FRS 2053 **HAZARDOUS MATERIALS TECHNICIAN**

Lecture	Skill	Fractional Credit
43	8	5

Course Description

This course provides the required training for Federal Occupations Safety and Health Administration (OSHA), Kentucky Occupations Health Safety regulation and U.S. Environmental Protection Agency (EPA) requirements. This course will cover responding to releases or potential releases of hazardous materials for the purpose of controlling the release and using specialized chemical-protective clothing and specialized control equipment.

Prerequisites: FRS 1047 or Consent **Corequisite:**

Task List

1.	Given examples of various specialized containers, identify each container by name and match the hazard class of the materials typically found inside the container.
2.	Given examples of the following tank cars, identify each tank car by type: a. Cryogenic liquid tank cars; b. High pressure tube cards; and c. Pneumatically unloaded hopper car
3.	Given examples of the following intermodal tank containers, identify each intermodal tank container by type: a. IM-101 portable tanks; b. IM-102 portable tanks; c. Specialized intermodal tank containers: 1. Cryogenic intermodal tank containers; 2. Tube modules
4.	Given examples of both facility and transportation containers, identify the approximate quantity in or capacity of each container.
5.	Given examples of the following transport vehicles, identify the capacity (by weight and/or volume) of each transport vehicle using the markings on the vehicle: a. Tank cars; b. Tank containers; and c. Cargo tanks
6.	Given at least three unknown materials, one of which is a solid, one a liquid, and one a gas, identify or classify by hazard each unknown material.
7.	Identify steps in an analysis process for identifying unknown materials.
8.	Identify the type(s) of monitoring equipment used to determine the following hazards: a. Corrosivity (pH); b. Flammability; c. Oxidizing potential; d. Oxygen deficiency; e. Radioactivity; and f. Toxic exposures
9.	Identify the limiting factors associated with the selection and use of the following monitoring equipment: a. Carbon monoxide meter; b. Colorimetric Tubes; c. Combustible gas meter; d. Oxygen meter; e. Passive dosimer; f. ph papers, ph meters, and strips; and g. Radiation detection instruments

10.	Given examples of various hazardous materials and the following monitoring equipment, in addition to other monitoring and detection equipment provided by the authority having jurisdiction, select the appropriate monitoring equipment to identify and quantify the materials: a. Carbon monoxide meter; b. Colorimetric tubes; c. Combustible gas meter; d. Oxygen meter; e. pH papers, pH meters, and strips; and f. Radiation detection instruments
11.	Demonstrate the field maintenance and testing procedures for the monitoring equipment provided by the authority having jurisdiction.
12.	Given a label for a radioactive material, identify vertical bars, contents, activity, and transport index, then match the label item to its significance in surveying a hazardous materials incident.
13.	Identify the types of hazard and response information available from each of the following resources and explain the advantages and disadvantages of each resource: a. Reference manuals; b. Hazardous materials data bases; c. Technical information centers (for example: CHEMTREC/CANUTEC, NRC); d. Technical information specialist; and e. Monitoring equipment
14.	Describe the following chemical and physical properties and their significance in a hazardous materials release: a. Boiling point; b. Concentration; c. Corrosivity (pH); d. Expansion ratio; e. Flammable (explosive) range; f. Flash point; g. Form (solid, liquid, gas); h. Ignition (auto ignition) temperature; i. Melting point; j. Reactivity; k. Specific gravity; l. Temperature of product; m. Toxic producers of combustion; n. Vapor density; and o. Vapor pressure; and p. Water solubility

15.	Match the following chemical and physical terms with their significance and impact on the behavior of the container and/or its contents; a. Acid, caustic; b. Air reactivity; c. Catalyst; d. Chemical interactions; e. Compound mixture; f. Critical temperatures and pressure; g. Halogenated hydrocarbon; h. Inhibitor; i. Instability; j. Organic and inorganic; k. Oxidation ability; l. pH; m. Polymerization; n. Radioactivity; o. Salt, nonsalt; p. Saturated, unsaturated, and aromatic hydrocarbons; q. Colution, slurry; r. Strength; s. Sublimation; t. Viscosity; u. Volatility; v. Water miscible, immiscible; and w. Water reactivity
16.	Given various hazardous materials and appropriate reference materials, identify the signs and symptoms of exposure to each material and the target organ effects of exposure to that material.
17.	Given a simulated facility and transportation container damage, describe the damage found using one of the following terms: a. Undamaged, no product release; b. Damaged, no product release; and c. Undamaged, product release
18.	Given examples of the following containers, identify the basic design and construction features of each bulk packaging and storage vessel: a. Fixed tanks, storage tanks; b. Tank containers (intermodal portable tanks); c. Piping; d. Tank cars; and e. Cargo tanks (tank trucks and trailers)
19.	Given DOT specifications markings for non-bulk or bulk packaging (including tank cars, tank containers, and cargo tanks) and the appropriate reference guide, identify the design and construction of the packaging and identify examples of the likely materials found in the packaging.
20.	Given examples of the following containers, identify the closures found on each container by name and match the purpose of each closure to the name of the closure: a. Cylinders; b. Drums; c. Fixed tanks, storage tanks; d. Tank containers, intermodal portable tanks; e. Piping; f. Tank cards; and g. Cargo tanks (tank trucks and trailers)
21.	Identify how a liquid pipeline may carry different products.
22.	Given an example of a ruptured pipeline, identify the following: a. Ownership of the line; b. Type of product in the line; c. Procedures for checking gas migration; and d. Procedure for shutting down the line or controlling the leak

23	Given an example of a domestic gas line break and the readings from a combustible gas indicator, determine the area of evacuation.
24.	Identify the method for determining the pressure in bulk packaging or facility containers using both a pressure gauge and the temperature of the contents.
25.	Identify the method of determining the amount of lading in bulk packaging or facility containers.
26.	Identify the types of damage that a container could incur.
27.	Given examples of tank car damage, identify the type of damage in each example by name.
28.	Identify the basic design and construction features of the following non-bulk packages used to store or transport hazardous materials. a. Carboys; b. Cylinders; and c. Drums
29.	Identify at least three resources available that indicate the effects of mixing various chemicals.
30.	Describe the heat transfer processes that occur as a result of a cryogenic liquid spill.
31.	Identify the impact of the following fire and safety features on the behavior of the products during an incident at a bulk storage facility: a. Tank spacing; b. B. Product spillage and control (impoundment and diking); c. Tank venting and flaring systems; d. Transfer operations; e. Monitoring and detection systems; and f. Fire protection systems
32.	Given various facility and transportation hazardous materials incidents, estimate the size, shape, and concentrations associated with the materials involved in the incident using computer modeling, monitoring equipment, or specialists in this field.
33.	Identify local resources for dispersion pattern prediction and modeling including computer, monitoring equipment, or specialists in the field.
34.	Identify the steps for determining the extent of physical, health, and safety hazards within the endangered area of hazardous materials incident given heat concentrations of the released material.
35.	Math the following toxological terms and exposure values with their significance in predicting the extent of health hazards in a hazardous materials incident. a. Immediately dangerous to life and health value (IDLH); b. Lethal concentration (LC50); c. Lethal dose (LD50); d. Permissible exposure limit (PEL); e. Threshold limit value ceiling (TLV-C); f. Threshold limit value short-term exposure limit (TLV-STEL); g. Threshold limit value time-weighted average (TLV-TWA); h. Parts per million (ppm), parts per billion (ppb); and i. Emergency response planning guide value (ERPG)
36.	Match the following terms associated with radioactive materials with their significance in predicting the extent of health hazards in a hazardous materials incident: a. Alpha radiation; b. Beta radiation; c. Gamma radiation; d. Half-life; and e. Time, distance, and shielding
37.	Identify the method for estimating the outcomes within an endangered area of a hazardous materials incident.
38.	Describe the steps for determining the response objectives (defensive, offensive, nonintervention) given an analysis of a hazardous materials incident.
39.	Given simulated facility, transportation, and hazardous materials incidents, identify the possible action options (defensive, offensive, and non-intervention) by response objective for each problem.
40.	Identify the possible action options to accomplish a given response objective.

41.	Identify the purpose and the procedures, equipment, and safety precautions for each of the following control techniques: a. Adsorption; b. Neutralization; c. Over-packing; and d. Patch and plug
42.	Given situations with known and unknown hazardous materials, determine the appropriate personal protective equipment for the action options specified in the plan of action in each situation.
43.	Identify the four levels of chemical protection (EPA/NIOSH) and match both the equipment required for each level and the conditions under which each level is used.
44.	Identify the factors to be considered in selecting the proper respiratory protection for a specified action option.
45.	Describe the advantages, limitations, and proper use of the following types of respiratory protection at hazardous materials incidents: a. Air purifying respirator; and b. Supplied air respirator (air line respirator)
46.	Identify the process for selecting the proper respiratory protection at hazardous materials incidents.
47.	Identify the operational components of the air purifying respirators and supplied air respirators by name and match the function to the component.
48.	Identify the factors to be considered in selecting the proper chemical-protective clothing for a specified action option.
49.	Match the following terms with their definitions and explain their impact and significance on the selection of chemical-protective clothing: a. Degradation; b. Penetration; and c. Permeation
50.	Identify at least three indications of material degradation of chemical-protective clothing.
51.	Identify the three types of vapor-protective and splash-protective clothing and describe the advantages and disadvantages of each type.
52.	Identify the relative advantages and disadvantages of: a. Heat exchange units; b. Air-cooled jackets; c. Water-cooled jackets; d. Ice vests (used for the cooling of personnel in chemical-protective clothing)
53.	Identify the process for selecting the proper protective clothing at hazardous materials incidents.
54.	Given examples of various hazardous materials, determine the appropriate protective clothing construction materials for a given action option using chemical compatibility charts.
55.	Identify the physical and psychological stresses that can affect users of specialized protective clothing.
56.	Given a simulated hazardous materials incident, select an appropriate decontamination procedure and determine the equipment required to implement that procedure.
57.	Identify the advantages and limitations and describe an example where each of the following decontamination methods would be used: a. Absorption; b. Adsorption’ c. Chemical and physical degradation; d. Dilution; e. Disposal; f. Neutralization; g. Solidification; h. Evaporation; i. Washing; and j. Vacuuming
58.	Identify the sources of technical information for selecting appropriate decontamination procedures and identify how to contact those sources in an emergency.
59.	Given simulated hazardous materials incidents in facility and transportation settings, develop a plan of action, including safety considerations. The plan shall be consistent with the local emergency response plan and the organization’s standard operating procedures and be within the capability of available personnel, personal protective equipment, and control equipment for that incident.

