Maryland Fire and Rescue Institute
Drill of the Month – May 2002

Hazardous Materials Operations Refresher 2002
Instructor Guide

Topic: Hazardous Materials Operations Refresher 2002

Level of Instruction:

Time Required: Three Hours

Materials:
- Appropriate Audio Visual Support
- Emergency Response Guidebook (Current Edition)

References:
- Hazardous Materials for First Responders, Second Edition, IFSTA
- Emergency Response Guidebook, 2000 Edition, U.S. Department of Transportation

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PREPARATION:

Motivation:

Objective (SPO): 1-1

> The individual will demonstrate the basic and skills expected of someone trained to the First Responder Operations Level under 29 CFR 1910.120(q), from memory, without assistance, to a written test accuracy of 70%.

Overview:

> Hazardous Materials Operations Refresher 2002
> - Basic Hazard and Risk Assessment Techniques
> - Personal Protective Equipment
> - Basic Terms
> - Control, Containment, and/or Confinement
> - Decontamination Procedures
> - Standard Operating Procedures

Session 1
Hazardous Materials Operations Refresher 2002

SPO 1-1 The individual will demonstrate the basic and skills expected of someone trained to the First Responder Operations Level under 29 CFR 1910.120(q), from memory, without assistance, to a written test accuracy of 70%.

EO 1-1 Identify the basic hazard and risk assessment techniques that someone at the First Responder Operations Level should know.

EO 1-2 Demonstrate how to select and use personal protective equipment provided to the first responder at the operations level.

EO 1-3 Demonstrate the basic hazardous materials terms that a first responder at the operations level should know.

EO 1-4 Demonstrate how to perform basic control, containment, and/or confinement operations within the resources available to a first responder at the operations level.

EO 1-5 Demonstrate how to implement basic decontamination procedures.

EO 1-6 Demonstrate knowledge of relevant standard operating and termination procedures for someone at the first responder operations level.

This drill is designed to serve as a refresher program for individuals who have been trained to the first responder operations level as required by the OSHA regulations (29 CFR 1910.120(q). The instruction should include lecture, group interaction, and practical activities.

I. Basic Hazard and Risk Assessment Techniques (1-1)

A. Recognition and Identification of Product
   1. Placards and labels
   2. Occupancy and location
   3. Type and shape of container
   4. Product release
   5. Shipping papers
      a. Bill of lading for road transport
      b. Dangerous cargo manifest for water transport
      c. Consist for rail transport
      d. Airbill for air transport
   6. Material safety data sheet

B. Form of Release
   1. Solid - movement dependent on particular size
   2. Liquid - movement dependent on viscosity and terrain
   3. Gas (vapor) - movement dependent on wind speed and direction

C. Hazards
   1. Thermal
      a. Hot
      b. Cold
   2. Reactive
      a. Chemical
      b. Radioactive
   3. Toxic
      a. Inhaled (most products harm by inhalation)
      b. Ingested
      c. Absorbed
      d. Injected
   4. Corrosive

D. Emergency Response Guidebook

Note: Students should have the books available to follow along with this section

1. Table of placards
2. Rail car/road tractor identification charts
3. Numerical or alphabetical listings
   a. Numerical are yellow
   b. Alphabetical are blue
4. Guide pages - orange pages
   a. Potential hazards
      1) Health
      2) Fire or explosion
      3) Most serious hazard listed first
   b. Public safety
      1) Initial actions
      2) Protective clothing

Note: Read entire section to determine appropriate protective clothing for type of incident

      3) Evacuation
   c. Emergency response
      1) Fire
      2) Spill or leak
      3) First aid
5. Protective action decision factors
6. Initial isolation and protective action distances - green pages
7. Criminal/terrorist use of chemical/biological agents

E. Risk Factors
   1. People
   2. Property including livestock
   3. Environment

F. Estimate Likely Harm
   1. Gather information
   2. Analyze information
   3. Assess information
   4. Make predictions
   5. Compile estimates

G. Response Objectives
   1. Prevent container failure
   2. Contain hazardous material
   3. Evacuate exposures
   4. Reduce hazard potential

II. Personal Protective Equipment (1-2)

A. Structural Firefighter Protective Clothing
   1. Good thermal protection
   2. No chemical protection
   3. Not designed for hazardous materials emergency response
   4. Self-contained positive pressure breathing apparatus provides good respiratory protection

B. Chemical Protective Clothing

Note: Use of chemical protective clothing is generally the training level of the First Responder Operations Level

   1. Level A
      a. Fully encapsulated
      b. Utilizes SCBA
      c. Provides best protection from airborne chemicals
   2. Level B
      a. Provides good protection from materials that are not absorbed through the skin
      b. Utilizes SCBA
      c. Designed for splash protection
   3. Level C
      a. Provides good protection from materials that are not absorbed

through the skin
b. Utilizes cartridge respirator
1) Require proper cartridge for hazard
2) Required sufficient oxygen level
c. Designed for splash protection
4. Level D
a. Little or no chemical protection
b. May utilize cartridge respirator
c. Street clothes

Note: A separate training session should be conducted to review the protective features offered by the personal protective clothing used by the department and to make sure that everyone knows how to wear it properly, especially the SCBA.

