

**HAZARDOUS WASTE AND EMERGENCY
RESPONSE OPERATIONS**

HAZWOPER

29 CFR 1910.120

40-HOUR TRAINING COURSE

SOUTHEAST MISSOURI STATE UNIVERSITY

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HAZARDOUS MATERIALS PRETEST

1. Hazardous materials means.....
2. Who defines hazardous materials?
3. T or F All hazardous materials must be regulated.
4. T or F Placards tell the responder exactly what is in the container.
5. T or F Hazardous materials are not permitted in the U. S. mail.
6. T or F I can usually smell a hazardous material before it will hurt me.
7. T or F Hazardous waste is worse than bulk hazardous materials.
8. T or F Chemical protective suits will assure complete protection to emergency responders.
9. T or F As an emergency responder, I must rescue people and stop hazardous materials leaks.
10. T or F Chemical combinations will only be as bad as the most dangerous chemical in the mixture.
11. T or F The EPA will clean up all hazardous materials spills.

SPILL REPORTING WORKSHOP

TEAM 1: AMMONIA RELEASE

At 3:00 am, a relief valve fails within a facility's ammonia refrigeration system. The valve is stuck open for approximately five minutes before the system's automatic shutoffs kick in and close the line down.

As a result of this system failure, approximately 600 pounds of anhydrous ammonia is released from the system. However, since the release occurs in the middle of a 90-acre facility complex. The release disperses before it reaches the perimeter of the facility.

Facility maintenance men are dispatched the next morning to repair the faulty valve. No further ammonia is released during the incident.

1. What actions should have been taken during this release?
2. Who was responsible for taking them?
3. Explain your reasoning.

Answer:

The ammonia release exceeded the RQ of 100 pounds and should have been reported immediately to the National Response Center. By not doing so, the facility personnel who identified the leak have breached their responsibility under the emergency reporting requirements under CERCLA.

Notification should have been made immediately after discovery, even if the discovery occurs several hours later and after the hazard has dissipated. Prompt notification not only fulfills the legal requirements but also protects the facility from future claims resulting from damages connected to the incident.

Some may argue that the release did not have off-site impacts since the material dispersed prior to leaving the property. BUT, since the release occurred at 3:00 am, it was impossible to for anyone at the facility to state with certainty what the overall dispersion pattern was at the site.

TEAM 2: Sulfuric Acid Release

A material handler punctures a 55-gallon drum of sulfuric acid. The puncture is severe enough to result in the loss of the entire contents of the drum. The area of the spill is evacuated and the facility HAZMAT team is called to neutralize the spill.

The spill is neutralized to a pH of 6.2 and the neutralized pool of liquid is washed into a process sewer with a facility fire hose. The process sewer discharges, through a holding sump, to the city's sewerage system.

1. What actions should have been taken during this release?
2. Explain your reasoning.

ANSWER:

The release of materials to a process sewer is often an area of significant concern. Hazardous materials may result in serious damage to the biological treatment system of the wastewater treatment plant.

The HAZMAT team may have isolated the process sewer prior to neutralization. In this situation, the pH was acceptable for the sanitary sewer.

Municipal authorities may require a facility to complete a hazardous materials control or slug discharge plan to provide a plan for such discharges.

TEAM 3: Canola Oil Release

During the unloading of a rail car containing canola oil, a fitting on the valve controlling flow into the receiving vessel ruptures causing a release of more than 200 gallons of oil onto the loading lot of the facility

Employees wash the spilled oil from the lot using hot water and steam. The oil/water mixture flows into a storm sewer.

1. What actions should be taken regarding the spill?
2. Explain your reasoning.

ANSWER:

This is a minor, but reportable spill of oil to the storm sewer. If the storm sewer combines with sanitary discharges at a municipal wastewater treatment plant, the spill should be reported to the plant operator.

However, if the storm sewer discharges to tributaries or navigable waters, it is subject to the reporting provisions of the CWA (report to National Report Center).

Examples 1-3 from: Einolf, D.M. (1998). *HAZWOPER Incident Command. A manual for Emergency Responders*. Government Institutes, Rockville, MD.

NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK EXERCISES

Take a few moments to look over the guidebook and examine the explanations and organization of the guide.

The Yellow pages are referred to as the "Numeric Index". This index lists the Identification Number of commodities in ascending order. The lowest number listed is 1001, which denotes acetylene. The second column lists the Guide Number for this material (Orange pages).