60.	Describe the purpose of, procedures for, equipment required, and safety precautions used with the following techniques for hazardous materials control: a. Absorption; b. Neutralization; c. Over-packing; and d. Patch and plug
61.	Given MC-306/DOT-406, MC-307/DOT-407, MC-312/DOT-412, MC-331, and MC338 cargo tanks, identify the common methods for product transfer from each type of cargo tank.
62.	Develop a site safety plan for a hazardous materials incident.
63.	Describe the components of a site safety plan for a hazardous materials incident.
64.	Given a simulated hazardous materials incident, demonstrate the ability to develop a site safety plan.
65.	Given a plan of action for a simulated hazardous materials incident, identify the points that should be made in a safety briefing before working on the scene.
66.	Given a role within the local incident management system for hazardous materials incidents, demonstrate how to perform the functions and responsibilities of that role.
67.	Identify the role, specified in the local emergency response plan and organization's standard operating procedures, of the hazardous materials technician during an incident involving hazardous materials.
68.	Given the local emergency response plan or organization's standard operating procedures, identify the duties and responsibilities of the following hazard sector functions within the incident management system including: a. Safety; b. Entry/reconnaissance; c. Information/research; d. Resources; e. Decontaminations; and f. Operations
69.	Given the local emergency response plan or organization's standard operating procedures, identify the duties and responsibilities of the hazard sector officer and describe how to coordinate all activities of that sector.
70.	Given a simulated hazardous materials incident, demonstrate set-up of the contamination reduction corridor as specified in the planned response.
71.	Given a simulated hazardous materials incident, demonstrate how to perform the decontamination process specified in the planned response.
72.	Identify the safety and emergency procedures for personnel wearing vapor-protective clothing.
73.	Identify the procedures for donning, working in, and doffing the following types of respiratory protection: a. Air purifying b. Airline respirator and required escape unit.
74.	Demonstrate donning, working in and doffing chemical-protective clothing in addition to any other specialized protective equipment provided by the authority having jurisdiction.
75.	Demonstrate the ability to record the use, repair, and testing of chemical-protective clothing according to manufacturer's specifications and recommendations.
76.	Describe the maintenance, testing, inspection, and storage procedures for personal protective equipment provided by the authority having jurisdiction according to the manufacturer's specifications and recommendations.
77.	Given a non-bulk and a bulk pressure vessel/container, select the appropriate material or equipment and demonstrate a method(s) to contain the following leaks: a. Valve gland; b. Vale seat; c. Valve inlet threads; d. Valve blowout; e. Fusible plug threads; f. Fusible metal plug; g. Valve stem assembly blowout; and h. Slide wall of cylinder
78.	Given the fittings on a pressure container, demonstrate the ability to: a. Close open valves; b. Tighten loose plugs; and c. Replace missing plugs

79.	Given a 55-gallon drum, demonstrate the ability to contain the following leaks using appropriate tools and materials: a. Bung leak; b. Chime leak; c. Nail puncture; and d. Forklift puncture
80.	Given a 55-gallon drum and an over-pack drum, demonstrate the ability to place the 55-gallon drum into the over-pack drum using the following methods: a. Slide-in; b. Rolling slide-in; and c. Slip over
81.	Identify the maintenance and inspection procedures for the tools and equipment provided for the control of hazardous materials releases according to the manufacturer's specifications and recommendations.
82.	Identify three considerations for assessing a leak or spill inside a confined space without entering the area.
83.	Identify the safety considerations for product transfer operations, including bonding, grounding, elimination of ignition sources, and shock hazards.
84.	Given an MC-306/DOT-406 cargo tank and a dome cover clamp, demonstrate the ability to install the clamp on the dome properly.
85.	Identify the methods and precautions used when controlling a fire involving a MC-306/DOT-406 aluminum shell cargo tank.
86.	Describe methods for containing the following leaks in MC-306/DOT-406, MC-307/DOT-407, and MC-312/DOT-412 cargo tanks: a. Puncture; b. Irregular-shaped hole; c. Split or tear; and d. Dome cover leak
87.	Describe product removal and transfer considerations for overturned MC-306/DOT-406, MC-307/DOT-407, MC-312/DOT-412, MC-3311, and MC-331, and MC-338 cargo tanks, including: a. Inherent risks associated with such operations; b. Procedures and safety precautions; and c. Equipment required

Lecture
Instructor Equipment List

Projection screen
Chalkboard or Marker board
Overhead projector
Slide projector
TV/VCR

Skills
Student Equipment List

Full protective equipment
SCBA

Old FRT Number: 870 / FRT 154