a hazardous materials incident involving marine tank vessels

15.1.3 Mandating of Competencies. This standard shall not mandate that hazardous materials response teams performing offensive operations on marine tank vessels have technicians with a marine tank and non-tank vessel specialty.

15.1.3.1 Hazardous materials technicians operating within the bounds of their training as listed in Chapter 7 shall be able to respond to marine vessel incidents.

15.1.3.2* If a hazardous materials response team desires to train some or all its technicians to have in-depth knowledge of marine tank and non-tank vessels, this chapter shall set out the minimum required competencies.

15.2 Competencies — Analyzing the Incident.

15.2.1 Determining the Type and Extent of Damage to Marine Vessels, Tank and Non-Tank. Given examples of damaged marine vessels, the technician with a marine tank and non-tank vessel specialty shall describe the type and extent of damage to each marine vessel and its cargo ballast systems and shall meet the following related requirements:

(1)* Given examples of marine vessels, describe a marine vessel's basic construction and arrangement features, for marine tank and non-tank vessels
(2)* Given examples of various marine vessels, point out and explain the design and purpose of each of the various types of marine vessel cargo/ballast compartment design, structure, and components, when present
(3)* Given examples of various fittings arrangements for marine tank and non-tank vessels, point out and explain the design, construction, and operation of each
(4) Given a marine tank and non-tank vessel, identify and describe the normal methods of cargo transfer
(5) Given a marine non-tank vessel, describe the following systems processes used in conjunction with cargo transfer:
   (a) Cargo transfer system (including liquid and vent piping arrangements)
   (b) Mechanical systems (cranes, booms, belts, etc.)
   (c) Pressure systems
   (d) Vacuum systems
   (e) Cargo securing system components (tie-downs, lashings, twist-locks, etc.)
(6) Given a marine tank vessel, describe the following systems/processes used in conjunction with cargo transfer:
   (a) Cargo transfer system (including liquid and vent piping arrangements)
   (b) Vapor recovery system
   (c) Vapor balancing
   (d) Pressuring cargo
   (e) Vacuum systems
   (f) Purging with an inert medium prior to transfer
   (g) Padding tanks
   (h) Inert gas system (tank vessel only)
   (i) Cargo monitoring systems (tank levels/alarms, tank pressures, pump controls, cargo line pressures, and cargo temperatures)
(7) Given the following types of cargo compartment damage on marine vessels, identify the type of damage in each example and explain its significance:
   (a) Crack, puncture, slit, or tear
   (b) Dent
   (c) Flame impingement
   (d) Over- or underpressurization
   (e) Brittle fracture
   (f) Pinhole or corrosion
   (g) Damage to a heat-affected zone (i.e., welded areas)
(8) Given examples of the types of emergency situations a marine vessel may experience that may result in damage to the vessel or its cargo transfer system, describe the following types of marine vessel emergencies and explain their significance related to the vessel's seaworthiness and cargo containment:
   (a) Grounding
   (b) Stranding
   (c) Allision/collision
   (d) Foundering
   (e) Heavy weather damage
   (f) Fire
   (g) Explosion/BLEVE
   (h) Polymerization and/or chemical reaction
   (i) Cargo shifting or fluidization/liquefaction
(9) Given a marine vessel involved in an emergency, identify the factors to be evaluated as part of the marine vessel damage assessment process, including the following:
   (a) Type of marine vessel
   (b) Type and location of damage
   (c) Fire control, stability, and ventilation plans/documentation
   (d) Dangerous cargo manifest
   (e) Stowage plan
   (f) Ingress and egress and potential restrictions due to security arrangements

(g) Bilge and ballast arrangements
(h) Pressurized or nonpressurized systems
(i) Cargo pumping arrangements (tank vessels only)
(j) Number and location of cargo compartments
(k) Cargo transfer and monitoring control system/location
(l) Location/arrangement of void spaces in cargo area
(m) Type/characteristics of cargoes in the damaged cargo system
(n) Type/characteristics of other cargoes on the marine non-tank vessel (outside the damaged area)
(o) Cargo compatibility
(p) Stability and stresses applied to the marine non-tank vessel
(q) Type and nature of cargo system damage
(r) Amount of product both released and remaining in the cargo compartment

(10) Given a cargo system containing a bulk liquid, determine the amount of liquid in the cargo tank

15.2.2 Predicting the Likely Behavior of the Marine Vessel and Its Contents. The hazardous materials technician with a marine tank and non-tank vessel specialty shall understand the likely behavior of both marine tank vessels and marine non-tank vessels, as well as the vessel's contents, and meet the following related requirements:

(1) Given the following types of marine vessels, provide examples of probable causes of releases:
(a) Certain bulk dangerous cargo ships (46 CFR Subchapter O, Parts 150–153)
i. Chemical tank ships
ii. Sophisticated parcel chemical tank ships
iii. Specialized chemical tank ships
iv. Chemical tank barges
(b) Liquefied gas tank ships (46 CFR Subchapter O, Parts 151 or 154)
i. Fully pressurized tank ships
ii. Semipressurized tank ships
iii. Ethylene (LPG and chemical gas) ships
iv. Fully refrigerated tank ships
v. Liquefied natural gas (LNG) ships
vi. Liquefied gas barges
(c) Tank ships (46 CFR Subchapter D, Parts 30–39)
i. Oil tank barges
ii. Oil tank ships
(d) Cargo and miscellaneous vessels (46 CFR Subchapter I, Parts 90–105)
i. Container vessels
ii. Break bulk
iii. Roll on/roll off (RoRo) vessels
iv. Dry bulk cargo ships or barges
(e) Offshore supply vessels (46 CFR Subchapter L, Parts 125–134)
(f) Passenger vessels (46 CFR Subchapter H, Parts 70–79)
i. Cruise ship
ii. Ferries
(g) Other vessels
i. Tug boats (46 CFR Subchapter C, Parts 24–27)
ii. Fishing vessels (46 CFR Subchapter C, Parts 24–28)
iii. Crew boat (46 CFR Subchapter T, Parts 175–185)
iv. Mobile offshore drilling unit (46 CFR Subchapter I-A, Parts 107–109)

(2)* Describe the significance of internal and external forces on a marine vessel's stress and stability in assessing marine vessel damage
(3) Given examples of the resulting damages to the cargo compartments and cargo transfer systems on marine vessels, describe the significance in the risk analysis process:
(a) Cargo spills or releases
(b) Tank leakage within the vessel
(c) Overpressure/vacuum damage
(d) Shifting cargo
(e) Cargo/container securing systems
(4) Describe the significance of the following when assessing marine tank vessel damage:
(a) Lining and cladding on cargo compartments
(b) Coated and uncoated cargo compartments
(c) Insulation or thermal protection
(d) Heating or refrigeration coils in cargo compartments

15.3 Competencies — Planning the Response.

15.3.1 Determining the Response Options. Given the analysis of an emergency involving marine vessels, the technician with a marine tank and non-tank vessel specialty shall determine the response options for each marine vessel involved and shall meet the following related requirements:

(1) Describe the methods, procedures, risks, safety precautions, and equipment that are required to implement hazardous cargo incident control procedures for various types of incidents and marine vessels
(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 materials in all forms, including bulk, non-bulk, solids, liquids, and gases:
(a) Vessel to/from shore transfer
(b) Vessel-to-vessel transfer
(c) Vessel to/from tank truck transfer
(d) Vessel to/from rail car transfer
(e) Internal transfer within the vessel
(f) Jettisoning of cargo
(g) Other types of transfers (e.g., frac/portable tanks)
(3) Describe the purpose of, procedures for, and risks associated with controlling leaks from various fittings on marine vessel cargo systems, including equipment needed and safety precautions
(4) Describe the hazards associated with working with vessels and marine property during emergencies

15.4 Competencies — Implementing the Planned Response.

15.4.1 Implementing the Planned Response. Given an analysis of an emergency involving marine vessels and the planned response, the technician with a marine tank and non-tank vessel specialty shall implement or oversee the implementation of the selected response options in a safe and effective manner and shall meet the following related requirements:

(1) Given a release from the following fittings on marine tank vessels, describe appropriate methods and procedures for controlling the release:
   (a) Tank hatch/expansion trunk
   (b) Valve or fitting
   (c) Cargo compartment vent/access hatch/door
   (d) Pressure/relief device (pressure and vacuum)
   (e) Manifold or pipeline
   (f) Transfer hoses and connections
   (g) Other deck penetrations
   (h) Bulk and non-bulk packaging

(2) Describe approved procedures for the following types of emergency cargo removal on board marine tank vessels:
   (a) Gas/liquid transfer (pressure/pump)
   (b) Flaring
   (c) Venting
   (d) Jettisoning of cargo

(3) Describe appropriate procedures for the following types of emergency cargo removal on board marine non-tank vessels:
   (a) Cranes and other lifting equipment
   (b) Unloading systems
   (c) Ramps and other vehicular methods
   (d) Gas/liquid transfer (pressure/pump)
   (e) Venting
   (f) Jettisoning of cargo

(4) Describe the importance of bonding, grounding, or isolation procedures for the transfer of flammable and combustible cargoes, or other products that can give off flammable gases or vapors when heated or contaminated

(5) Demonstrate the methods for containing the following leaks on marine vessels:
   (a) Puncture
   (b) Irregular-shaped hole
   (c) Split or tear
   (d) Dome/hatch cover leak
   (e) Valves and piping failure
   (f) Pressure relief devices (e.g., vents, burst/rupture disc)

(6) Given the following product transfer and recovery equipment, describe the safe and correct application and use of the following:
   (a) Portable pumps (air, electrical, hydraulic, gasoline/diesel)
   (b) Vehicles with power-take-off driven pumps
   (c) Vehicles, such as fork lifts
   (d) Pressure liquid transfer equipment
   (e) Vacuum trucks
   (f) Cranes
   (g) Ramps
   (h) Conveyors

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

(8) 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

Chapter 16 Competencies for Hazardous Materials Technicians with a Flammable Liquids Bulk Storage Specialty

16.1 General.

16.1.1 Introduction.

16.1.1.1 The hazardous material technician with a flammable liquids bulk storage specialty shall be that person who, in incidents involving bulk flammable liquid storage tanks and related facilities, provides support to the hazardous materials technician and other emergency response personnel, provides strategic and tactical recommendations to the on-scene incident commander, provides oversight for fire control and product removal operations, and acts as a liaison between technicians, response personnel, and outside resources. For the purposes of this chapter, flammable liquid bulk storage tanks also include the related pipelines, piping, transfer pumps, additive tanks, and loading racks commonly found in a flammable liquid bulk storage tank facility.

Δ **16.1.1.2** The hazardous materials technician with a flammable liquids bulk storage specialty shall be trained to meet all requirements at the awareness level *(see Chapter 4)*, all competencies at the operations level *(see Chapter 5)*, all competencies at the technician level *(see Chapter 7)*, and all competencies of this chapter.

16.1.1.3 Hazardous materials technicians with a flammable liquids bulk storage specialty shall also receive training to meet governmental response and occupational health and safety regulations.

16.1.1.4 The hazardous materials technicians with a flammable liquids bulk storage specialty are expected to use appropriate personal protective clothing (PPE) and specialized fire, leak, and spill control equipment.

16.1.2 Goals.

16.1.2.1 The goal of the competencies in this chapter shall be to provide the hazardous materials technician with a flammable liquid bulk storage specialty with the knowledge and skills to perform the tasks in 16.1.2.2 in a safe manner.

16.1.2.2 In addition to being competent at the hazardous materials technician level, the hazardous materials technician with a flammable liquids bulk storage specialty shall be able to perform the following tasks:

(1) Analyze an incident involving a bulk flammable liquid storage tank to determine the magnitude of the problem by completing the following tasks:
   (a) Determine the type and extent of damage to the bulk liquid storage tank
   (b) Predict the likely behavior of the bulk liquid storage tank and its contents in an incident