Using the yellow pages, list all of the entries for Identification Number 1993.

The Blue pages provide an alphabetical listing of over 2,200 commodities. The second column provides the Guide Number for each entry and the third column provides the Identification Number for each entry.

Using the Blue pages, find the Guide Number and Identification Number for Magnesium phosphide.

The Orange pages act as checklists for emergency response personnel during their first actions at a hazardous materials site. The general contents of the Orange pages include: potential hazards, public safety, and emergency response.

Look up the Guide Number for 1993 Diesel fuel and answer the following:

1. What are the hazards associated with an indoor release of this material?
2. What health hazards are associated with the material?
3. What type of protective clothing should be worn during your response?
4. Is evacuation necessary if a large spill occurs?

Finally, highlighted materials listed in the Yellow or Blue pages indicate that the Green pages should be consulted for further information. The Green pages provide information regarding isolation and protective action distances for the materials.

Look up sulfuric acid, fuming in the guide and answer the following:

1. What is the Identification Number for this material?
2. What is the Guide Number for this material?
3. What protective clothing should you wear to respond to a spill of the material?
4. Does the material have an isolation and protective action distance reference? If so, what are the isolation area for the material and the nighttime protection distance for the material?

HAZARDOUS SUBSTANCE DATA SHEET

NAME OF SUBSTANCE:

COMMON: _____ CHEMICAL: _____

I. PHYSICAL/CHEMICAL PROPERTIES

	Gas	Liquid	Solid	SOURCE
Normal Physical State:	_____	_____	_____	_____
Molecular Weight	_____	_____	_____	_____
Density	_____	_____	_____ gm/ml	_____
Specific gravity	_____	@	°F/°C	_____
Solubility: Water (ppm)	_____	@	°F/°C	_____
Solubility: _____	_____	@	°F/°C	_____
Boiling Point	_____	_____	°F/°C	_____
Melting Point	_____	_____	°F/°C	_____
Vapor Pressure (mmHg)	_____	@	°F/°C	_____
Vapor Density	_____	@	°F/°C	_____
Flash Point OC/CC	_____	_____	°F/°C	_____
Other: _____	_____	_____	_____	_____
_____	_____	_____	_____	_____

II. HAZARDOUS CHARACTERISTICS

A. TOXICOLOGICAL HAZARD	HAZARD	CONCENTRATIONS	SOURCE
Inhalation	Yes No	_____	_____
Ingestion	Yes No	_____	_____
Skin/Eye Absorption	Yes No	_____	_____
Skin/Eye Contact	Yes No	_____	_____
Carcinogenic	Yes No	_____	_____
Teratogenic	Yes No	_____	_____
Mutagenic	Yes No	_____	_____
Aquatic	Yes No	_____	_____
Other: _____	Yes No	_____	_____
_____	_____	_____	_____
B. FIRE HAZARD	HAZARD	CONCENTRATIONS	SOURCE
Combustibility	Yes No	_____	_____
Toxic Byproducts:	Yes No	_____	_____
Other: _____	Yes No	_____	_____
_____	Yes No	_____	_____
Flammable/Explosive	Yes No	_____	_____
LFL/LEL	_____	_____	_____
UFL/UEL	_____	_____	_____
C. REACTIVITY HAZARD	HAZARD	CONCENTRATIONS	SOURCE
Water	Yes No	_____	_____
Other: _____	Yes No	_____	_____
_____	_____	_____	_____

HAZARD EVALUATION EXERCISES

In this exercise you will consult a variety of references to obtain information for one chemical. From the data, the degree of hazard will be determined and the risk of exposure evaluated.

Also, look for information or recommendations for protection of response personnel including chemical protective clothing and respiratory protection.

Refer to each reference when recording data. One objective is to assess the value of the different resources.

A. List of Resources

a.	b.	c.
d.	e.	f.

Record Your Data

Source	A	B	C	D	E	F
State						
SpG/den						
Bp						
Mp						
Vp						
Vden						
Fp						
LEL						
UEL						
Auto pt						
Solub.						
TLV/PEL						
IDLH						

The chemical you will examine is Trichloroethene.

SITE CHARACTERIZATION EXERCISES

1. Two different CGI models have Class I, Division I, Groups A, B, C and D. One is approved as "Intrinsically Safe" and the other is rated as "Explosion proof". Can both of these instruments be used under the same conditions?
2. A benzene detector tube indicates a concentration of 95 ppm. A PID calibrated to benzene gives a reading of 215 ppm in the same atmosphere. Why the difference?
3. A tank car is leaking carbon dioxide in an area of uneven terrain. What instruments do you need for safe site entry?
4. A PID calibrated to measure benzene is used to measure vapors emanating from a drum labeled "Carbolic Acid, Liquid (Phenol)". How should any response be recorded?
5. What is indicated by an 11% oxygen level in a permit-required confined space?
6. In a benzene atmosphere, your PID measures 500 ppm. What is the percent volume of benzene in air? Does this concentration indicate an immediate flammability hazard? The LEL for benzene is 1.1%

LEVELS OF PROTECTION EXERCISES

PROCEDURE: Using all available information and materials that we discussed in class, please evaluate the situations described below. Make your best recommendation and provide a basis for your reasoning. If there is other information you believe would help in this evaluation, make note of it and discuss it with the rest of the class.

1. A team must enter a chlorine cloud to close a leaking cylinder. Measurements near the cloud indicate concentrations approaching 1000 ppm. What level of protection is required?
2. A response team has been requested to investigate a site where Level B protection is required. There is no danger of an IDLH atmosphere. No pressure demand SCBAs are available since they are already in use at another response. Several demand SCBAs are available from the local fire department. Can they be used? What should be considered in this decision?
3. An initial survey is underway at an abandoned site containing several hundred drums. The ground is very wet and discolored. The PID indicates vapor/gas levels ranging from 900-1200 ppm a foot from the ground. The ambient air monitors read zero, but there is a strong odor. What level of protection should be worn? Do you recommend any other precautions?
4. An old chemistry research laboratory must be surveyed. It has been abandoned for several months and is poorly ventilated. The windows have been painted shut. What level of protection is needed for the entry team? What hazards should be determined first?
5. Twenty waste drums are discovered at a waste storage area that have NFPA labels attached to them. The label is marked as follows: Blue- 2; Red-3; Yellow-1; White-0. What level of protection is needed when handling the drums? Any special considerations?
6. Level A protection is needed for a permit-required confined space entry. Identify the factors that were considered when making the selection.
7. A two-man team in Level B protection was exiting a response site when one of them trips and breaks his ankle. Both of their SCBA warning alarms are sounding. The backup person only has a gas mask, 5-minute escape pack and an SCBA with 1700 psi. What actions should be taken?

PROTECTIVE CLOTHING SELECTION EXERCISE

PROCEDURE:

Using the information provided in class and the resources available to you, select the appropriate protective clothing for the following situations.

1. There is a sulfuric acid release that will require you neutralize the material and place the material into a container for disposal. These duties may require a minimum of 8 hours to complete. What type of protective clothing would you select to perform these actions? What type of respirator would you use? Any special cartridge if an APR is warranted? Any other equipment needed?
2. During the unloading of pesticides at the facility warehouse, methyl parathion is released from a leaking container. You must respond to the event and prevent the material from reaching an open drain. In addition, you must cleanup the spill and place the recovered material into a drum for disposal. What type of protective clothing would you wear? What type of respirator would you require? Any special cartridge if an APR is warranted? Any other considerations?

FINAL EXERCISE: PLANNING

You will be given a scenario involving a hazardous materials/waste incident. As a group, you must establish an organization that will respond to the incident. Based on the information, you must develop the following:

- Site Safety Plan
- Site Control Plan
- Contingency Plan
- Work Plan/Objectives of Investigation
- Heat Stress Program
- Equipment List
- Decontamination Plan

The instructors will be available to assist you with any questions pertaining to the incident. Everything that you develop will be used in Friday's exercise, so be as thorough as you can.

Based on your plans, each team will respond. Each entry team will be expected to complete a variety of tasks in addition to the entry task. Your team objectives include the following:

- Investigate only, no container handling or clean up.
- Identify all drums and other sources of contamination.
- Determine sensitive areas.

Upon completion of the exercise you will be given additional time to complete the following tasks which must be turned in before certificates are awarded:

- All plans and programs developed prior to entry, with any revisions.
- Response log.
- Heat stress log.
- Site investigation report with map and findings.
- Recommendations for further action.

GOOD LUCK!!!