III. Basic Terms (1-3)

A. Ignition
1. Flash point - point at which a material gives off sufficient fuel vapors that can be mixed with air to form an ignitable mixture
2. Autoignition temperature - point at which fuel vapors when mixed with air will ignite without an ignition source
3. Lower explosive limit - point below which there are insufficient vapors to form an ignitable mixture

B. Properties
1. Vapor density - weight of vapor in relation to an equal volume of air with air having a weight of 1
2. Specific gravity - weight of a solid or liquid in relation to an equal volume of water with water having a weight of 1

3. Solubility - ability of a product to mix with another

IV. Control, Containment, and/or Confinement (1-4)

A. Absorption
   1. Use of absorbent materials such as sorbent to absorb materials
   2. Does not relieve chemical hazard
   3. Absorbent material also flammable

B. Damming
   1. Simple dam - designed to stop flow of water and product
   2. Underflow dam - designed to allow water to flow through lower portion of dam while trapping products on top of water (specific gravity of less than 1)
   3. Overflow dam - designed to allow water to flow over the top of the dam while trapping products on the bottom of the water (specific gravity greater than 1)

C. Diking - used to contain product in an area

D. Diverting - used to reroute product to a different area

E. Retention - creating a pool or basin where product can be collected for later removal

F. Vapor Dispersion - using water fog to disperse vapors away from ignition source or exposure

G. Vapor Suppression - generally applies to foam being used to suppress the mixture of fuel vapor with air

H. Dilution - generally using water to reduce hazard

Note: If time permits and the resources are available, the students could construct dams, dikes, and retention systems. The instructor may also want to review the operation of the foam equipment and foam fire attack.

V. Decontamination Procedures (1-5)

A. Emergency decontamination
   1. Use small hoseline with minimal pressure and flow
   2. Contain runoff
   3. May require removal of contaminated clothing
   4. Done prior to arrival of hazardous material team

B. Procedures
   1. Quick rinse with garden hose or small hoseline with low flow and pressure
   2. Scrubbing with soap and water if equipment available
   3. Any clothing or equipment recovered from hot zone is considered hazardous waste
   4. Avoid direct contact with contaminated people or items
   a. Use rubber gloves and boots as minimum protective clothing
   b. Consider respiratory protection for airborne products including residue

Note: If time permits, the instructor may want to have the students set up and operate an emergency decontamination station.

VI. Standard Operating Procedures (1-6)

A. Establish Zones
   1. Hot zone
      a. Area of product release
      b. Perimeter based on Emergency Response Guidebook initial isolation distances or meter readings
      c. Only people with proper clothing and training work in this area
      d. Everyone in hot zone considered exposed

2. Warm zone
    a. Area for contamination reduction or decontamination
    b. Size based on area required for decontamination
    c. Only people with proper clothing and training work in this area
3. Cold zone
    a. Area for staging and unprotected resources
    b. Location of command post
    c. No special clothing required

B. Control Access
1. Keep people including emergency responders in proper zone
2. Monitor access to warm and hot zones
3. Establish safety officer

C. Operations
1. Operate only within training and equipment
2. Do not take unnecessary risks
3. Take care of emergency response personnel first
4. Do not trade lives
5. Consider withdrawal and exposure protection as options
6. Support recovery as needed to prevent safety hazard and protect exposures
7. Conduct termination activities
    a. Critique incident against SOP's
    b. Develop after-action report

D. Exercise
1. Divide the attendees into groups of 3-5
2. Assign each group one of the following products or select other products as appropriate for the response area
    a. Chlorine
    b. Propane (liquified petroleum gas)
    c. Anhydrous ammonia
    d. Diesel fuel
    e. Sulfuric acid

3. Consider a location in the community for the incident to make it more realistic
4. Have the students develop the following information
   a. ID No.
   b. ERG Guidebook No.
   c. Determine if it more a health hazard or a fire hazard
   d. Determine the initial isolation and evacuation distances for a small spill and a large spill for both day and night operation
   e. Determine the appropriate protective clothing for a fire and a spill
   f. Determine the emergency response for a fire or spill
   g. Determine the location and size of the zones
   h. Estimate the likely harm for a small or large spill or a fire
   i. Develop the incident command structure
   j. Summarize the responsibilities of the first alarm response
5. Have the groups report out
6. Conclude the session with a critique of each incident

SUMMARY:

Review:

Hazardous Materials Operations Refresher 2002

- Basic Hazard and Risk Assessment Techniques
- Personal Protective Equipment
- Basic Terms
- Control, Containment, and/or Confinement
- Decontamination Procedures
- Standard Operating Procedures

Remotivation:

Providing periodic refresher training in hazardous materials operations for emergency responders will assist in reducing the potential for someone getting injured or killed in a real incident. Individual responders need to understand how to utilize the resources available to them while taken precautions to reduce the harm caused by such an incident.

Assignment:

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EVALUATION: