



24- Hour Industrial Emergency Response Operations Level

Facilitator Guide

Acknowledgments

The Midwest Consortium developed this course for Hazardous Waste Worker Training under cooperative agreement number U45 ES 06184 from the National Institute of Environmental Health Sciences.

We encourage you to comment on these materials. Please give your comments to your Program Director.

Warning

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Disclaimer

This training is intended to meet the requirements of the OSHA Hazardous Waste Operations and Emergency Response Final Rule (1910.120 effective March 6, 1990) for first-responder personnel who will perform at the operations level at industrial hazardous material incidents. The training program covers basic hazard recognition; use of provided protective equipment; basic control, containment, confinement, and decontamination procedures; other relevant standard operating procedures; and incident termination. It does **not** provide the necessary skills to equip participants to perform more advanced activities. Additional training is necessary to perform the activities of hazardous materials technicians or specialists. These activities include implementing the emergency response plan, identifying materials using monitoring instruments, selecting protective equipment, and performing advanced control, containment, or confinement.

For further information about this matter, consult the training facilitator and/or your company's safety/emergency response plan, your union health and safety specialist, or the Local Emergency Planning Committee for your city or county.

Content updated April 3, 2024 and all web links are active as of that date. If you find an error, please inform your Program Director so it can be updated.

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Course Overview – Facilitator Guide

Participants are here because they are members of an emergency response team which may have to respond to an incident involving hazardous materials at an industrial facility.

This course is designed to satisfy the requirements for personnel whose duties and functions are consistent with the description for Operations-Level First

Responder as described in 29 CFR 1910.120, (q) (6) (ii):

“First responders at the operations level are individuals who respond to releases or potential releases of hazardous substances as part of the **initial** response to the site for the purpose of protecting nearby persons, property or the environment from the effects of the release. They are trained to respond in a **defensive** fashion without actually trying to stop the release. Their function is to confine the release from a **safe** distance, keep it from spreading, and prevent exposures.” (emphasis added)

The length of the course is 24 contact hours, as required by OSHA. To be eligible for the next level of training, Hazardous Materials Technician, 24-hours of previous training at the Operations-level is required.

Requirements for Emergency Responders Awareness Level:

- Understand hazardous materials and associated risks
- Understand potential outcomes of emergencies
- Have the ability to recognize hazardous materials
- Identify hazardous materials if possible, using resources such as the Emergency Response Guidebook
- Understand the role of emergency responder
- Have the ability to contact appropriate personnel

Requirements for Emergency Responders Operations Level:

- Fulfill requirements of Awareness Level
- Basic hazard and risk assessment techniques
- Select and use proper personal protective equipment that is provided
- Basic hazardous materials terms
- Basic control, and/or confinement operations
- Basic decontamination
- Understanding of relevant standard operating procedures
- Termination procedures

This training assists the employer in documenting competencies. It is up to the employer to provide the certification.

Recommended Agenda

Day 1	Day 2	Day 3
Intro (includes Pretest) ½ hour	Review ¼ hour	Review ¼ hour
Intro to HAZWOPER ½ hour	PPE 3 ¾ hours	Work practices 2 ½ hours
Rights and Responsibilities 1 hour	-	-
Hazard Recognition 2 hours	-	Emergency Response 1 ½ hours
Lunch	Lunch	Lunch
Health Hazards 1 ¾ hours	CPC/Levels of Protection 1 hour	Simulations 2 ¾ hours
Monitoring 2 hours	Decon 2 ¾ hours	Review ¼ hour
Review ¼ hours	Review ¼ hour	Closing (includes Posttest) ¾ hour
8 hours	8 hours	8 hours

Facilitator Preparation

The course is designed for use with both open enrollment and contract audiences. Pre-planning with company personnel for delivery of the program is an important part of preparation for contract programs. Employer documents such as the facility Emergency Response Plan and relevant SOPs may be included in the training program. It is important that these documents be reviewed before using them to ensure that minimum OSHA requirements are satisfied.

In the event that the documents are inadequate, the areas of concern should be addressed with facility management. During the delivery of training, facilitators must cover basic OSHA requirements, even if the facility plan is deficient in some areas. Facility personnel may only provide training for Consortium programs if they agree to follow the curriculum and are a co-facilitator with the Consortium Training Center personnel.

This 24-hour course incorporates a variety of teaching methods to meet varied learning styles. Material presentation, discussion, small-group activities, exercises, demonstrations, and site simulations are used to present material. These varied formats are designed to meet the different types of learners who might be present in your courses. The Facilitator Guide provides step-by-step instructions for presenting the material. Each section of the Facilitator Guide includes information such as time requirements, teaching methods, required materials, suggested facilitator preparation, minimum content requirements, issues which may arise, and reference materials. Every facilitator should be familiar with the material in the Participant Guide, the Facilitator Guide and the specific content presented. In addition, facilitators should be familiar with the OSHA Standard, 29 CFR 1910.120 and other applicable standards mentioned in the text.

Carefully review the section(s) of the Facilitator Guide which correspond to the topics you are teaching before preparing your lesson. Complete this review before preparing your lesson. Lesson plan forms may be helpful when drafting your presentation outline. Examples of lesson plan forms are shown on the following two pages.

Lesson Plan Form 1

Teaching Methods for This Lesson Plan	Audiovisual Requirements
<ul style="list-style-type: none"> _ Presentation _ Discussion _ Question and answer _ Hands-on simulation _ Team teaching _ Small-group exercises _ Case study _ Other (describe): 	<ul style="list-style-type: none"> _ Training handbook _ Supplemental handbook material _ Websites: _ Whiteboard _ Hands-on simulation _ Other (describe):
Reference Materials	Special Space or Facility Requirements
	(List any room size or special facility regulations here, such as set-up areas, equipment storage concerns, etc.)
Suggested Discussion Questions	Suggested Facilitator Preparation

Lesson Plan Form 2

Subject Area or Element	Detail	Reference Number or Citation
Major subject heading or Roman numeral item from outline format.	Detailed breakdown of subject area or element. This area will necessarily occupy more space than the column to the left.	e.g., page number in training notebook, section number of regulation, or audiovisual material.

Presentation of Material

Review time is shown on the agenda at the end of days 1 and 2 and at the beginning of day 3. Use this time to reinforce key points and objectives.

Graphics and Audiovisuals

Graphics are available and should be used to assist with in-class instruction.

Graphics appear throughout the Participant Guide to illustrate chemical properties, monitoring instruments, respiratory protective equipment, and protective clothing.

Refer participants to these illustrations as you discuss the material.

Photographs, sketches, charts, posters, short videos, and PowerPoint slides are also useful training tools and may be introduced in the lesson where appropriate.

PowerPoint slides should be limited to those which support lesson presentation. Avoid using word slides, slides with term definitions, and slides as lecture outlines. These types of slides are not effective at keeping participant attention. Effective slides contain questions, color graphics and short lists.

Exercises

Small-Group Activities and Exercises

Small-group activities and exercises (many with performance measures) are incorporated throughout this training course. Exercises are collected in a separate document, the Exercise Guide. In this Facilitator Guide, the instructions for the activity are shown. Scenarios for several response settings are presented in this Guide so that tabletops and hands-on work can be selected based on participant needs. As a facilitator, you will select the appropriate material and provide the exercise to the participants. The purpose of these activities and exercises is to experientially involve participants in clarifying information, identifying options and developing skills.

Most activities or exercises are done in small groups or with a buddy. These activities and exercises enhance the learning process; therefore, it is strongly recommended that you make activities and discussions comfortable so that everyone can participate. Assume that every class will have participants with a wide range of communication skills. Some participants will have no problems

participating in group discussion, while others may have a hard time talking with group members, especially on day 1. Some participants will hesitate to be the recorder for the report backs. As with any team or group, facilitate productivity by the group, as they wish to organize themselves for a task.

Suggestions for handling group activities and discussions include the following:

- Allow participants to freely express their values, attitudes, and opinions.
- Do not judge participant responses.
- Facilitate discussion by paraphrasing and clarifying. It is seldom appropriate for the facilitator to give opinions.
- Avoid putting people on the spot. Instead of asking individuals for answers, have a volunteer from the group present answers to the class.
- Keep the groups focused on the task at hand. Because small-group exercises can draw heavily on the participants' personal experience, sometimes one person can dominate and run away with the discussion. If you see this happening, steer the discussion back on track by asking another group for reactions.
- Keep the participants alert and interested by encouraging participation. If the groups are not participating or giving only cursory answers, ask them probing questions about their answers to make them be more specific.

Activities are designed to provide the opportunity for participants to observe demonstrations and receive hands-on experience using equipment while reinforcing theoretical aspects learned in class. Some are set up as rotating stations with an assistant facilitator at each station. Performance checklists are completed by the participant during many of these activities; the performance checklist is reviewed and signed by the facilitator when work at each station is completed. Retention of Performance Checklists in the Program File is required to document skills; knowledge test scores are also retained. The combination of attendance, 100% on all Performance Checklists and a minimum score of 70% for knowledge tests is the definition of Successful Completion. The training center policy on remediation for anyone who does not achieve Successful Completion must be followed.

Ensure that only those who have provided Fitness for Training documentation participate in any respiratory protection/CPC exercises. Without this documentation and completion of the exercises, a certificate of 'attendance' can be provided, but not a certificate showing successful completion.

PROGRAM INTRODUCTION

Time Requirement: 30 minutes

Number of Facilitators: 1 or more, consistent with ratio shown in the Minimum Criteria

Materials

- Sign-in sheets
- Registration Materials (if not collected prior to the course)
- Participant Guide
- Agenda
- Pre-test
- Paper block to post hazards of interest cited by participants

Objectives

During this introductory session, participants will:

- Review the goals of the program
- Describe successful completion and the role of evaluation
- Use a local example to identify or illustrate response hazards
- Complete a pre-test

Teaching Methods

Discussion

Suggested Facilitator Preparation

- Review agenda and Participant Guide
- Provide an example of a local release or one from the Midwest that resulted in a response. See options in Resources below or search in newspaper, newsletters and @MidwestHazMat
 - Include in the description:
 - Location and surrounding area features (homes, other hazards, transportation routes, water ways)
 - Time of day
 - Material(s) released - name and volume
- Test web links prior to the session and If any are inoperative please notify your Program Director
- Review the timeline and evaluation forms (ask Program Director for website)
- Obtain the pretest and answer guide (ask Program Director for website)
- Ensure that all facilitators know the requirements for 'successful completion'

Minimum Content Requirements

- Welcome everyone and facilitate brief introductions
- Review the HAZWOPER acronym and the MWC
- Present a local example
- Review the agenda and goals of the program
- Each participant completes the pretest
- Review requirements for successful completion

Questions You May Be Asked

It is likely that a few participants will want detailed questions answered during the initial module. This section is meant to be an overview, with details to follow in later modules.

1. Why is there a test?

The pre-test helps to determine what topics the class may already know about or may need more attention. It is a benchmark to measure how much knowledge has been gained during the course.

2. Why does this take 3 days?

As a program funded by the National Institute of Environmental Health Sciences (NIEHS), we are devoted to hands-on training so that skills are developed and practiced. This takes time. We could read you the material in a much shorter amount of time but back at work you would not be able to do the tasks of a responder.

Instructional Resources

Chemical Safety Board	http://www.csb.gov/
CHEMTREC	https://www.chemtrec.com/
Operations Center	https://www.chemtrec.com/responder/services/Pages/OpCen.aspx
NFPA (National Fire Protection Association)	http://www.nfpa.org/

The following will be used or referenced during the program

- *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*. October 1985. NIOSH/OSHA/USCG/DHHS (NIOSH) Publications No. 85-115 <https://stacks.cdc.gov/view/cdc/5827>
- *NIOSH Pocket Guide to Chemical Hazards*. NIOSH, <http://www.cdc.gov/niosh/npg/>
- ERG (2020 edition) <https://www.phmsa.dot.gov/training/hazmat/erg/emergency-response-guidebook-erg>
- Hazardous Waste Operations and Emergency Response. (29 CFR 1910.120). March 6, 1989. OSHA, http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=standards&p_id=9765.
- Hazard Communication. (29 CFR 1910.1200) OSHA, <http://www.osha.gov/dsg/hazcom/ghs-final-rule.html>

Developing a local example (several as examples)

CSB exercises. <https://mwc.umn.edu>.

WI. <https://www.greenbaypressgazette.com/story/news/2019/10/17/residents-evacuated-possible-ammonia-leak-american-foods-green-bay/4008221002/>

MN. <https://www.mda.state.mn.us/ammonia-incident-summaries>

IL. <https://wgntv.com/news/7-hospitalized-after-ammonia-leak-in-streamwood-food-processing-complex/>

Presentation of the Session

This session can be presented as follows:

Welcome the class.

- Participants can be welcomed by an employer, union representative, or similar person in support of the program if it is held on-site.
- Have participants sign in.
- Explain why the program was created, and reference HAZWOPER.

Introduce the program presenters:

- The training institution conducting the training.
- The Midwest Consortium.
- The facilitators who are present.

Participant introductions

- Ask the participants to introduce themselves to the class. Have them briefly tell their name, where they are from, their experience with hazardous materials, why they are taking the class and how they will use this training.

- Start a list in a visible location of hazardous materials or hazards that participants mention during the introduction. It will be helpful to refer back to this list several times during the course.

Describe the program activities, referring to the Participant Guide.

- Present the overall goals of the class, which are to learn about and develop skills in:
 - Risks of hazardous materials
 - Possible outcomes of an emergency
 - Ways to recognize hazardous materials
 - Your role as an operations-level responder
 - The need for other resources
 - Basic hazard and risk-assessment techniques
 - Selecting and using proper protective equipment
 - Basic hazardous materials terms
 - Basic control, containment, and confinement procedures
 - Basic decontamination procedures
 - Standard operating procedures and incident termination.
- When participants finish they will be better able to:
 - Size up a scene
 - Work within the system to participate in response actions
 - Use protective equipment
 - Perform certain basic response actions
 - Minimize exposure to hazardous conditions

Post or distribute the agenda.

Explain training policies (e.g., smoking, breaks, phone policies, etc.).

Collect medical sign off forms, if not done previously.

Explain the value of evaluation as part of training improvement.

Use a local example to identify or illustrate response hazards.

Administer the pretest.

Collect the pretest.

Ask participants if they have any questions.

Encourage participants to ask questions throughout the training.

Refer to 'Get the Most from Training' list in Participant Guide.

Summary – Program Introduction

Review course objectives:

- Size up a scene
- Work within the system to participate in response actions
- Use protective equipment
- Perform certain basic response actions
- Minimize exposure to hazardous conditions.

Answer any questions

Introduction to HAZWOPER

Time Requirement: 30 minutes

Number of Facilitators: 1 or more, consistent with ratio shown in the Minimum Criteria

Materials

- Whiteboard or equivalent; markers
- Participant Guide
- Other course resource materials, including HAZWOPER (paper or electronic <https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.120>)

Objectives

When participants have completed this session, they will be better able to:

- Define the term 'hazardous material'
- Use HAZWOPER to identify training requirements
- Identify reasons why an Emergency Response Plan is needed

Questions You May Be Asked

“Why doesn’t the definition of hazardous materials emergencies include all emergencies?”

The facilitator should be prepared to discuss other hazardous situations which may arise in the workplace but don’t meet the HAZWOPER definition of a hazardous materials emergency.

Presentation of the Session

This session can be presented as follows:

What Is a Hazardous Material?

Using the Participant Guide, review the definition of a hazardous material and introduce HAZWOPER.

In preparation for the exercise to use HAZWOPER, describe the contents of the regulation and note that paragraph q is for emergency response.

Exercise - Using HAZWOPER - Discussion

Participants answer the following questions using 29 CFR 1920.120(q)(6)(ii). Discuss the implications of their answers.

1. Does this definition fit your job? Yes or No
2. Based on this paragraph, what training is required?

Training Requirements of HAZWOPER

Using the Participant Guide, review the difference in training requirements between Awareness Level and Operations Level. In summary, emergency responders at the operations level are trained to respond in a defensive fashion without trying to stop the release. Their function is to confine the release from a safe distance, keep it from spreading, and prevent exposures. Emphasize that additional training at the technician level is required to actually stop the release.

The Emergency Response Plan

Ask: “What is an SOP”?

Discuss and introduce the Emergency Response Plan (ERP) as an SOP. Review the requirements listed in the Participant Guide.

Ask “What is a hazardous materials emergency”? Review the definition found in the Participant Guide.

Summary – Introduction to HAZWOPER

Review the objectives:

- Define the term ‘hazardous material’
- Use HAZWOPER to identify training requirements
- Identify reasons why an Emergency Response Plan is needed

Review Summary content in Participant Guide

Answer questions

Review Questions – Intro to HAZWOPER - Answers

1. What is a hazardous materials emergency?

A **hazardous material emergency** is a spill or release of hazardous materials that cannot be controlled without outside help. This definition also includes the threat of a spill or release.

2. When is an Emergency Response Plan developed?

Before an emergency

3. List 6 topics in an Emergency Response Plan.

The regulation requires that the following topics be included in an Emergency Response Plan.

- Pre-emergency planning and coordination with outside parties
- Personnel roles, lines of authority, training, and communication
- Emergency recognition and prevention
- Safe distances and places of refuge
- Site security and control
- Evacuation routes and procedures
- Decontamination procedures
- Emergency medical treatment and First Aid
- Emergency alerting and response procedures
- Critique of response and follow-up
- Personal protective equipment and emergency equipment

RIGHTS AND RESPONSIBILITIES

Time Requirement: 1 hour

Number of Facilitators: 1 or more, consistent with ratio shown in the Minimum Criteria

Materials

- Whiteboard or equivalent; markers
- Participant Guides
- 29 CFR 1910.120
- Other course resource materials

Objectives

When participants have completed this session, they will be better able to:

- Identify two laws that impact worker health and safety
- Identify application of federal and state OSHA enforcement of health and safety regulations
- Describe key rights and responsibilities workers and employers have under the OSHAct

Teaching Methods

- Presentation
- Small-group activity

Suggested Facilitator Preparation

- Review the Participant Guide
- Review relevant sections of the OSHAct
- Review whistleblower guidance at OSHA website
- Develop background if contract program: has there been an OSHA inspection?
- Review OSHA reporting requirements
(<https://www.osha.gov/recordkeeping2014/OSHA3744.pdf>). Minimum Content Requirements
- SARA materials
- OSHA worker rights and responsibilities
- OSHA employee responsibilities

Questions You May Be Asked

1. “Why isn’t (some other right or responsibility) in the law?”

Facilitators should be prepared to facilitate this discussion.

2. “What should I do if my employer is not meeting their responsibilities?”

Facilitators need to know in advance the mechanism for health and safety problem resolution if participants are in a contract program. If open enrollment, the facilitator should be prepared to facilitate a discussion of how to approach problem resolution.

Presentation of the Session

This session can be presented as follows:

SARA

Ask: “Does anyone know what SARA is?” Introduce SARA, especially how Title I resulted in the HAZWOPER regulation.

Exercise – Worker and Employer Rights and Responsibilities

Administer the Worker and Employer Rights and Responsibilities questions found in the Participant Guide. The correct answers (found below) will be reviewed at the end of this section.

Then review the rights and responsibilities. This can be quite ‘dry’ if done in PowerPoint. Consider asking each group to review several and report back to the group, including a note about relevance to the current workplace and any experience in applying the right/responsibility (example: review of the posting of injury and illnesses during the previous year).

Exercise - Worker and Employer Rights and Responsibilities - Answers

- or F 1. The employer must pay for all health and safety equipment required by OSHA standards.
- T or F 2. OSHA can fine workers for violating OSHA standards.
- or F 3. The employer doesn't have to correct problems cited by OSHA until all legal Appeals are exhausted.
- or F 4. OSHA violations can be issued when workplace hazards are causing serious physical harm.
- T or F 5. If OSHA conducts an inspection of the work site, the union or employee representatives must be paid for time they spend on the walk-around, according to OSHA regulations.
- T or F 6. OSHA has the right to enter the workplace and conduct an inspection at any time, whether the employer wants it or not.
- or F 7. The "general duty clause" can be used by OSHA if a serious hazard exists but no specific safety and health standard covers the problem.
- T or F 8. According to the OSHAct, the employer and the employees have an equal duty to provide a safe and healthful workplace.
- or F 9. If employers receive an OSHA citation, they must appeal it within a certain number of days or the citation becomes final.
- or F 10. The OSHA 300A form must be posted during the months of February, March, and April and presents the annual summary of recordable employee injuries.

OSHAct and OSHA

Introduce OSHAct, including the following key points:

- The employer has the sole responsibility to provide a safe and healthy workplace
- The employer must pay for all required safety equipment, except for that which can be worn off the job, such as prescription safety glasses and safety shoes
- Employees have the right to be informed about hazards in the workplace

Ask: “What does OSHA do?”

Discuss OSHA and its role in workplace safety and health.

Using the Participant Guide, walk through the various Worker and Employer Rights and Responsibilities under the OSHAct. Ensure that participants are familiar with OSHA Form 300A, which is found in the Participant Guide.

This may be more impactful if each of the small groups is asked to review several of the rights and responsibilities. In a report back, participants could address how that item could affect them at work.

After the report back, ask participants to look at the responses to the exercise. Urge participants to report which items they now answer differently.

Summary - Rights and Responsibilities

Review objectives:

- Identify two laws that impact worker health and safety
- Identify application of federal and state OSHA enforcement of health and safety regulations
- Describe key rights and responsibilities workers and employers have under the OSHAct

Review Summary content in Participant Guide

Answer any questions

Review Questions - Rights and Responsibilities - Answers

1. List two employer responsibilities under the OSHA Act.
 - a. *Furnish safe and healthy job and environment*
 - b. *Comply with OSHA standards*

2. List two employee responsibilities and two employee rights under the OSHA Act. (must list two rights and two responsibilities):
 - a. *RIGHT: To request an inspection.*
 - b. *RIGHT: To participate in an OSHA walk-around*
 - c. *RIGHT: To be a witness or to give information*
 - d. *RIGHT: To be informed of imminent dangers*
 - e. *RIGHT: To be told about citations*
 - f. *RIGHT: To appeal about OSHA performance*
 - g. *RIGHT: To appeal abatement date*
 - h. *RIGHT: To have a closing conference*
 - i. *RIGHT: To know of health hazard exposures*
 - j. *RIGHT: To have access to OSHA record*
 - k. *RIGHT: To participate in development of new standards*
 - l. *RIGHT: To review a citation procedure when a citation is not issued*
 - m. *RIGHT: To file a discrimination complaint*
 - n. *RESPONSIBILITY: To abide by established safety rules*
 - o. *RESPONSIBILITY: To wear and/or use required safety equipment*
 - p. *RESPONSIBILITY: To bring safety/health concerns to attention of management*

3. List five training requirements for operations-level emergency responders.

Any 5 of:

 - a. *Previously fulfilled awareness requirements*
 - b. *Know basic hazard and risk assessment techniques*
 - c. *Select and use proper personal protective equipment that is provided*
 - d. *Know basic hazardous materials terms*
 - e. *Know basic control, containment, and/or confinement operations*
 - f. *Know basic decontamination*
 - g. *Understand relevant standard operating procedures*
 - h. *Know termination procedures*

HAZARD RECOGNITION

Time Requirement: 2 hours

Number of Facilitators: 1 or more, consistent with the ratio shown in the Minimum Criteria

Materials

- Whiteboard or equivalent; markers
- Participant Guide
- Hazard Communication standard
- As needed, the MWC HCS2012 exercise may be used.
- Emergency Response Guidebook
- Print the ERG Exercise Worksheet
- Collect information sources for Hazard Recognition Exercise
 - New Jersey Factsheet
<https://web.doh.state.nj.us/rtkhsfs/indexfs.aspx>
 - ERG

Objectives

When participants have completed this session, they will be better able to:

- Identify several types of hazards that pose risks during a response
- Identify information on hazardous materials placards and labels, and from container shapes
- Use the Emergency Response Guidebook (ERG) to find information on a hazardous material
- Identify the types of information on shipping papers and SDSs

Teaching Methods

- Presentation
- Small-group activity

Suggested Facilitator Preparation

- Review the Participant Guide
- Review the HAZWOPER and Hazard Communication standards
- Review use of ERG
- Review 29 CFR 1910.95

Minimum Content Requirements

- Emergency recognition
- Types of hazards
- Chemical hazards: six sources of information
- Biological hazards
- Physical hazards

Questions You May Be Asked

1. “Why don’t the labels at my facility look like HazCom, NFPA or HMIS?”

Facilitators should review 1910.1200 and be prepared to discuss alternatives. Also questions about labeling of pipes and small containers may be raised; both are addressed in 1910.1200. Hazardous wastes are

exempted from 1910.1200. This may cause some confusion for participants. Under 1910.120, employers must provide training about known health hazards of wastes, but are not required to provide an SDS. Facilitators should be prepared to facilitate a discussion about how workers can obtain information about health hazards of wastes which are found at the facility.

2. “The employees at my facility know every hazard at the site so training about the DOT system or other labeling systems and/or recognition of unknown hazards is unnecessary.”

Here are a few scenarios that can help answer the question:

- A truck delivering chemicals to the plant may include chemicals other than those used at the facility. What happens if a spill occurs from the trailer on plant grounds?
- What happens if bulk material is transferred into an incorrectly labeled container?
- If employees may be called upon to respond to an emergency at a remote site, how will they recognize hazards at the scene?
- Other scenarios also exist. It is also important to note that hazard recognition training is required by HAZWOPER.

Presentation of the Session

This session can be presented as follows:

Recognizing an Emergency

Ask: “How might plant workers become aware of an emergency?” Refer to the list in the Participant Guide.

Ask: “What actions should emergency responders take when they become aware of an emergency?” Discuss content in Participant Guide.

Types of Hazards - Overview

Review examples of the 3 main types of hazards (Chemical, Biological, Physical) found in the Participant Guide.

For contract programs, use your reconnaissance to tailor discussion of hazards to the hazards specific to the plant. Also, review the hazard listing from the Introduction. If reconnaissance was done with management, the participants may have much to add!

For open enrollment programs, ask participants which specific hazards are present at the workplace.

Recognizing Chemical Hazards – 6 sources of information

The National Fire Academy 6-point scheme is used to categorize information collection: occupancy and location, DOT placards and labels, markings and colors including other label systems, container shapes and sizes, shipping papers and SDSs, senses.

1. Occupancy and Location

Discuss how knowledge of the purpose and activity of the location can aid in describing potential hazards. Review the list of descriptors found in the Participant Guide.

2. DOT Placards and Labels

Labels, placards and documents that can be used to identify hazardous materials will be covered.

Ask:

- What labels and placards are you familiar with?
- Have you ever used documents such as shipping papers or SDSs?
- How are labels, placards and documents useful in emergency response?
- Review how to use the DOT Emergency Response Guidebook (ERG).
- Display DOT placards and labels. Discuss the meaning of colors, words, symbols and numbers on the placards.
- Select a DOT placard, and lead the class through identification of one chemical. Have the page numbers ready to give to the class. Tying in the discussion to an actual incident could make the identification more exciting; read the Numbered Guide information or hit the important points.

Exercise – Using the ERG

- Describe the exposure scenario to be used in the exercise. A good exposure scenario includes the information time of day, name of compound released, transportation or storage method, volume released, and downwind populations. Add other factors as appropriate.
- Facilitate a report back after each group has completed the Worksheet to ensure that everyone has identified the correct information. (next page)

Emergency Response Guide Exercise

(Instructor will provide a scenario and ask you to work in small groups to fill in the information below.)

ID Number: _____

Container: Rail Tank Car Highway Tank Truck 150 lb. Cylinder
Drum Roll-Off Box

Time of Day: 2 a.m. 2 p.m. **Wind Speed (if applicable):**

Instructions: Using the information in the *Emergency Response Guide* (print or CD version), answer the following questions, providing all significant information.

1. The substance is (you need to give only one name): _____

2. a. The Guide number that should be consulted for more information is:

b. The Guide title is: _____

3. The distance to allow for each of the following (feet or miles) is:

a. Isolation _____ b. Evacuation _____

[Use low end of range for small release, high end of range for larger release. If the distance cannot be determined or is not given in the Guide, put "N/A" for answer.]

4. The primary hazard is due to: a. Health b. Fire

5. Major fire or explosion hazards due to this type of material are (list up to three):

_____, _____

6. Potential health effects from exposure to this material are (list up to three):

_____, _____

7. What respiratory protection is recommended for responses to this material?

3. Markings and Colors

Ask: “Other than DOT placards, how else might information be provided to responders?”

Labels may be found on small containers or large stationary tanks of chemicals. Colors, symbols and numbering systems are used to identify hazards.

Globally Harmonized System for Labeling - Hazard Communication Standard

Refer to the HCS2012 symbols in the Participant Guide. Discuss, emphasizing the following:

- Labels consistent with the HCS2012 are likely to be found on chemical containers coming from the manufacturer.
- Container labels under HCS2012 have certain required elements, including a pictogram.
- Signal words can only be “Danger” (more hazardous) or “Warning”.

The 2012 Hazard Communication standard requires that any alternative label must be consistent with the HCS2012 - no conflicting hazard warnings or pictograms are allowed.

National Fire Protection Association (NFPA) - 704 System

Display an NFPA label. Discuss the meaning of colors, numbers and special symbols.

The higher the number, the higher the hazard. This is the opposite of the HCS2012 system. However, HCS category numbers do not appear on labels. They will be found in Section 2 of the Safety Data Sheet (SDS) for chemicals.

The Hazardous Materials Information System (HMIS)

Display an HMIS label. Discuss the meaning of colors, numbers and letters. Like the NFPA system, the higher the number, the higher the hazard.

Letter codes (A-K, X) indicate PPE required. An asterisk in the first box next to "Health" indicates a chronic health effect. The target organ is designated by an icon. Physical hazards are also indicated by icons.

NOTE: draw attention to the Notes of Caution at the end of this section. The reverse order of ranking systems can cause confusion.

4. Container Shapes and Sizes

It is important to be able to determine contents of tanks, trucks and railcars that may be at the workplace in order to provide information to plant management and fire service and other responders. Using the images and content in the Participant Guide, discuss the various trucks, railcars, tanks, drums, cylinders, and totes. Review the chemical container checklist in the Participant Guide.

Exercise - Container Shapes and Sizes

Divide the class into small groups. Have the groups complete the Exercise found in the Participant Guide. You can assign two containers to each group rather than every group doing all four containers.

Facilitate a report back.

5. Shipping Papers and Safety Data Sheets (SDSs)

Review in the Participant Guide:

- Shipping papers for hazardous material-required by DOT
- Manifest forms-required by the EPA and DOT
- Waste Profile Sheets-analysis of hazardous waste
- SDSs – required by the Hazard Communication standard to be available in the workplace
- Documents are important resources for recognizing health and safety hazards
- Discuss the limitations of documentation
- Discuss other sources of information

6. Sense

Ask: “Are all senses to be trusted?”

No.

“What limitations are there to relying on senses?”

- Color blindness
- Ability to smell differs among people
- Smell affected by colds or other infections
- Sense of smell can be overwhelmed (hydrogen sulfide)
- Skin may be protected by hair or clothing

Recognizing Biological Hazards

Ask: “What biological hazards might you encounter during a response?”

Using the Participants Guide, address the types of biological hazards: infectious wastes, poisonous plants, fungi and yeasts, insects, snakes, animals

Recognizing Physical Hazards

Ask : "What are some examples of physical and safety hazards?"

List responses where the whole class can see. If the participants don't list all of them, add those they missed. Discuss each hazard, with points of emphasis below.

Refer back to the list of hazards generated at the beginning of the course.

Radiation

Ask: "Is it possible that you might be exposed to radiation during a response?"

Ask: "How would you know there was potential radiation exposure?"

Noise

Ask: "What are sources of noise during a hazardous materials emergency response?"

Be prepared to facilitate a discussion of the duration of exposure, and how that is reflected in the noise standard.

Slips, Trips, and Falls

Ask: "What situations at a response could lead to slips, trips or falls?"

Electricity

Ask: "What are clues that there could be an electrical hazard at a response site?"

Heat and Cold

Ask: "What about response activities make hot or cold environments even more challenging?"

Steam

Ask: "How can you recognize sources of steam or steam hazards?"

Anything that looks like a cloud should be avoided - it may be steam of a chemical. Steam piping and steam-heated equipment may be hot enough to cause serious burns.

Confined Spaces

Ask: "What is a confined space?"

Ask: "How can you identify a space that requires a permit to enter?"

Exercise - Hazard Recognition - Answers

Distribute several information resources, in addition to the SDS in the Participant Guide. Be prepared to facilitate a discussion on differences between various sources of information and underscore the need for information gathering as part of preplanning. If you select a compound that is used at the facility, prepare answers to the questions in advance and provide that SDS.

The Problem

1. What kind of information should be known about remover/thinner before there is an emergency?

What's in it?

What to do if there's a spill?

How to get more information.

What protective equipment is needed?

Are storage vessels appropriately labeled?

2. In the resources provided, what information can be found on the topics listed in Question 1?

1-methoxy 2-propanol; guide #129, ID # 3092.

See SDS and other references.

3. Do all the sources contain information on the topic?

Resources vary in what information they include. Some are more detailed than others. Some are more geared to emergency response than others. Ask participants to share what they observed.

Summary – Hazard Recognition

Review objectives:

- Identify several types of hazards that pose risks during a response
- Identify information on hazardous materials placards and labels, and from container shapes
- Use the Emergency Response Guidebook (ERG) to find information on a hazardous material
- Identify the types of information on shipping papers and SDSs

Review Summary content in Participant Guide

Answer questions

Review Questions - Hazard Recognition

1. List major types of health and safety hazards.

Chemical, biological, physical

2. On the placard provided, what information is shown?

Corrosive, class 8; sulfuric acid, fuming



3. What do the following pictograms mean?



Health hazard



*Exclamation mark
(irritant, sensitizer,
acute toxicity, narcotic,
hazardous to ozone)*



Oxidizer

4. What do the following symbols indicate?



Radioactive



Do not use water



Flammable

5. Why is a container shape important?

Container shape gives a clue to what is inside and what pressure it might be under.

6. List major types of information contained on an SDS.

Identification, Hazard identification, Composition/information on ingredients, First-aid measures, Fire-fighting measures, Accidental release measures, Handling and storage, Exposure controls/personal protection, Physical and chemical properties, Stability and reactivity, Toxicological information, Ecological information, Disposal considerations, Transport information, Regulatory information, and Other information

7. Where are shipping papers kept in a truck when sitting in the driver's seat?
When leaving the vehicle?

Shipping papers are kept in the cab of trucks when the driver is present. When the shipment arrives, a copy of the papers is given to plant personnel.

8. List barriers to identifying biological hazards at a response.

Many are hidden
Most are not labelled (only infectious agents has a label)
Little time to differentiate between poisonous/nonpoisonous

9. Can you identify poison ivy?

Poison ivy is a vine with groups of 3 leaflets. The leaves can be smooth or notched, and have pointed tips. Poison ivy can be reddish in the spring, green in summer, and yellow/orange in the fall.

10. What are several reasons why physical hazards exist during an emergency?

There are many situations where physical hazards may exist during an emergency: a radioactive material may leak from a drum or other container; electrical wires may be downed, causing trip hazards as well as the risk of electrocution. Other hazards may result from heat or cold, steam, confined spaces

HEALTH HAZARD RECOGNITION

Time Requirement: 1 ¾ hours

Number of Facilitators: 1 or more, consistent with ratio shown in the Minimum Criteria

Materials

- Whiteboard or equivalent; markers
- Participant Guide
- Information resources for exercise

Objectives

When participants have completed this session, they will better be able to:

- Define chemistry terms used to evaluate how a chemical will behave
- Identify potential effects of exposure to chemicals in the workplace
- Use resources to identify some ways to limit exposure
- Describe key parts of medical surveillance

Suggested Facilitator Preparation

- Read the chapter in the Participant Guide
- Review OSHA standard 1910.1020, Access to employee exposure and medical records
- Review addendum to this section, Chemical Effects on the Body (by organ system)
- Refer to the list of hazards generated at the beginning of the course.
- Assemble resources for the exercise (ERG, NIOSH Pocket Guide, SDSs, New Jersey Fact Sheets, Placard/label)

Minimum Content Requirements

- Chemical and physical characteristics
- Fire triangle
- Explosive limits
- Chemicals and the body
- Medical surveillance

Questions You May Be Asked

1. “Are the chemicals at work harming me?” The facilitator should be prepared to discuss work exposures in relation to other causes of major diseases, i.e. the many causes of lung cancer. The participant should be referred to an occupational medicine clinic for detailed information. Specific references could also be discussed.
2. “How can I get exposures measured?” Company and union resources should be discussed. Filing an HHE or OSHA complaint is a last resort.
3. “Can the results of medical surveillance be used to fine me?” This is a common concern of workers. The facilitator should be prepared to discuss union and OSHA avenues to resolve this concern.
4. “How do you know if a physician specializes in occupational medicine?” Few physicians are “occ docs”. Be prepared to give the names or locations of “occ docs” in your area.
5. “Which type of radiation is dangerous?” All radiation is dangerous. Stress, the concepts of time, distance, and shielding.
6. “Can urine collected for a required chemical analysis be used for a drug screen?” Facilitators should be aware of company practices. Refer participant to their union or management representative.

Presentation of the Session

This session can be presented as follows:

Chemical Reactions

Ask "What are some chemicals used at your facility or that you have experience with?' List them.

Ask "In your work have you ever experienced or observed unexpected chemical reactions?"

- Possible answers include:
 - Acids degrading stainless steel or other metals (oxidation of metals, corrosion)
 - Blew a safety valve (pressure build-up due to temperature increase or chemical reaction)
 - Explosion (exceeded the Lower Explosive Limit and generated some source of spark)
- Ask "What chemical properties do you think are important to know when responding to an emergency?"
- List answers. As you present, add any properties the participants missed.
- As you introduce each chemical property, ask the participants if they can give an example of a chemical that is flammable, has high vapor pressure, etc. Keep them thinking and participating.

Chemical and Physical Characteristics

- Ask "What chemical properties do you think are important to know when responding to an emergency?"
- List answers. As you present, add the properties the participants missed.
- As you introduce each chemical property, ask the participants if they can give an example of a chemical that is flammable, has high vapor pressure, etc. Keep them thinking and participating.

Throughout this discussion, relate the importance of each property to emergency response, as shown in the Participant Guide.

Freezing/Melting/Boiling Points

Using the Participant Guide, introduce these concepts. Note that participants should be familiar with melting or freezing point from observing the behavior of snow and ice.

Hydrogen Ion Concentration (pH)/Corrosives (Acids/Bases)

Ask participants to give examples of acids and bases. Have participants look at the pH Scale in the Participant Guide and talk about strong acids and strong bases (alkalis) as corrosive.

A small amount of water added to concentrated acid can generate a lot of heat, causing splashing. When diluting acid, it is always safer to add the acid to the water than to add the water to the acid. Hence the saying: Always Add Acid.

Flash Point/Flammable, Combustible, Ignitable/Autoignition Temperature

Point to the examples in the Participant Guide to show how very different these can be for common chemicals.

Solubility in Water/Specific Gravity

Ask the participants for examples of substances that will float or sink in water.

Relative Gas Density

Sulfur hexafluoride is heavier than air (R_{GasD} = 5.11). In a short YouTube video <https://www.youtube.com/watch?v=1PJTq2xQiQ0> (running time 0:30), an aluminum “boat” floats on a sea of sulfur hexafluoride, and is then sunk by filling it up with the gas, much as you might fill a boat with water and sink it. Emphasize that gases that are heavier than air can be very dangerous if they leak, as they will accumulate in low places.

Vapor Pressure

Refer to the illustration in the Guide.

A video showing a vapor pressure experiment can be found on YouTube at: <http://www.youtube.com/watch?v=cMAYcwCjgqo> (running time 3:14, but they repeat the experiment several times, so you can see the whole experiment in 1 minute). When the water in the aluminum can heats up, the vapor pressure of the water increases until it reaches the same air pressure as the room. At this temperature (the Boiling Point), the water boils and fills the can with warm water vapor. Plunging the can into ice water suddenly drops the vapor pressure inside the can, so that the air pressure of the room can crush the can.

This can actually happen when working with chemicals. If a container of a hot chemical is sealed up tight, and the temperature surrounding the container drops, the container can start to collapse.

Viscosity

A very brief video showing the difference between a high viscosity and a low viscosity liquid may be found at: <http://www.youtube.com/watch?v=vNzTYzjLgKE>. This demonstration could easily be done live, using water and corn syrup, molasses or honey.

Volatility

Relate volatility to material loss to the air and to displacement of air.

Toxicity

Ask participants 'What makes a chemical toxic?' Refer to the list of chemicals for their worksite.

Note that OSHA regulates 400 toxic substances; the US EPA's Toxic Substance Control Act (TSCA) Chemical Substances Inventory lists over 62,000 substances; and Safety Data Sheets are available for over 100,000 substances. (<https://www.osha.gov/SLTC/hazardoustoxicsubstances/>)

Fire Tetrahedron: Fuel, Oxygen/Oxidizing Agent, and Chemical Reaction

Refer to the image in the Participant Guide and discuss these concepts.

Explosive Limits

Use the illustration in the Participant Guide to discuss explosive limits.
Chemicals and the Body

Ask: "What is a response to exposure?"

If no one answers, use the example of alcohol or inhaling second-hand smoke.

Acute Effects or Acute Toxicity

Ask: "What is an acute exposure?"

Discuss acute exposures and health effects from examples provided by individuals in the class or your own experience. Talk about the dangers of acute exposures to chemicals. Most of the exposures discussed during the previous exercise were probably acute exposures.

If they don't seem to get the point:

- Ask: "What toxic effect does alcohol have on humans?"
- Participants usually mention liver damage (chronic effect) rather than central nervous system effects (acute effect).

Ask, "What is meant by saying acute exposures can be prevented by the chemical's good warning properties?" Some examples:

- Severe irritants of eyes, throat, airways, and skin
- Solvents-central nervous system effects
- Smells bad; the sense of smell can be unreliable-don't depend on your nose.

Emphasize that warning properties are a very unreliable way of avoiding exposure.

Ask the participants to name some chemicals that don't have good warning properties:

- Carbon monoxide (CO) (210 times the affinity for hemoglobin that oxygen has.) CO also binds much tighter than oxygen.
- Lead exposure and heavy metals in general
- Asbestos

- Hydrogen sulfide – although it smells bad, your nose gradually becomes insensitive to the smell.

This format can be used throughout the health effects section with success.

Challenge the participants by asking questions. If no one speaks, answer your own question while writing the answers where all can see. If you have the participants "hooked" by being interactive, they will listen and feel free to ask any questions that pop into their heads.

Chronic Effects or Chronic Toxicity

Ask "What is a chronic exposure?"

Write some examples of chronic exposures where all participants can see.

Ask: "What do you worry about from chronic exposures?"

- Cancer
 - Participants may have a high level of concern about cancer.
 - Ask, "Do you know anyone who developed cancer after working with chemicals?"
- Lung disease (from fibers, dusts, etc.)
- Damage to skin, eyes, liver, nervous system, kidneys, heart, and reproductive system

Emphasize that some exposures can cause either acute or chronic effects.

Routes of Entry

Ask: "What are the routes of entry?"

- Distinguish between skin damage and skin absorption
- Discuss inhalation, skin absorption (and eye exposure), ingestion, and injection

Factors That Influence the Body's Response to Exposure

Using the example of alcohol, ask the participants to imagine that you serve everyone in a large group a jigger of whiskey and you all drink it together at one time. (What route of entry is this?)

Dose-response: The more you drink, the greater the effects. Refer to the chart in the Participant Guide.

Imagine that you keep repeating the process until someone appears silly or unsteady. (Is this an acute or a chronic effect?) At this point, some individuals still don't appear drunk. Imagine that you keep repeating the process until half of the people pass out.

There still will be one or two people who don't appear drunk.

You should emphasize that each person has his or her own dose response to alcohol, and the same is true for chemicals.

Ask: "Why do you think people respond differently to alcohol and other chemicals?"

Some reasons are:

- Heredity (includes sensitivity to allergens, metabolism, biochemical mechanisms, susceptibility, etc.)
- Gender
- Body weight
- Age
- Health condition
- Personal habits
- Participants may come up with other factors

Effects of Chemicals on the Body - Local and Systemic Effects and Target Organs

Ask whether the chemicals you have been talking about have local effects on contact (skin, eyes, airways) or get into the bloodstream (systemic).

Ask "What is the difference between local and systemic effects?"

Discuss what is meant by chemicals having target organs.

Points to be emphasized:

- Chemicals have an organ as a target in causing cancer (liver, skin, etc.).

- The more frequent the exposure to chemical carcinogens, the shorter the time to develop cancer.

Refer to the first illustration, *Health Effects: Where does the health effect occur (Target Organ) and What are potential causes (the Hazard)?* in the Participant Guide, for local and systemic effects and target organs.

Refer back to exposures and effects mentioned previously.

Refer to the second illustration, *Health Effects: How Does Your Body React (Acute/Chronic; Local/Systemic)?* In the Participant Guide for possible symptoms of exposure and adverse health effects.

Exercise – Information Sources

Distribute appropriate materials for a specific chemical that may include:

- HCS label
- DOT Placards or Label
- NFPA-704 Label
- DOT Emergency Response Guidebook (ERG)
- NIOSH Pocket Guide (may need to review use, if not done in Awareness training)
- SDS
- New Jersey Fact Sheet

Procedure:

Divide the class into small groups. Provide one or more resources to each group, balanced by the amount of information available (example: DOT placard will be paired with ERG; NIOSH Pocket Guide, SDS, New Jersey Fact Sheet are all separate as they each contain much information; pair HCS and NFPA-704 labels). Ask each group to complete the worksheet in the Participant Guide for the source provided (not all sources will contain all the information). The Worksheet includes the following questions.

1. What is the name of the chemical or hazardous waste?
2. What does the placard or label tell you about the chemical?
3. What are the physical hazards of the substance—explosion, fire, reactive, oxidizing material, etc.?
4. What are the health hazards?
5. What target organs does this chemical affect?
6. What are the safe handling recommendations?

7. What personal protective equipment is recommended to limit worker exposure?
8. Is First Aid information given? What is it?
9. Is the chemical volatile? What is the vapor pressure and vapor density?

Bring out the following points in discussion/report back:

- there is more information on the Hazard Communication labels than on an NFPA-704 label or a DOT placard.
- rating scales on HCS and other labels are reversed.
- New Jersey Fact Sheet is easier to understand than SDS

Heat and Cold

Ask: “What heat or cold hazards might be expected during a response?”

Ask: “What are the symptoms of overexposure to heat?” Refer to Participant Guide.

Ask: “What are the symptoms of overexposure to cold?” Refer to Participant Guide.

Noise

Ask: “What are the loudest noises during a response?”

Use responses and the dBA table in the Participant Guide to facilitate a discussion about noise exposures.

Radiation

Ask: “What are some forms of ionizing radiation?” Using the Participant Guide, discuss.

- Alpha
- Beta
- Gamma
- Neutron

The use of instruments to detect radioactivity will be discussed in the Monitoring chapter.

Emphasize that for Protection from Radiation: time, distance, shielding – effective shielding depends on the type of radiation, as shown.

Medical Surveillance

Key points to emphasize:

HAZWOPER requires medical surveillance for certain groups of workers exposed to hazardous materials during emergency response.

Employers are required to pay for required medical exams.

The employer must keep records of medical exams and exposure monitoring until 30 years after the worker's employment ends.

The employee should report all work-related injuries and illnesses immediately.

“Emergency medical treatment and first aid” is a required section of the Emergency Response Plan.

Exposure records are part of medical records.

Ask: have you obtained exposure records?

Review where to store them.

Refer to the Things the Responder Should Do summary.

Summary – Health Hazard Recognition

Review objectives:

- Define chemistry terms used to evaluate how a chemical will behave
- Identify potential effects of exposure to chemicals in the workplace
- Use resources to identify some ways to limit exposure
- Describe key parts of medical surveillance

Review Summary content in Participant Guide

Answer questions

Review Questions - Health Hazard Recognition - Answers

1. Describe the importance of the following terms:

Boiling Point - The temperature at which a liquid changes into a vapor or gas. Chlorine's boiling point is -29 degrees Fahrenheit. When the air temperature is less than this, chlorine will remain a liquid and the emergency is not so hard on the respiratory system. Most of the time, in most places, the air temperature will be above this, rendering chlorine a deadly gas. The few degrees difference between -30 degrees Fahrenheit and -28 degrees Fahrenheit is a big one when we're talking about chlorine emergencies.

Flammability - The potential for a substance to catch fire. Flammability is based off the Flash Point. It tells you how much danger there is of a fire.

Flash Point - The temperature at or above which there is enough vapor of a liquid chemical to ignite if an ignition source is applied.

Relative gas density - Tells you whether a gas is lighter or heavier than air. The RGasD of gasoline is 4.40, which tells you that it is heavier than air. If it is spilled, you would want to get everyone to higher ground because the gas would pool in low-lying areas. If, on the other hand, ammonia spilled inside a building, you would want everyone to get down on the ground because its RGasD of 0.59 tells you that it would rise.

2. What are the most common ways that substances enter the body?

The most common ways substances enter the body are through the skin (absorption), mouth (ingestion), lungs (inhalation) and injection (skin puncture).

3. What are some possible health effects of exposure to hazardous materials?

Possible health effects of exposure to hazardous materials can range from choking, coughing, nausea, dizziness or burning (all acute) to cancer, liver disease, impotence, mental deterioration or lead poisoning (all chronic).

4. Who is legally required to be included in medical surveillance?

Members of official hazardous response teams, emergency response personnel who have signs or symptoms resulting from exposures, workers who wear respirators more than 30 days per year and workers whose exposure exceeds exposure limits for more than 30 days in a year.

5. When should medical examinations be performed?

Medical examinations should take place prior to a new job assignment, on a routine basis, at the termination of job or assignment, and/or if the employee shows signs or symptoms related to exposure.

Addendum for Facilitators

This organ system review of toxicology is taken from a previous version of this manual and included here as a review for facilitators.

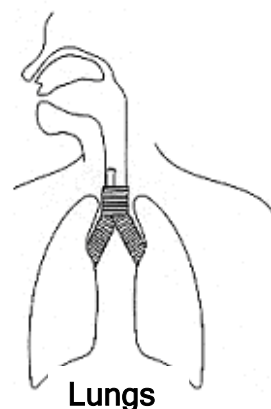
Effects of Chemicals on the Body

Chemicals can affect different parts of the body in different ways. In fact, a chemical may affect one part of the body but be harmless to another. The next section will describe how different parts of the body may react to chemicals.

The Respiratory System

The nose, windpipe, and lungs make up this system. The main purposes of the respiratory system are:

- To act as a filter and keep large particle and soluble gases from going into the lungs
- To warm the air
- To exchange oxygen for carbon dioxide across lung tissue



With each breath, air and dust are inhaled. People working near chemicals may also inhale vapors from the chemicals. Symptoms that may result from a chemical or dust exposure include:

- | | |
|----------------------|-------------------|
| Cough | Coughing up blood |
| Runny nose | Sneezing |
| Difficulty breathing | Tight Chest |

Respiratory diseases related to some workplace exposures include:

- | | |
|-------------|----------------------------|
| Bronchitis | Emphysema |
| Lung cancer | Asphyxiation (suffocation) |

Some examples of exposures that can cause respiratory diseases include:

- | | |
|--------------------|------------------------|
| Asbestos | Carbon monoxide |
| Methylene chloride | Coal dust |
| Helium | Cyanide gas |
| Silica | Strong acids and bases |

Methods for protecting the respiratory system include:

- Wearing appropriate respirators when needed

—If symptoms appear or persist, see a doctor.—

The Skin

The skin generally provides protection from the environment. It helps maintain warmth and acts as a barrier against bacteria and viruses, as well as chemicals. However, some chemicals can cause damage to the skin or can be absorbed through the skin and affect other areas of the body.

Symptoms that may result from chemical exposure include:

Rashes or redness	Itching
Acne	Ulcers, cracks
Blisters	Swelling
Discolored patches, bumps, or moles	

Skin diseases related to some workplace exposure include:

Acute and allergic dermatitis	Skin cancer
Chloracne	

Some examples of exposures that can cause skin diseases include:

Solvents	Formaldehyde
Corrosives	Ultraviolet light
Some pesticides	

Methods for protecting the skin include:

- Wearing appropriate chemical-protective clothing
- Wearing sunscreen if the skin will be exposed to sunlight

-If symptoms appear or persist, see a doctor.-

The Eyes

Generally the same types of chemicals and vapors which harm the skin also can harm and irritate the eyes. Symptoms that may result from a chemical exposure include:

Watery eyes	Blurred vision
“Halos” or circles in vision	Loss of vision

Eye disorders related to some work place exposures include:

Burns	Clouding
Glaucoma	

Some examples of exposures that can cause eye disorders include:

Radiation	Corrosives
Dusts	

Methods for protecting the eyes while working with chemicals include:

Guarding against exposure	Wearing chemical-protective goggle/face shields
Not rubbing eyes	Not wearing contact lenses.
Knowing the location of the eye wash	Making sure the eye wash is tested periodically

-If symptoms appear or persist, see a doctor-

The Stomach, Liver and Intestinal System

The gastrointestinal tract includes the esophagus, stomach, and small and large intestines. Any of these structures may become damaged if harmful substances are swallowed. The liver also may be harmed by chemicals absorbed by the skin or inhaled by the lungs. A primary function of the liver is to process and “detoxify” substances in the body. Sometimes the exposure is too great to “detoxify,” or the opposite occurs and the liver changes nontoxic materials into harmful substances. Symptoms that may result from a chemical exposure include:

Diarrhea	Blood in the stool
Abdominal pain/cramping	Persistent heartburn or nausea

Gastrointestinal diseases related to some work place exposures include:

Stomach ulcers intestines Hepatitis	Cancer of the stomach, liver, or
---	----------------------------------

Some examples of exposures that can cause gastrointestinal diseases include:

Solvents	Biological agents like bacteria and viruses
Metals	Asbestos

Methods for protecting the gastrointestinal system include:

- Maintaining good housekeeping practices to prevent exposure
- Always washing hands before drinking, eating, or smoking
- Not chewing gum or tobacco while working with chemicals
- Not eating, drinking, or smoking in contaminated areas
- Keeping food away from contaminated areas

-If symptoms appear or persist, see a doctor-

The Brain and Nerves

Chemicals which affect the brain and nerves (nervous system) are among the most dangerous. The effects on the nervous system are often delayed. Chemicals which cause nerve damage can enter the body through the skin, lungs, and mouth. Symptoms that may result from a chemical exposure include:

Dizziness	Nausea
Difficulty sleeping	Tremors or shakes
Loss of appetite	Loss of muscle coordination
Memory loss or forgetfulness	Convulsion or seizures
Personality change	Paralysis

Nervous system disorders related to some work place exposures include:

- Loss of feeling in fingers and toes
- Difficulty walking
- Decreased “communication” between nerves and your brain

Some examples of exposures that can cause nerve damage include:

- Metals like lead, mercury, and arsenic
- Some pesticides like parathion, malathion™, and DDT
- Some organic solvents like methylene chloride, toluene, and styrene

The precautions which prevent skin absorption, ingestion, and inhalation will also help protect the brain and nerves.

-If symptoms appear or persist, see a doctor-

The Reproductive System

The reproductive system includes all those parts of the body related to producing and having a baby. Both men and women can experience reproductive problems as a result of exposure to chemicals on the job. Symptoms that **women** may experience, resulting from a chemical exposure include:

- Miscarriages
- Painful monthly periods
- Difficulty becoming pregnant
- Decreased sex drive
- Unusual vaginal bleeding or spotting

Symptoms that **men** may experience, resulting from a chemical exposure include:

- Impotence (Inability to have or maintain an erection)
- Difficulty getting partner pregnant
- Decreased sex drive

Reproductive disorders related to some work place exposure include:

Decreased fertility	Sterility
Prostate cancer in men	Uterine or ovarian cancer in women
Birth defects	Stillbirths

Some examples of exposures that may cause reproductive damage include:

Some pesticides	Radiation
Lead	PCBs (polychlorinated biphenols).

The precautions which prevent skin absorption, ingestion, and inhalation will also help protect the reproductive system.

-If symptoms appear or persist, see a doctor-

The Blood, Bone Marrow, and Heart

The heart, which pushes blood through the arteries, is the center of the circulatory system. Blood, produced in the bone marrow, consists of cells which carry oxygen throughout the body. Symptoms that may result from chemical exposure include:

Fatigue	Shortness of breath
Pain radiating into the left arm	Unusual bruising
Chest pain	

Blood diseases related to some work place exposure include:

Anemia	Leukemia (cancer of the blood)
--------	--------------------------------

Some examples of exposures that can cause blood diseases include:

Lead, cadmium, and arsenic	Benzene
Radiation	

The precautions which prevent skin absorption, ingestion, and inhalation will also help protect the blood, bone marrow, and heart.

—If symptoms appear or persist, see a doctor—

The Kidneys and Bladder

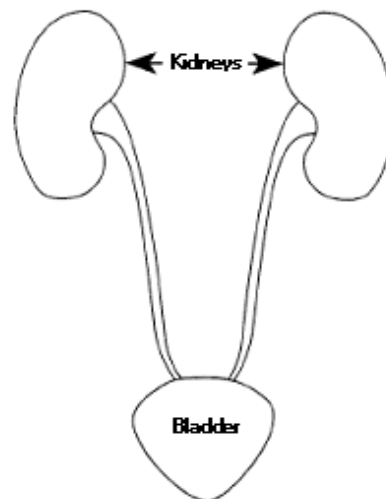
The kidneys filter waste substances from the blood. The body gets rid of this waste in the urine, which is stored in the bladder. Symptoms that may result from a chemical exposure include:

- Painful urination
- Bloody or brown urine
- Frequent urination

Some examples of exposures that can cause kidney or bladder diseases include:

- Metals like lead or cadmium
- Organic solvents like benzene
- Some pesticides

The precautions which prevent skin absorption, ingestion, and inhalation will also help protect the kidney and bladder.



—If symptoms appear or persist, see a doctor—

MONITORING

Time Requirement: 2 hours

Number of Facilitators: 1 or more, consistent with ratio shown in the Minimum Criteria

Materials

- Whiteboard or equivalent; markers
- Participant Guides
- Examples of monitoring instruments
- Supplies and PPE for lab exercise

Objectives

When they have completed this session, participants will be better able to:

- Identify why and how the work environment is monitored
- Identify some hazards that can be monitored
- Identify steps taken to monitor the scene of a hazardous materials emergency
- Identify the uses of different types of monitoring equipment during a response
- Demonstrate the use of a monitoring device and record the results

Teaching Methods

- Presentation
- Demonstration
- Small-group activity

Suggested Facilitator Preparation

- Review the Monitoring chapter in the Participant Guide
- Review this section
- Assemble monitoring equipment for demonstration and hands-on exercise
- Review OSHA standard 1910.1000, Air Contaminants, where PELs are listed
- Review facility SOPs for monitoring (contract programs only)
- Prepare lesson plan
- Review exercises and activities
- Review manufacturer's information and instructions for use, maintenance, and storage of equipment used during module
- Prepare Lab situation data sheets

Minimum Content Requirements

- Uses of monitoring equipment
- Exposure levels
- Explosive limits
- Demonstrations of available equipment
- Monitoring at an emergency response
- Exercise - Monitoring lab

Questions You May Be Asked

1. "How do I monitor in confined spaces?"

You should be prepared to discuss safe confined space entry (CSE) procedures. Be prepared to describe the actions an employee may take if directed to enter a space which they feel is unsafe. For contract programs, the CSE program should be reviewed prior to presenting this module. For open enrollment, general approaches of working through union or company

- health and safety officers should be discussed. You must be aware of the consequences of refusal to work.
2. "How do I know whether the routine and emergency monitoring at my plant is adequate?"

- For contract programs, reconnaissance will provide you with information about the facility's monitoring program and equipment.
3. "Can I get my plant's monitoring results?"

Access to monitoring information may be a new concept for many individuals. How to request this information and what to do with it (keep it with personal medical records, provide it to private or union occupational medical doctor) should be discussed.

Presentation of the Session

This session can be presented as follows:

The Importance of Monitoring

Ask: "Why would you want to monitor in a response?" List responses where the whole class can see them. Be prepared to fill in any gaps not mentioned. Refer back to the list generated at the beginning of the class and to examples in the Participant Guide.

Ask: "When would you want to monitor?"

Ask: "How are the results of these (refer to the list) reported?"

Uses for Monitoring Data

Refer to content in Participant Guide. Emphasize that conditions can change rapidly during an emergency response.

Monitoring at an Emergency

Ask: "For what purposes can monitoring data can be used pre-, during, and post-emergency?" Refer to Participant Guide content.

Note: Pre-planning is essential for emergency response. The Emergency Response Plan (ERP) must contain the monitoring plan for emergency response.

Emphasize that practicing emergency response is essential for good performance during an actual emergency.

What Can Be Monitored in the Air?

Review the following:

1. Oxygen Deficiency/Enrichment
2. Fire and Explosion Hazards
3. Toxic Chemicals
4. Corrosivity
5. Radiation

Measures of Concentration

Review the examples of measures of concentration given in the Participant Guide.

Key points:

- Emphasize that 1 ppm, 1 mg/m³ or 1 f/cc are small concentrations. Some chemicals are hazardous even at these low concentrations.
- Percent is used for higher concentrations. A solution of 1% would be 10,000 ppm.

Exposure Limits and Guidelines

Ask: “How do you find exposure limits and guidelines?” Using the Participant Guide, discuss PEL, TLV, REL, STEL, C, and TWA.

Points to be emphasized: There are several sources of occupational exposure levels (including many company-designated levels), but only PELs are legally enforceable.

PELs are often not the most protective exposure limits.

Many limits are expressed as an 8-hour time-weighted average.

Even though an exposure may be high for a short period of time, the 8-hour TWA may not be exceeded. See Tables Z1 and Z2 in 29 CFR 1910.1000 for STEL or C values.

All releases should be treated as hazardous material releases until it is verified that they are not hazardous.

Types of Air Monitoring

Discuss personal and area monitoring and the advantages/disadvantages of each method, especially the need for area, direct reading instruments for many responses, or personal alarming monitors for personal exposure:

- Personal sampling
- Area monitoring
 - Direct-read sampling
 - Long-term area monitoring

Monitoring Instruments

Discuss the features of several instruments commonly used in hazardous waste site work, and demonstrate them and/or pass them around the class. Some examples might include:

- Oxygen meter
- Combustible-gas indicator (CGI)
- Length-of-stain tubes
- Personal alarm systems
- Photoionization Detectors(PID)
- Radiation monitor

Sound Level Measurements

Point out that noise measurements are made using a sound level meter for area measurements or a noise dosimeter for personal sampling of an individual worker's noise exposure.

Monitoring at an Emergency – Review

Review content in Participant Guide regarding the selection of monitoring equipment, preplanning, and monitoring during an emergency.

What can be Monitored in the Environment?

Special training is required to perform testing of water, soil, surfaces, drums, or chemical compatibility.

Exercise - Monitoring

Equipment

- Combustible Gas Meter
- Oxygen Meter (or combined CGI/Oxygen meter)
- Three containers with very low level concentrations of flammable vapors (unknown concentrations)
- Yardsticks, measuring tapes or distance markers for ten-, three- and one-foot intervals from mixture containers or bladders
- Hand-sampling pumps (Draeger™ or MSA™) and length-of-stain tubes for ammonia
- One re-closable container with ammonia and water mixture
- Performance checklists with clipboards and pens for each participant
- Safety glasses and disposal container for glass

Organization

Divide the class into three teams

Set up a rotation through three stations:

Station A: Ammonia monitoring

- One ammonia/water bladder/container for each team
- A hand-sampling pump and indicator tubes
- A yardstick, ruler or tape markers at one foot from the opening to the container
- Safety glasses and disposable container for glass

Station B: Oxygen monitoring

- An oxygen meter or combined CGI/OXYGEN meter

Station C: Flammable monitoring

- One flammable vapor container
- Combustible gas indicator
- A yardstick, tape measure or markers at one, three and ten feet from the container opening

Each team will conduct the required monitoring at each of the three stations, record the reading, and then move on to the next station. At each station, the facilitator should initialize the checklist.

Instructions to Groups

Station A: Ammonia monitoring

- Leak check the pump
- Break off tube ends and seat the tube at the tube-breaker port on the pump
- Obtain one sample one foot from the container opening
- Using another tube obtain second sample several inches from the container opening (optional)
- Ideally, all three team members should take the one-foot sample
- Record all reading on the check sheet

Station B: Oxygen monitor

- Turn on monitor
- Properly set controls
- Record current oxygen level
- Optionally, the team members may obtain samples of the oxygen concentration from several areas of the room, or in a stairwell, or near the exhaust pipe of an automobile.

Station C: Flammable monitoring

- Turn on Combustible Gas Indicator
- Calibrate (Zero set) the CGI meter
- Provide a container of a low-toxicity flammable solvent. Alternatively construct a tube with three sampling ports and put a small amount of solvent in the bottom of the capped tube.
- Each team member should take three readings: one foot, three feet and ten feet away from the container opening
- Record all three readings

Retain checklists to document skill performance.

Summary - Monitoring

Review objectives:

- Identify why the work environment is monitored
- Identify some hazards that can be monitored
- Identify steps taken to monitor at the scene of a hazardous materials emergency
- Identify the uses of different types of monitoring equipment during a response
- Demonstrate the use of a monitoring device and record the results

Refer back to the list from the beginning of the course and discuss the techniques that could be used to sample for each of the exposures that have been listed of interest to participants.

Review Summary content in Participant Guide

Answer questions

Review Questions - Monitoring - Answers

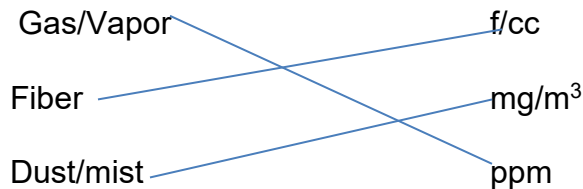
1. What are two reasons to conduct monitoring during an emergency response?

To obtain Personal and Real-time(or Area) Monitoring

2. Is an STEL or TWA generally more applicable to emergency responder exposures? Why?

Time Weighted Averages (TWA) are more applicable to emergency responders doing cleanup because they cover the entire work shift. A STEL is only for 15 minutes and is more suitable to be compared to short-term peak exposures.

3. Match the following.



4. What instruments are used to test air in a confined space?

Oxygen meter, Combustible-Gas Indicator (CGI) / LEL Meter / Explosion Meter, Toxic gas meter such as for H₂S or CO.

5. Imagine that a combustible-gas indicator gives a reading of 0%. What are the possible reasons for this reading?

- *Low battery charge*
- *Meter is turned off*
- *Mixture is too rich to burn*
- *Meter is not calibrated.*
- *Sample error*
- *Chemical limitation*
- *There is actually 0% combustible gas present*

Personal Protective Equipment (PPE) Introduction

Time Requirement: 15 minutes
Number of Facilitators: 1 or more, consistent with ratio shown in the Minimum Criteria

Materials

- Participant Guide
- Whiteboard or equivalent; markers

Objectives

When completed, participants will be better able to:

- Describe the role of PPE in limiting exposure

Teaching Methods

Presentation/Discussion

Suggested Facilitator Preparation

- Review the Participant Guide
- Prepare class notes

Minimum Content Requirements

- Overview of PPE; relate to agenda
- Hierarchy of controls

Questions You May Be Asked

“PPE is easier, so I don’t understand why it is last on the list.”

Ask: “What has to happen after the PPE is purchased?”

Facilitate a discussion of the need to properly fit, train, maintain, replace PPE. This requires personnel, tracking, record keeping, and the ongoing costs do accumulate.

Presentation of the Session

The session can be presented as follows:

Introduction

Discuss PPE in terms of RPE, CPC and other; link to the agenda.

Emphasize that PPE is the last line of defense against hazards. Under the hierarchy of controls, from most preferable to least preferable:

- Eliminate
- Substitute
- Modify
- Contain
- Ventilate
- Work Practice
- PPE

Ask participants about PPE use in their previous responses, and if any of the responses involved chemicals on the list of those of interest created during Intro to HAZWOPER.

Personal Protective Equipment (PPE) Introduction

What part of the Hierarchy of Controls is illustrated by...?

- Keep adsorbents from losing the contaminant through evaporation (Contain)
- Confined Space work (Ventilate, Work Practice)
- Fire suppression (Contain, Work Practice)

Respiratory Protection

Time Requirement: Presentation – 1/2 hour
 Demonstration and Workshops – 1.75 hours

Number of Facilitators: 2 or more; consistent with ratio shown in Minimum Criteria

Materials

- Whiteboard or equivalent; markers
- Participant Guides
- NIOSH information on respirators, <http://www.cdc.gov/niosh/topics/respirators/>
- OSHA Respiratory Protection standard, 29 CFR 1910.134, https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=12716
- Open-space room which will allow groups mobility with protective equipment
- Four tables set up as lab stations
- SCBA units (one per participant)
- Bottles of breathing air (1 breathing air cylinder per participant)
- Supplied-air respirator
- Air-purifying respirators

- Manufacturers' instructions for respirators that will be demonstrated and used in the lab
- Fit test hood and materials (if part of program plan)
- Cleaning wipes
- Plastic wash basins (1 per every 2 participants)
- Soap and disinfectant
- Sponges
- Paper towels
- OSHA training videos on respiratory protection, https://www.osha.gov/SLTC/respiratoryprotection/training_videos.html#video. Do not use all of the recommended videos, and do not show them from beginning to end, because there are many repetitious segments in the videos, but individual videos may be useful to augment certain lectures and demonstrations. They may be viewed on YouTube or downloaded to a computer.

Objectives

When they have completed this session, participants will be better able to:

- Identify situations where respiratory protection is needed
- Identify types and features of respirators used to protect against exposure to hazardous materials
- Identify limitations of different types of respirators
- Demonstrate the inspection, donning and doffing of an APR or SCBA
- Demonstrate respirator cleaning procedures
- Identify the key components of a respiratory protection program

Teaching Methods

The presentation of the respiratory protection section is done by combining lecture, demonstration, and lab and small group activity. You should provide various examples of the types of respirators. If possible, as the different types of respirators are introduced, pass the facepieces around the room for the participants to look at. At the end of the presentation, ask some review questions to sum up the lecture. Long question-and-answer sessions with the participants should be avoided, because many of their questions will be answered during the lab.

Suggested Facilitator Preparation

- Read the chapter on respirators in the Participant Guide. See also the MWC Personal Protective Equipment Participant and Facilitator program Guides.
- Prepare lesson plan
- Review exercises and activities including answers
- Review manufacturer's information and instructions for equipment used during module
- Assemble supplies and equipment for lab stations
- Review 29 CFR 1910.134, Respiratory Protection
- For a sample respiratory protection program, see: http://www.osha.gov/dcsp/compliance_assistance/sampleprograms.html#Respiratory Protection.
- For contract programs, review company respirator program

Minimum Content Requirements

- The different types of respiratory protection that are available
- When respiratory protective equipment should be used and what type
- If performing respirator fit testing, medical fitness required
- If using Levels A or B, medical fitness-for-training is required
- Care and maintenance of respirators
- Donning and doffing SCBAs and APRs
- Lab (Note: SCBA required for all open enrollment programs and strongly recommended for all contract programs.)
- Respiratory protection program

Questions You May Be Asked

1. "We don't do it this way in our plant. So what are we supposed to do?"

This question gives you the opportunity to emphasize the need for additional training on company-specific equipment.

2. "What about facial hair? My employer has a 'no beard' policy, and I don't like it."

Emphasize that facial hair prevents a good fit, resulting in exposure to toxic substances.

3. "What do I do when my employer gives me the wrong respirator and tells me that I've got to wear it or else?"

Be prepared to facilitate a discussion on strategies to improve the company respiratory protection program through discussions with employee or management representatives. Emphasize that the law requires that employers provide adequate protection from respiratory hazards.

4. "I store my respirator in my locker in a paint mixing room."

Emphasize that anything that lands on your respirator when you're not wearing it might be inhaled the next time you wear it.

5. "Why do chemical cartridges or filters need to be replaced more frequently when using a PAPR?"

The air flow through the cartridges or filters of a PAPR is higher due to the fan moving more air through the cartridges or filters than breathing alone would move. Therefore the cartridges or filters get loaded up with contaminants faster.

Presentation of the Session

The session can be presented as follows:

Use of Respirators for Emergency Response

- Use questions in Participant Guide to facilitate discussion.
- Emphasize that PPE is the last line of defense against hazards for routine operations, but is essential for emergency response.
- Refer back to the list of chemicals of interest to the participants. Ask participants which chemicals may require respirator use during an emergency.

Types of Respirators

Ask "What considerations should be made when selecting respiratory protection?"

List responses (for example):

- Oxygen in the atmosphere
- Hazardous substances at the work site
- Exposure to confined space
- Exposure to extreme temperatures
- Communication needs

There is an OSHA training video, "Respirator Types" (available at <https://www.osha.gov/respiratory-protection/training>, total running time 16:10), that could be used here. As well as respirator types, the video covers user seal checks, fit testing and the N/R/P and 95/99/97 systems.

Air-Purifying Respirators (APR)

Ask "What is an air-purifying respirator (APR)?"

Refer to the illustrations of full-face and half-face APRs in the Participant Guide. Discuss when APRs are appropriate and their limitations.

Cartridges and filters for protection from chemical and particle exposure

Ask "What do you know about filters and cartridges used with APR?"

Discuss particulate filters and chemical cartridges, including:

- When not to use chemical cartridges
- The meaning of color labels
- When to change cartridge

Other Reusable APRs

Discuss characteristics of gas masks and PAPRs

Discuss the characteristics of filtering facepiece respirators. Emphasize that not all filtering facepiece respirators are N95's

Supplied-Air Respirators (SAR)

Ask "What is a supplied-air respirator (SAR)?"

Discuss the three different modes of operation, and explain why demand mode is the least protective.

Self-Contained Breathing Apparatus (SCBA)

Ask "What is a self-contained breathing apparatus (SCBA)?"

- Discuss key parts of a SCBA including air tank, facepiece, hose, demand regulator, main-line valve, and by-pass valve.
- Demonstrate donning and doffing a SCBA, using the following checklist:
 - Check gauges and valves

- Turn on cylinder valve and listen for low-pressure alarm
- Put on the tank and harness and adjust straps
- Don the facepiece and check the facepiece seal. (Fit testing will be reviewed later in this chapter.)
- Check the main-line and by-pass valves

You may have another facilitator demonstrate the procedures for donning and doffing the SCBA while the lead facilitator narrates the step-by-step procedures.

Respirator Fit

Ask "What do you do to ensure that your respirator fits?" and "How do you know when you have a 'good' fit?"

Ask "What are two types of respirator fit testing?"

An OSHA training video, "Respirator Fit Testing" (available at <https://www.osha.gov/respiratory-protection/training>, total running time 11:59), may be useful here.

Review qualitative and quantitative fit testing, including:

- Purpose for testing
- Method of testing
- Cautions when testing

Review routine user checks including:

- Purpose for testing
- Method of testing
- When testing is necessary

Discuss difficulties that may occur while using respirators.

Respiratory Protection Factors

Review how respirators are selected. Discuss:

- Assigned protection factors
- Fit factor calculation (Review sample calculation in the Participant Guide.)

Respiratory Protection Factor Exercise

Protection Factors:

1/2 face APR =	10
full-face APR =	50
SAR =	1,000
SCBA =	10,000

1. You are working where the industrial hygienist has been sampling a spill of chlorobenzene. The results indicate exposure to 1,500 ppm. The PEL for chlorobenzene is 75 ppm. What is the minimum type of respiratory protection that can safely be used?

$$PEL = 75 \text{ ppm}$$

$$\text{If using a half-face APR, Fit factor} = \frac{1500 \text{ ppm}}{10} = 150 \text{ ppm}$$

10

$$\text{If using a full-face APR, Fit factor} = \frac{1500 \text{ ppm}}{50} = 30 \text{ ppm}$$

50

With a full-face APR, 30 ppm is less than the PEL, so this is the minimum acceptable type of respiratory protection.

2. You are working when a leak occurs which has a concentration of ammonia consisting of 3,500 ppm. The PEL for ammonia is 50 ppm. What is the minimum type of respiratory protection that can safely be used?

$$PEL = 50 \text{ ppm}$$

$$\text{If using a full-face APR, Fit factor} = \frac{3500 \text{ ppm}}{50} = 70 \text{ ppm}$$

50

$$\text{If using an SAR, Fit factor} = \frac{3500 \text{ ppm}}{1000} = 3.5 \text{ ppm}$$

1000

With an SAR, 3.5 ppm is less than the PEL, so this is the minimum acceptable type of respiratory protection.

Medical Fitness to Wear a Respirator

Ask "Why should a physician or other licensed health care professional review the job and examine you if you are assigned to wear a respirator?"

List responses

Discuss:

- Some of the possible physical conditions which may *prevent* an individual from wearing a respirator.
- Need for physical examinations prior to wearing a respirator. Include in the discussion who pays for the exam, how often exams are required, and who retains medical records for workers who wear respiratory protection.
- Some of the difficulties that may occur while wearing respirators.

An OSHA training video, "Medical Evaluations for Workers Who Use Respirators" (available at <https://www.osha.gov/respiratory-protection/training>, total running time 9:39), may be useful here.

Cleaning, Storage, Inspection, and Maintenance of Respirators

Discuss the significance of proper care of respiratory equipment. Refer to the Participant Guide to review requirements for cleaning, storage, inspection and maintenance of respirators.

An OSHA training video, "Maintenance and Care of Respirators" (available at <https://www.osha.gov/respiratory-protection/training>, total running time 10:14), may be useful here.

Minimum Requirements for a Respirator Program

Ask "What criteria should be required for a respiratory protection program?"

- List responses.
- Refer to the list in the Participant Guide for points to consider. Also refer to the Sample Respiratory protection program, available at http://www.osha.gov/dcsp/compliance_assistance/sampleprograms.html#Respiratory Protection. For contract programs, refer to the site's respiratory protection program.

The last 5 minutes of the OSHA training video, “Respiratory Protection in General Industry” (available at <https://www.osha.gov/respiratory-protection/training>, total running time 10:22), discusses the written respiratory protection program, and would fit well in this section. Also, the OSHA training video, “Respiratory Protection Training Requirements” (available at <https://www.osha.gov/respiratory-protection/training>, total running time 7:54), may be useful here.

Exercise - Respiratory Protection Lab

Number of Facilitators: 2 or more, consistent with ratio shown in Minimum Criteria

Time Requirement: approximately 3 hours

Materials:

- NIOSH Pocket Guide and worksheets from Participant Guide
- List of chemicals of interest to the participants

Procedure:

Introduction

The purpose of providing 3 hours of workshop is to give the participants an opportunity to wear and become familiar with SCBAs, APRs and air-line egress units, and cleaning and inspection procedures. Also during this time, participants practice proper fit testing procedures, learn the difference between various models and sizes of full-face APRs, and learn to clean, assemble, and inspect a respirator for defective parts.

An OSHA training video, “Respirator Safety, Donning (Putting on) and Doffing (Taking off) and User Seal Checks” (available at <https://www.osha.gov/respiratory-protection/training>, total running time 9:17), may be useful here.

The four stations include:

1. Donning and Doffing SCBA
2. User checks
3. Inspecting and Cleaning Respirators
4. Wearing air-line with escape unit

Each training center must have at least six functioning SCBAs if a full class of 24 participants is present.

Each of the four stations requires one lead facilitator who has experience with or is very familiar with the equipment to be donned so that they can answer questions as needed. Each station has a checklist to guide the participant and facilitator as to what occurs at the station. After the participant does the required tasks and completes the checklist, they bring the form to the station leader, who signs off, indicating that the participant has completed the station.

It is Consortium policy that all "open-enrollment" participants wear SCBA, egress unit, and APR. If enough equipment exists for only three rotations, then the Inspection and Cleaning Station can be modified to require participants to wash the APR facepiece during the Fit Testing Station and demonstrate respirator procedures and assembly in large-group presentation. If three stations are used (numbers 1, 3, and 4), then document the Station 2 checklist form with the APR Station Leader signing it and writing across the sheet "Wash APR at Station 1 and Inspection Demonstrated."

The checklists are part of the Consortium's documentation of training and must be collected from the participants and maintained by the training institutions. Make copies of the checklist from your master facilitator guide. Each participant should receive copies of each checklist. Each station leader needs to read through the checklists to know the station's objectives

Station 1: Donning and Doffing an SCBA

Equipment

- One SCBA per participant
- Extra facepieces in various sizes
- Minimum of 1200 lbs. of air pressure for each participant
- Manufacturer's procedures for donning and doffing SCBA
- One table for every four participants

- Paper towels and mild cleaning solution, or moist wipes
- Performance checklist with clipboard and pen for each participant

Organization:

- Depending on class size and equipment, determine how many groups to have
- Set up an equipment pick-up area
- Set up large tables (one for every 4 participants) for donning and doffing

Instructions:

- Issue facepiece and SCBA
- Review and demonstrate the manufacturer's suggested procedures for donning and doffing SCBA. For example, if the manufacturer has a video, you may want to show it. Then demonstrate the procedures on one participant.
- With your guidance, have participants don SCBA, following the step-by-step instructions. The general steps follow:
 - Check air in SCBA to ensure that it is adequate for the duration of the lab (approximately 1200 lbs)
 - Inspect SCBA to see whether all parts are functional
 - Follow manufacturer's suggested "check-out" procedure, and don the SCBA
 - Turn on the emergency valve
 - Have participants wear the SCBA
- Give participants the opportunity to walk up and down steps
- Discuss hyperventilation; you should check to see that no one is hyperventilating and make eye contact to ensure that all are doing okay
- Check emergency valve; reinforce that 5 minutes of air remain when the bell goes off
- Have participants doff SCBA, following step-by-step instructions:
 - Bleed air out of high-pressure hose, then remove from cylinder
 - Remove and replace cylinder
 - Check condition of the "O-ring."
 - Return to classroom with the facepiece, which will be used in other labs
- Have participants complete the Lab Performance Checklist, which you will review, sign, and retain

Station 2: User checks APRMaterials:

- One APR per participant - assorted sizes and brands
- Cartridges to match APRs-various types and brands
- Paper towels
- Cleaning solutions (MSA™ has a cleaner/sanitizer in packets.)
- 2 plastic wash basins
- Clipboard and pen for each team
- Performance checklist for each participant

Organization:

- Depending on class size, determine how many groups to have.
- Set up an area with respirators and cartridges. Equipment should be displayed so participants can handle it.

Instructions:

- Each participant should select a respirator
- Review and demonstrate maintenance and inspection procedures:
 - Check facepiece seal. Review degradation, and reinforce need for proper storage.
 - Remove cartridges, and check valves
 - Check face shield
 - Check head straps and clips
- Demonstrate and perform positive and negative user checks
- Show various types of cartridges
- Don respirators
 - Check to see that proper procedures are followed
- Emphasize no facial hair; describe problems with contact lenses and dentures
- Review requirement for optical kit in full-facepiece for workers requiring glasses
- Each participant demonstrates ability to conduct the user checks
- Doffing
 - Demonstrate proper doffing technique
 - Observe each participant doff respirator
 - Review maintenance procedures briefly
 - As appropriate, label respirators for participant's exclusive use during the remainder of the program
- Have participants complete the Lab Performance Checklist, which you will review, sign, and retain

Station 3: Inspecting and Cleaning RespiratorsMaterials:

Each station should have:

- Plastic wash basin
- Soap and disinfectant
- Sponges
- Paper towels
- Clipboard and pen
- Lab Performance Checklist

Organization:

Have station set up with equipment for cleaning respirators

Instructions:

- Participants should pair up and share wash basins, sponges, soap, and disinfectant (maximum 2 participants per basin)
- Review and demonstrate inspecting and cleaning of respirators:
 - Disassemble respirator and all its parts
 - Inspect respirators for worn parts and defects
 - Wash and dry respirator
 - Reassemble respirator
- Provide information for SCBAs to allow completion of questions 6-8 on checklist. From the OSHA Technical Manual:
 - For all respirators, inspections must include a check of respirator function, tightness of connections, and the condition of the various parts including, but not limited to, the facepiece, head straps, valves, connecting tube, and cartridges, canisters, or filters. In addition, the elastomeric parts must be evaluated for pliability and signs of deterioration.
 - For SCBA's, which require monthly inspections, the air and oxygen cylinders must be maintained in a fully charged state and recharged when the pressure falls to 90% of the manufacturer's recommended pressure level. In addition, the regulator and warning devices must be inspected to ensure that they function properly.
- Have participants complete the Lab Performance Checklist, which you will review, sign, and retain

Station 4: Wearing an Air Line with Escape UnitMaterials:

- Four wash basins set up for cleaning respirators
- SAR (one per participant)
- Minimum 1200 lbs. air pressure for each participant
- Egress units (one for each participant)
- Clipboard and pen for each participant
- Lab Performance Checklist

Organization:

- Have station set up with equipment for cleaning respirators.

Instructions:

- Review and demonstrate connecting to and disconnecting from egress unit using SAR
- Have participants practice connecting to and disconnecting from egress unit
- Have participants complete the Lab Performance Checklist, which you will review, sign, and retain

All checklists are retained by the training center as part of each participant's permanent record.

Summary - Respiratory Protection

Review objectives:

- Identify situations where respiratory protection is needed
- Identify types and features of respirators used to protect against exposure to hazardous materials
- Identify limitations of different types of respirators
- Demonstrate the inspection, donning and doffing of an APR or SCBA
- Demonstrate respirator cleaning procedures
- Identify the key components of a respiratory protection program

Review Summary content in Participant Guide

Refer back to the list created at the beginning of the course, and ask participants if they have any further questions on the subject of respiratory protection.

Review Questions – Respiratory Protection - Answers

1. List several situations in which respiratory protection would be required.
Oxygen deficiency, presence of chemicals, presence of dust, presence of fibers
2. What are the limitations of APRs?
You can only wear an APR if the identity and concentration of contaminants are known, and it cannot be worn in an IDLH atmosphere.
3. What are the limitations of SCBAs?
SCBA contains a limited supply of breathing air, is bulky and heavy, and must be used in positive-pressure mode if the atmosphere is IDLH.
4. Why are routine positive-and negative-pressure checks important?
Positive-pressure checks are necessary to ensure the valves and other points have good seals. Negative-pressure checks are necessary to ensure the facepiece has a good seal with the face.
5. Why are medical exams required for persons who use respirators?
You must have a medical exam prior to wearing respirators because they can aggravate conditions like lung disease, severe high blood pressure, and heart disease. People with claustrophobia may also find respirators highly uncomfortable.
6. List parts of a respirator that should be checked before and after each use.

SCBA

- a. *Condition of facepiece*
- b. *Hose and points where hose attaches to facepiece and tank*
- c. *Headbands to be sure they can be tightened for a good fit*
- d. *Head and tank harnesses for cracks, tears, or other defects*
- e. *Regulator according to manufacturer's directions*
- f. *Air tanks for damage*

APR

- a. *Point where cartridges screw into mask and valves*
- b. *Condition of facepiece*
- c. *Headbands to be sure they can be tightened for a good fit*
- d. *Head and tank harnesses for cracks, tears, or other defects*

7. Why is proper storage of respirators important?
If improperly stored, respirators may become contaminated or damaged.

8. List items that must be included in a written respiratory protection plan.
 - *Procedures for selecting respirators for use in the workplace*
 - *Medical evaluations*
 - *Fit testing*
 - *Use of respirators in emergency situations*
 - *How to clean, disinfect, repair, discard, and store respirators*
 - *Procedures to ensure adequate air flow, quality and quantity*
 - *Training of employees in respiratory hazards likely to occur*
 - *Training of employees in proper use and limitations*
 - *Procedures for evaluating program*

Chemical Protective Clothing

Time Requirement: 1 hour
Number of Facilitators: 1 or more, consistent with the ratio shown in Minimum Criteria

Materials

- Whiteboard or equivalent; markers
- Participant Guide
- OSHA standards on PPE
- NIOSH Pocket Guides
- Chemical protective clothing (CPC) for illustration
- Storage rack or table for CPC

Objectives

When they have completed this session, participants will be better able to:

- Identify general types, uses and limitations of chemical-protective clothing
- Identify the EPA/OSHA levels of personal protective equipment (PPE)
- Identify the general guidelines for selection of CPC and demonstrate selection for a scenario
- Demonstrate the donning and doffing of CPC provided
- Identify the procedures for inspection, maintenance, and storage of CPC

Teaching Methods

- Presentation
- Demonstration
- Small-group activity

Suggested Facilitator Preparation

- Read the Personal Protective Equipment chapter in the Participant Guide
- Learn what CPC is available to participants
- Prepare lesson plan
- Review exercise

Minimum Content Requirements

- The different types of chemical protective clothing (CPC) that are available
- Recognize when CPC should be used and what type
- Different levels of protection of PPE
- Strengths and limitations of PPE
- Precautions when wearing CPC
- Penetration, degradation and permeation
- Use, care and maintenance of CPC
- Donning and doffing of PPE

Questions You May Be Asked

“We don’t have any of this type of equipment where I work, what should I do?”

Facilitators should be prepared to facilitate discussion of strategies to upgrade PPE at the plant for contract programs. This issue should be resolved with management before the program begins. Facilitators should reinforce that employers must provide adequate PPE. The consequences of refusal to work should also be raised.

Presentation of the Session

This session can be presented as follows:

Personal Protective Equipment

Ask "Why is protective clothing necessary?"

Ask "What are the types of protective clothing you have used in the past?"

- Discuss OSHA standards on PPE

Ask "What are situations in which protective clothing is required?"

- List responses where the entire class can see them

Ask "What considerations should be made when selecting protective clothing?"

- List responses where the entire class can see them

Refer back to the list of chemicals from the beginning of class, to relate them to the need for CPC.

Chemical-Protective Clothing

- Emphasize that different types of CPC are needed to protect against different hazards
- Stress that totally encapsulating chemical-protective suits are the only ones that can protect from vapor hazards
- Also note that CPC can have an expiration date, because it can and does degrade during use and storage

Personal Protective Equipment Program

Ask: "What must your companies PPE Program address?"

Review list provided in Participant Guide.

Selection of CPC and other PPE

Ask: "What guidelines should be considered when selecting CPC?"

Review list provided in Participant Guide.

Levels of PPE

Ask "What equipment, according to OSHA, makes up Level A protective clothing?" and "What is required, and what is optional equipment?"

- If available, have a second facilitator demonstrate the equipment that makes up Level A

Ask "When is Level A equipment necessary?"

Repeat these questions and demonstration for Levels B, C, and D protection

- Non-vapor-tight TECPs may be used for Level B protection

List five precautions to consider when selecting CPC

- Have participants make a list of five precautions to consider. This task should take about 3 minutes. Ask for volunteers to state what they considered.
- List participant responses where everyone in the class can see them. Add additional responses to complete the list.

Characteristics and Properties of CPC

Review guidelines for CPC usage found in Participant Guide.

Discuss Penetration, Degradation, and Permeation.

Chemical-Resistant Materials

Refer to the Participant Guide for a list of CPC materials and their advantages and disadvantages

Precautions When Wearing CPC

Refer to the Participant Guide for a list of precautions in the use of CPC.

Points to emphasize:

It does not have to be a hot day for heat stress to occur when wearing CPC.

Proper inspection, cleaning, storage, and maintenance are essential

Discuss issues when wearing PPE such as:

- Hearing impairment
- Vision impairment
- Heat stress
- Slips, trips, and falls
- Care taken when donning and doffing gloves to avoid rips and tears
- Avoiding placing hands and knees on the ground to prevent permeation of chemicals and abrasion of suit material

Inspection, Maintenance, and Storage of CPC

Ask "Why is it important to inspect, maintain, and properly store CPC?"

Demonstrate how to inspect CPC including examining suits for cuts, holes, rips and tears, abrasions, weakness in zippers, signs of malfunctioning, and discolorations and visible chemical contaminants.

Exercise - Levels of PPE

1. At a paved storage area on the plant grounds, a truck has overturned, spilling unknown materials onto the ground. The material is vaporizing. You do not have any monitoring equipment. What level of protection should you wear?

An unknown atmosphere requires Level A protection. If the contaminant and concentration are identified by responders trained to use monitoring equipment, the level may be lowered.

2. A tank containing ammonia has a minor leak. The ammonia level is measured about 247 ppm (300 ppm is IDLH for ammonia). What level of PPE should the person taking the measurement have used?

Since the substance and potential health effects are known now that the sampling has been conducted the appropriate protection is Level B. Level A may be considered for skin contact protection and may have been needed when the sampling was conducted.

Be prepared to discuss the relation between 247 and 300 ppm. If a method was used that is not very accurate (e.g., length of stain tubes) or a unit not calibrated in some time, then more protection may be warranted. Also, IDLH limits the exposure time.

3. A cylinder of chlorine has ruptured. Level A is required for the HaMat Technicians who have gone in to patch the leak. You will be assisting in the perimeter of the hot zone where the concentration is less than 1 ppm. What level of protection should you be wearing?

Level C with a minimum of a full-face respirator with an acid gas cartridge. Chlorine has a TLV TWA of 0.5 ppm and a ceiling of 1 ppm and is a severe irritant. The maximum use of a cartridge is 10 ppm. Continuous monitoring should be done and an SCBA donned if the concentration exceeds 1 ppm.

4. Leaking drums are reported in a storage room. Sensors in the room show that the oxygen concentration is 18% and combustible-gas is at 45% LEL. What should you wear to enter the room?

Do not enter the room. A 45% LEL is a potentially explosive atmosphere. Point out that the measurements were obtained from a stationary sensor; it would have been a dangerous entry.

5. A storage tank containing phenol is apparently leaking, and a pool has formed on the ground. You need to enter the area to assist with monitoring. What level of PPE should you wear?

Level A is needed since the concentration of phenol is unknown and the possibility for skin contact exists.

6. Several five-gallon containers of hydrochloric acid have been found leaking in the warehouse. Detector tubes (length of stain) indicate a concentration of 35 ppm in the warehouse. What level of PPE should you wear to confine the spill?

Level C with an acid splash suit and a full-face respirator with acid cartridge. The maximum concentration for an acid gas cartridge is 50 ppm.

Length of stain tubes are not very accurate, so consult the incident commander regarding whether Level C is sufficient. Continuous monitoring should be done and an SCBA donned if the concentration increases.

Summary – Chemical Protective Clothing

Review objectives:

- Identify general types, uses and limitations of chemical-protective clothing
- Identify the EPA/OSHA levels of personal protective equipment (PPE)
- Identify the general guidelines for selection of CPC and demonstrate selection for a scenario
- Demonstrate the donning and doffing of CPC provided
- Identify the procedures for inspection, maintenance, and storage of CPC

Review Summary content in Participant Guide

Answer questions

Review Questions – Chemical Protective Clothing - Answers

1. List four examples of PPE.

Respirators, chemical protective clothing, boots, gloves and hearing protection

2. List three situations at your facility that require PPE for emergency response. What level of protection (A, B, C) is required for each?

Answers will depend on the facility and situation.

3. List some precautions to take while wearing CPC.

All joints should be secured with tape, making a tab for easy removal; When removing suit, prevent contamination of internal clothing; Rapid heat and moisture build-up will occur in the suit during use; Look for signs of heat stress; Motion is restricted; Seams are the weak point; A variety of suit sizes should be available; Suits offer no fire protection; Do not exceed temperature limits of suits

4. When should PPE be inspected?

PPE should be inspected when received from the distributor, issued to the user, put into storage, taken out of storage, used for training, used for emergency response, sent for maintenance, and received from maintenance.

5. When should PPE be replaced?

Replace when TECP suits fail pressure test or when any PPE is torn or damaged.

PPE - Other Protective Gear

Time Requirement: 15 minutes

Number of Instructors: 1 or more, consistent with ratio shown in the Minimum Criteria

Materials

- Participant Guide
- Whiteboard or equivalent; markers

Objectives

When completed, participants will be better able to:

- Identify OSHA requirements or other guidelines for hearing, eye/face, head and foot, hand/arm protection
- Describe special protective clothing

Teaching Methods

This session incorporates standards for Personal Protective Equipment (PPE) other than Respiratory Protective Equipment (RPE) and Chemical Protective Clothing (CPC) as a participant review and feedback.

- Presentation/discussion
- Small-group activity

Suggested Instructor Preparation

- Review the Participant Guide
- Review the PPE standards and guidelines listed in the Participant Guide
- Review the CPC sections of the program that these participants have completed.
- Prepare copies of the standards/guidelines (or ensure sufficient number of electronic devices are available)
- Prepare an outline for notes to be included in the program file

Minimum Content Requirements

- Other PPE standards shown in the Participant Guide

Questions You May Be Asked

"Where does other safety equipment come in - like fall protection?"

That too is PPE; if a participant needs to use it because of assigned duties or response activity, specialized training is required. Facilitate a discussion about whether the same principles apply - hazard analysis, provided and inspected, appropriately fit, training, maintained.

Presentation of the Session

The session can be presented as follows:

Review the objectives

Review the listed standards: noise, eye/face, head, foot, electrical, hand.

Exposure-Specific Protective Clothing and Testing

Discuss the different types of exposure-specific clothing that may be used, with emphasis on those that participants may require.

Summary - Other PPE Requirements

Review the objectives:

- Identify OSHA requirements and other guidelines for hearing, eye/face, head and foot, hand/arm protection
- Describe special protective clothing

Review Summary content in Participant Guide

Answer any remaining questions

DECONTAMINATION

Time Requirement: Presentation – 1 ¼ hours
 Demonstration and Workshops – 1.5 hours

Number of Facilitators: 2 or more - ensure facilitator to participant ratio during exercises is consistent with Minimum Criteria

Materials

- Whiteboard or equivalent; markers
- Participant Guide
- NIOSH Pocket Guides
- Open-space room which will allow groups mobility with protective equipment
- Four tables set up as lab stations
- Emergency response plan (ERP) for the training space per MWC Policy, tab 20
- Chemical protective clothing (CPC)
- Duct tape (Tape recommended by the manufacturer should be used in the field.)
- SCBA units (one per participant)
- Bottles of breathing air (1 breathing air cylinder per participant)
- Supplied-air respirator
- Air-purifying respirators

- Cleaning wipes
- Minimum Decon Line Equipment:
 - (3) Play pools or large tubs
 - Plastic sheeting, 15' x 45' minimum, 4 mil thick or greater
 - Assorted brushes, minimum of 3 long-handled
 - (3) Garden hoses with water hook-up and backflow preventer or 3 garden sprayers
 - (4) Stools or three-step ladders (If using Level A, provide enough for suiting up, doffing, and decon.)
 - (3) Trash bins with liners
 - Clipboard and pen (one per participant)
 - Lab Performance Checklists (one set per participant)
 - Clothing racks
 - Plastic wash basins (1 per every 2 participants)
 - Soap and disinfectant
 - Sponges
 - Paper towels

Objectives

When they have completed this session, participants will be better able to:

- Identify steps in pre-planning decontamination
- Identify methods to prevent contamination of personnel, PPE, equipment and the environment
- Identify the purpose of each of the work zones put in place during a hazardous materials emergency response
- Identify basic decontamination methods
- Demonstrate setting up a decontamination line, using supplies provided

Teaching Methods

- Presentation
- Demonstration
- Exercise (ensure compliance with MWC medical fitness for training requirements)

Suggested Facilitator Preparation

- Read the Decontamination chapter in the Participant Guide
- Ensure all medical clearances have been obtained
- Prepare lesson plan
- Review exercises and activities; assemble performance checklists
- Review manufacturer's information and instructions for equipment used during module
- Assemble supplies and equipment for lab stations
- For contract programs, review relevant sections of the facility ERP
- Practice the lab

Minimum Content Requirements

- Definition and purpose of decontamination
- Examples of standard operating procedures for preventing contamination
- Work zones - what are they and how are they distinguished?
- Decontamination methods: physical and chemical removal
- Protection of Decon Line Workers; decon of equipment, respirators and PPE; and disposal of contaminated materials.
- Hands-on PPE/Decon Lab - Level A, Level B or Level C (Level A or B required for open enrollment programs and strongly recommended for contract programs.)

Questions You May Be Asked

1. "We don't do it this way in our plant. So what are we supposed to do?"
Facilitators should be prepared to facilitate a discussion about working through union or management representatives to facilitate changes in the facility ERP. Emphasize that HAZWOPER requires the development and implementation of written decon procedures.
2. "Am I dragging contaminants around the plant and into their car and home if they do not follow decon properly?" Facilitators should use this opportunity to reinforce the need for proper decon to protect coworkers, family members and the community.

Presentation of the Session

This session can be presented as follows:

Introduction

Emphasize that most contaminants cannot be seen with the naked eye. Even if PPE, tools, etc. look clean, they must be decontaminated.

Pre-Planning for Decontamination

Ask: “What should your decontamination plan include?” Review list in the Participant Guide. The ERP needs to be kept up to date for the hazards currently present in the facility.

Limiting Contamination

Ask: “What actions can you take when donning PPE to limit contamination?” Review list in the Participant Guide.

Ask: “What other precautionary measures can help reduce the amount of contamination during response activities?” Discuss and review those listed in the Participant Guide.

Emphasize that PPE is not foolproof. For best protection, always avoid direct contact with contaminants if possible.

Work Zones

Review figure of Zones in the Participant Guide. Ensure participants know:

- The Hot Zone is also called the Exclusion Zone
- The Warm Zone may be called the Contamination Reduction Zone (CRZ)
- The Cold Zone can be called the Support Zone

Primary Activities in Each Work Zone

Ask “What activities occur in each Work Zone?”

Refer to diagrams found in Participant Guide. Use discussion to make sure participants understand the difference between zones. Consider making a list of what takes place in each zone.

Emphasize on the decontamination Line:

- PPE should always be removed as if it is still contaminated.
- It is not possible to successfully decontaminate porous materials such as wood.
- Decontamination workers usually wear one level lower PPE than those they are decontaminating, unless the contaminant is exceptionally dangerous.

Decontamination Procedures and Follow up Steps

Ask: “What are the ways that decontamination can be accomplished?” Discuss each listed in the Participant Guide. Emphasize that different decontamination procedures are needed for different contaminants.

Evaluating the Effectiveness of Decontamination

Ask: “What are some methods to evaluate the effectiveness of decontamination?”
Review the various methods identified in the Participant Guide.

Decontamination of Equipment and Breathing Apparatus

Discuss how to decon equipment and PPE, as outlined in the Participant Guide.

Other Considerations

Ask: “What safety precautions can be taken to protect those on the decon line as well as those being decontaminated?” Review list in Participant Guide.

Exercise - Suit-up and Decontamination Lab

Organization of the Lab – only participants with medical fitness for training don A or B

Two options:

Option A: Divide the class into 3 teams, depending on class size

Option B: If the class is very large, it is possible to have 4 teams

Be sure that each person has a buddy

Set up area with PPE. Equipment should be displayed so participants have the opportunity to handle it.

Set up three stations

Donning PPE (15-25 minutes)

Decon and Doff PPE (15-25 minutes)

Set-up and assist with Decon (30-50 minutes)

Rotate teams through the three stations

OPTION A: 3 TEAMS

Phase 1:

Team 1 sets-up and performs decon line

Team 2 dons and doffs PPE and goes through decon line

Team 3 assists Team 2 suit-up and observes decon line

Phase 2:

Team 1 dons and doffs PPE and goes through decon line

Team 2 assists Team 1 suit-up and observes decon line

Team 3 sets-up and performs decon line

Phase 3:

Team 1 assists Team 3 suit-up and observes decon line

Team 2 sets-up and performs decon line

Team 3 dons and doffs PPE and goes through decon line

OPTION B: 4 TEAMS

Phase 1:

Team 1 (up to 8 participants) begins suit-up

Team 2 (up to 4-6 participants) assists with suit-up

Teams 3 and 4 (up to 4-6 participants each) sets up decon line

Phase 2:

Team 1 passes through decon line

Team 2 begins suit-up

Team 3 assists with suit-up

Team 4 performs decon line

Phase 3:

Team 1 performs decon line

Team 2 passes through decon line

Team 3 begins suit-up

Team 4 assists with suit-up

Phase 4:

Team 1 assists with suit-up

Team 2 performs decon line

Team 3 passes through decon line

Team 4 begins suit up

Phase 5:

Team 1 performs decon line

Team 2 observes

Team 3 assists with suit-up

Team 4 passes through decon line

Instructions for the Lab

Donning the Equipment

Demonstrate each piece of PPE

Review CPC inspection procedures, emphasize degradation and permeation concepts

With one person, demonstrate proper donning procedures.

LEVEL A

Put on SCBA, follow manufacturer's check-out list (not on air)

Step into suit up to waist

Put on boots

Pull suit on the rest of the way

Allow participants to sit in suits for 2-3 minutes

Facilitator hooks participant up to air, when participant indicates ok

Facilitator tests emergency valve

Facilitator zips suit

Establish eye contact and check to see if participant is ok

Repeat for each participant

Have each display hand signals:

- "All right" (thumbs up)
- "Not all right" (thumbs down)
- "Get me out" (arms at throat)

Have each participant remove right arm from sleeve to activate emergency bypass valve

Have each participant signal ok and place their arm back in the sleeve

Proceed single file through decon line

LEVEL B or C

Put on suit

Tape sleeves and pant legs

Put on SCBA or SPR

Tape on hood

Proceed single file through decon line

Decon and Doff PPE

Participants go through decon line and doff PPE

Check to see that participants follow safety precautions

Participants complete performance checklists which are reviewed and initialed by the Facilitator .

Set-up Decon Line and Assist with Decon

Option A

NOTE: The decon line is set up and disassembled by each team.

Participants set up decon line

Facilitators critique the line and correct problems as necessary

Participants run decon line (may have them wear splash suits to keep from getting wet)

Participants complete performance checklists which are reviewed and initialed by the facilitator

Decon line is disassembled

Option B

NOTE: The decon line is set up initially and remains intact throughout entire exercise

First group (Teams 3 and 4) set up the decon line

Facilitators critique the line and correct problems as necessary

Participants run decon line (may have them wear splash suits to keep from getting wet)

Participants complete performance checklists which are reviewed and initialed by the facilitator

Final group (Team 1) disassembles the line

Summary - Decontamination

Review objectives:

- Identify steps in pre-planning decontamination
- Identify methods to prevent contamination of personnel, PPE, equipment and the environment
- Identify the purpose of each of the work zones put in place during a hazardous materials emergency response
- Identify basic decontamination methods
- Demonstrate setting up a decontamination line, using supplies provided

Review Summary content in Participant Guide

Answer questions

Review Questions - Decontamination - Answers

1. Why is it important to decontaminate personnel, PPE, and other equipment before re-entering the clean zone?

Decontamination is important to prevent the spread of contamination from the Hot Zone, and to protect coworkers, family members and the public.

2. How can contamination be prevented?

Contamination can be prevented by properly donning and doffing PPE, following SOPs, not walking through obviously contaminated areas, using remote-sampling techniques, covering monitoring and sampling equipment, wearing disposable garments, and containing the source of the hazardous material.

3. Describe the basic activities in each zone.

Hot zone – plugging and patching, containing spills

Warm zone – decontamination

Cold zone – determine effectiveness of decontamination and do medical assessment

4. What are some basic decontamination methods?

Physically or chemically removing contaminants

Rinsing off contaminants

Disinfecting

Sterilizing

WORK PRACTICES

Time Requirement: Presentation – 1 hour
 Demonstration and Workshops – 1 ½ hours

Number of Facilitators: 1 or more, consistent with ratio shown in Minimum
Criteria (1:5 facilitator:participant ratio during exercises)

Materials

- Whiteboard or equivalent; markers
- Participant Guides
- NIOSH Pocket Guides
- Open-space room which will allow groups mobility with protective equipment
- Four tables set up as lab stations
- Chemical protective clothing (CPC)
- Tape recommended by the manufacturer of CPC
- Assemble supplies on lab list

Objectives

When they have completed this session, participants will be better able to:

- Identify general work practices required for confined space entry, lockout and fire protection
- Identify information required for sizing up (hazards and risk assessment) the scene of a hazardous materials emergency
- Identify work practices that may be performed at the Operations Level
- Demonstrate one or more of the following techniques: absorbing, diking, diverting, blocking

Teaching Methods

- Presentation
- Demonstration
- Small-group activity

Suggested Facilitator Preparation

- Read the Work Practices chapter in the Participant Guide. New material on the Hierarchy of Controls has been added
- Review background reading materials
- Prepare lesson plan
- Review exercises and activities
- Practice the lab
- Review manufacturer's information and instructions for equipment used during module
- Assemble supplies and equipment for lab stations
- For contract programs, review relevant SOPs and the facility ERP

Minimum Content Requirements

- SOPs and their importance to emergency response
- Control, containment, and confinement
- Hands-on Lab

Questions You May Be Asked

1. “The SOPs at my work site are lacking. What should I do?” The facilitator must be ready to facilitate discussion of how to determine if an SOP exists, how to obtain a copy within the union/management structure and approaches to problem resolution.
2. “I am expected to perform response activities beyond their level of training. What should I do?” The facilitator should be prepared to emphasize the training requirements of 1910.120 and facilitate a discussion of problem resolution within the union/management structure. For contract programs, the facilitator should be familiar with the company ERP and if the situation exists where employees will perform duties beyond their level of training the facilitator should have previously discussed the situation with management.

Presentation of the Session

This session can be presented as follows:

Types of Hazard Control

Referring to the image in the Participant Guide, discuss the Hierarchy of Controls.

Standard Operating Procedures

Routine SOPs

Note that SOPs vary from one facility to another.

SOGs for training only

Confined Space Entry Procedures

Ask: “What are the properties of confined spaces?” Discuss those provided in Participant Guide.

NOTE: emphasize that this is not CSE training

Ask: “What are some common confined spaces found at manufacturing facilities?” Review the list in Participant Guide.

Ask: “What are the characteristics of permit-required confined spaces?” Review the list in the Participant Guide.

Ask: “What advance planning can be done to make confined space work safer?” “What else can be done during confined space work?” Discuss content in Participant Guide.

Emphasize that rescues from confined spaces are exceptionally dangerous. They should not be attempted without specialized training. Every year, many would-be rescuers die in confined spaces. Responders who may be required to rescue victims must be provided training in the types of spaces at the facility and perform a simulated rescue annually.

SOPs should be reviewed for compliance with OSHA standard 1910.146, Permit-Required Confined Spaces.

Lock-out Procedures

Ask: “What are some examples of equipment requiring lock-out?” Discuss and refer to list in Participant Guide. Review the example of a lock-out tag in the Participant Guide.

Ask: “What are the minimum recommended procedures for lock-out?” Discuss and review those listed in Participant Guide.

Fire Prevention

Ask: “What are Employer and Worker responsibilities for fire prevention?” List where all can see and review Participant Guide for completeness.

SOPs needed for Emergencies

Using the Participant Guide, review each part of the ERP.

Emphasize that employees should be familiar with the ERP before an emergency occurs. As an operations-level first responder, participants should respond in a “defensive fashion without actually trying to stop a release.” The purpose of the response is to protect nearby persons, property or the environment from the effects of the release.

Exercise - Work Practice Lab

Instructions for Small Group Activity and Work Practice Lab

This lab is divided into three activities which occur concurrently. The class should be divided into three groups and rotate through each activity. Minimal PPE is recommended only to prevent participants from becoming excessively wet. Full PPE with respirator/SCBA may be used, but will require more time and create a time imbalance between the small group activity and the hands-on labs. A minimum of three facilitators is needed to successfully present these activities.

If the class is very small, all can participate in the lab at one time.

NOTE: These activities may be modified for contract programs to adjust for more “real-life” settings which may be encountered in the facility. In no instance should modifications be made which are beyond the scope of the operations level first responder.

Initialing the checklist affirms that the skill was conducted correctly--100%.

Small Group Activity

Supplies: Small Group Activity worksheets, Pens

Organization:

Facilitator should be available for questions but should not provide “clues”

The facilitator should facilitate a discussion at the end of the exercise.

Answers

1. What information would you want to gather?

- Assess the extent of the spill from a distance
- Determine if others are present in the vicinity
- Observe if a placard is on the truck

2. What should you do at this point?

- *Notify a supervisor, who will activate the emergency response system.*

Now you are a member of the response team. The chemical has been identified as **acetone**—a chemical that is routinely received at the plant.

3. What should you know about the chemical?

- *You should look up the safety, health and fire hazards of acetone.*

4. What previous training should you have had?

- *Hazard Communication*
- *Respiratory Protection*
- *Emergency Response*

Diking and Absorbing Lab

Equipment and Supplies:

- PPE
- Splash suits
- Gloves
- Impervious boots
- Face shield, depending on spill scenario
- Spill liquid (non-toxic)
- Absorbent materials (absorbent socks, clay chips, dirt/sand, cat litter, etc.)
- Non-spark tools (shovel, scoop, push broom, etc.)
- Waste drums
- Performance checklist with clipboard and pens for each participant

Organization:

- Assemble equipment and PPE
- Prepare simulated spill (leaking drum, pipe, container, etc.)

Instructions:

Teams should assemble the necessary equipment from available supply and develop a strategy.

Team reviews strategy with facilitator

Facilitator and team members don PPE

Team approaches spill then dikes and absorbs spill in a manner which minimizes contact with the material.

Facilitator critiques diking/absorbing.

Team discusses disposal of PPE/equipment.

Facilitator reinforces concepts of decontamination and the fact that operations-level workers may not directly come into contact with spill or clean it up.

Team members complete performance checklists which are reviewed and initialed by the facilitator and are retaining in the program file.

Block the Drain Lab

Equipment and Supplies:

- PPE
- Splash suits
- Gloves
- Impervious boots
- Face shield, depending on spill scenario
- Spill liquid (non-toxic)
- Blocking materials (carpet, plastic sheeting, garbage can cover, etc.)
- Non-spark tools (shovel, scoop, push broom etc.)
- Waste drums
- Dirt or other weights
- Performance checklist with clipboard and pen for each participant

Organization:

- Assemble equipment and PPE

- Prepare simulated spill (leaking drum, pipe, container etc.) with access to drain (self-contained drain).

Instructions:

Teams should assemble the necessary equipment from available supply and develop a strategy

Team reviews strategy with facilitator

Facilitator and team members don PPE

Team approaches spill then places blocking material over the drain until it is completely covered. The activity should be performed in a manner which minimizes contact with the material. Diking may also be done, as necessary.

Facilitator critiques blocking and diking (if applicable) activities.

Team discusses disposal of PPE and equipment.

Facilitator reinforces concepts of decontamination and need for identification of material.

Team members complete performance checklists which are reviewed and initialed by the facilitator and are retained in the program file.

Summary – Work Practices

Review objectives:

- Identify general work practices required for confined space entry, lockout and fire protection
- Identify information required for sizing up (hazards and risk assessment) the scene of a hazardous materials emergency
- Identify work practices that may be performed at the Operations Level
- Demonstrate one or more of the following techniques: absorbing, diking, diverting, blocking

Review Summary content in Participant Guide

Answer questions

Review Questions - Work Practices

1. What is the Hierarchy of Controls?

The hierarchy of controls refers to the preferred methods of hazard control: Elimination, Substitution, Engineering Controls, Administrative Controls, PPE

2. Why are SOPs necessary for emergency response?

SOPs are needed to provide guidelines for carrying out tasks safely.

3. Explain the importance of the buddy system.

The buddy system provides workers with someone to help them in case of an emergency. Also, if one worker forgets a safety precaution, his/her buddy can remind him/her.

4. Describe a confined space situation. Why is a permit necessary?

A confined space situation has limited ways to get in and out, is not intended for continuous human occupancy, yet it is still possible for a person to enter and work. A permit is necessary because confined spaces pose many hazards.

4. What are the basics of a lock-out procedure?

The lock-out procedure is basically when a piece of equipment is locked so that no one else can turn it on or use it. A tag is placed on the equipment to warn others. This helps prevent people from being injured.

5. List several elements of a fire-prevention program.

Fire prevention programs should include maintaining fire-extinguishing media, properly positioned fire-extinguishing equipment, having adequately trained fire brigades, routine drills, etc.

6. What is the primary SOP for an emergency response?

The ERP

7. What “immediate effects” occur at a release or spill?

Immediate effects are air discoloration, unusual smells, chemical burns or discoloration on floor/gravel, and worker reactions (coughing, etc.).

8. Preliminary identification includes the use of which resources?

Preliminary identification uses placards or labels, shipping papers, SDSs, physical characteristics and monitoring results to figure out the chemical(s) present.

9. What are the duties of the operations-level first responder, according to 1910.120 or the ERP at the plant?

The operations-level first responder may take actions such as diking, diverting, blocking, absorption and collection.

10. List an example of basic control.

Containment - plugging a hole in a leaking drum (technician)

Confinement – blocking a ditch or storm drain (operations)

11. Why is a critique of an incident required?

Incident critiques are required to address any concerns that came up during the incident regarding equipment, training, etc. Critiques also help to improve existing plans.

12. What actions can be taken to ensure that the equipment and supplies are ready in case of an emergency?

To keep equipment and supplies ready for emergencies, store them properly and perform regular inspections. Always restock following training or emergency response.

EMERGENCY RESPONSE PLAN

Time Requirement: Presentation – 1.5 hours
Number of Facilitators: 1 or more, consistent with ratio in the Minimum Criteria

Materials

- Whiteboard or equivalent; markers
- Table
- Participant Guides

Objectives

When they have completed this session, participants will be better able to:

- Identify the topics that must be covered in the Emergency Response Plan (ERP)
- Identify the roles of key positions in the Incident Command System (ICS)
- Identify response activities that occur in each zone

Teaching Methods

- Presentation
- Demonstration
- Small-group activity

Suggested Facilitator Preparation

- Read the Emergency Response chapter in the Participant Guide
- Obtain company ERP or use MWC 'For training only ERP'
- Prepare lesson plan
- Review exercise

Minimum Content Requirements

- Elements of an ERP
- When an ERP is required
- The ICS and team member duties
- Zones in which various roles are conducted
- ERP exercise

Questions You May Be Asked

1. "There is no ERP at my facility." This impression may be a result of incomplete training by the employer or be an apparent violation of 1910.120. The facilitator must be ready to facilitate the discussion to determine if a plan does exist and how to obtain a copy for information and/or review. For contract programs, plant personnel responsible for the ERP should be identified. For general admission programs, it may be up to the employee to investigate further.

2. "Our ERP is missing most of these parts." In the case of contract programs where the employer's ERP is known to be inadequate, the facilitator should be comfortable directing a discussion of approaches to problem resolution.

3. "What should I do if I've been exposed to hazardous materials without the correct PPE?" Participants may recognize that previous work may have resulted in exposure to hazardous materials because of inappropriate PPE or assignments in zones for which the workers were not properly protected. These individuals should be referred to the union representative or occupational physician.

Presentation of the Session

This session can be presented as follows:

Emergency Response Plan (ERP)

Ask: “What are the topics covered in an ERP?” List for all to see and review in comparison to the Participant Guide.

Note: An ERP should be in place at any plant where employees are participating in emergency response.

Where employees do not participate in emergency response, an Emergency Action Plan (EAP) is necessary. Employers at these facilities must evacuate their employees and not allow them to assist in case of any emergency.

Personnel roles, lines of authority, training and communication

The Incident Command System (ICS)

Ask: “What are the important functions organized under the ICS?” Review list found in Participant Guide.

Review the example of an ICS organizational chart found in the Participant Guide. Then go through the personnel roles and lines of authority.

Training

Discuss the five levels of training and respective duties

Communication

Discuss the importance of communication in an emergency. Review the buddy system, including the common hand symbols illustrated in the Participant Guide.

Zones and Their Primary Activities in Each Work Zone

Review the 3 Zones. Ask: “What should be considered when determining locations of Zones?” Refer to the list in the Participant Guide. Review the procedures, personnel and PPE for each zone.

Emphasize that operations-level emergency responders may work in the Hot Zone in a defensive fashion only. Only persons trained at the technician’s level will approach the point of release.

Exercise - Emergency Response

A list of questions is shown in the Participant Guide that can be answered using a for-training-only ERP also included in this section of the Participant Guide. Participants should work in small groups, with each group assigned several of the items. During a report back, facilitate a discussion of responses from each group.

Answers

Pre-Emergency Planning

1. What is the importance of pre-emergency planning?

To be ready if an emergency occurs

Phone numbers available

Equipment/supplies properly maintained and stored

Personnel trained

2. What pre-emergency planning is included in the plan?

Coordination with LEPC, police, fire and hospital

Annual meetings

Development of ERP

Distribution of ERP

Review procedure for ERP

3. What other pre-planning items might be included to improve the plan?

Monthly meetings with safety personnel

Involvement of employees in hazard identification

Lines of Authority

4. What is the chain-of-command in this command in this ERP?

Emergency coordinator (= Incident Commander)

Technician

Operations

5. Who are the members of the ER team?

Coordinator and alternates

Technicians

Operations

Head Guard

6. What are the duties of the Incident Commander?

Identify material involved in an emergency

Activate internal facility alarms

Notify outside organizations

Assume overall authority

7. What are the duties of the Operations-Level First Responder?

Use provided PPE

Basic control, containment and/or confinement

Implement basic decon

Participate in other procedures as directed and trained.

Training

8. What training is required for personnel?

1910.120

1910.1200

1910.134

Degreaser maintenance (see Section 5)

Fire prevention (see Section 5)

9. Are the training requirements consistent with 29 CFR 1910.120?

Yes

10. Why is training important?

Reduce response time

Reduce injuries

Prevent spread of contamination

Communication

11. What are the purposes of communication during an emergency?

To facilitate response

To facilitate treatment of any injuries

12. What can happen to interfere with communications?

Radios may jam

Without backup system, audible alarms may be inactivated by power failure

Smoke may obscure hand signals

Excess noise may interfere with voice communication

Phone lines may be down

Communication may be impeded if lights are not operable

Emergency Recognition and Prevention

13. What are the procedures for fire alarms?

Evacuate (non-supervisory)

Shutdown operation and evacuate (supervisory)

Notify front gate guard

14. What is required for fire prevention?

Degreaser maintenance

Fire suppression system maintenance and testing

No smoking policy

Training on no smoking, fire alarm system

15. What types of chemical accidents are possible? What are the procedures to notify personnel?

Release of TCE

Entry into degreaser

Action: report to supervisor

16. What are the evacuation procedures? Who can authorize an evacuation?

Go to flagpole. Do not return until told to or the "all clear" sounds

Not stated who can authorize

Safe Distances and Places of Refuge

17. Where is the place of refuge?

If the evacuation horn is sounded, all non-supervisory personnel must report immediately to the flagpole area. Supervisors should secure their area per previous training and then report to the flagpole.

Site Security and Control

18. Who is in charge of site security?

The Emergency Coordinator manages site security and control.

Evacuation routes and procedures

19. Why are various alarms needed?

Each communicates something different.

Decontamination

20. What are the decon procedures?

Water and detergent wash

Extinguisher sent out for refilling

Respiratory protective equipment cleaned with isopropyl alcohol

Clothing sealed and disposed of

21. Are the decontamination procedures adequate? If not, what additional information is needed?

No. How are decon equipment/supplies cleaned?

If sludge from the degreaser gets on respirators, will isopropyl alcohol remove it?

Emergency Medical Treatment and First Aid procedures

22. Who will provide First Aid?

First shift nurse

Designated person on second and third shifts

23. Are the emergency medical treatment procedures adequate? If not, what additional information is needed?

Probably.

The issues: distance to treatment

Reasonably anticipated "worst-case" scenario

Training of persons at the site

Emergency alerting and response procedures

24. What emergency equipment is available?

Safety showers

Eye wash

SCBA

Spill control cart

Respirators

Gloves

Safety glasses

First-aid supplies

Fire hoses/extinguishers

25. What are the procedures for clean-up of large spills?

Call outside group

26. Are the procedures for spill clean-up adequate? If not, what additional is needed?

No. How are decon equipment/supplies cleaned?

If sludge from the degreaser gets on respirators, will isopropyl alcohol remove it?

Critique of response and follow-up

27. Is there a formal procedure to assemble data and report on all activities?

Yes

28. Who is in charge of follow-up? Why might this part of the plan be a concern?

The Emergency Coordinator. The problem is follow-up is often not verified.

PPE and Emergency Equipment

29. What emergency equipment is available?

Safety showers, eye wash, self-contained breathing apparatus (SCBA, 4 per floor), spill-control cart (protective gear, adsorbents, etc.), respirators, gloves, safety glasses, first aid supplies (kits and cabinet), fire hoses, fire extinguisher

30. What procedures are in place to maintain and inspect this equipment?

None

Example of an Emergency Response Plan - for training only

The Participant Guide contains an example of an ERP for training purposes.

Summary – Emergency Response Plan

Review objectives:

- Identify the topics that must be covered in the Emergency Response Plan (ERP)
- Identify the roles of key positions in the Incident Command System (ICS)
- Identify response activities that occur in each zone

Review Summary content in Participant Guide

Answer questions

Review Questions-Emergency Response Plan - Answers

1. What are some required parts of the ERP?

- a. Pre-emergency planning and coordination*
- b. Personnel roles, chain of command, training and communication*
- c. Emergency recognition and prevention*
- d. Safe distances and places of refuge*
- e. Site security and control.*
- f. Evacuation routes and procedures.*
- g. Decontamination procedures.*
- h. Emergency medical treatment and First Aid procedures.*
- i. Emergency alerting and response procedures.*
- j. Critique of response and follow-up.*
- k. Emergency response equipment.*
- l. Emergency response.*

2. Why is preplanning necessary?

Preplanning is necessary so everyone can be ready for an emergency.

3. What SOPs might be included in the ERP?

- a. Respirator and PPE*
- b. Communication*
- c. Fire suppression system*
- d. Maintenance and testing*
- e. Confined space entry*

4. Describe the function of the ICS, and list personnel and duties that may be part of it.

- a. Incident Commander - directs all aspects of the team*
- b. Safety Officer - monitors and implements the safety plan*
- c. Liaison Officer - coordinates between agencies*
- d. Public Information Officer - controls releases to the media*
- e. Operations Officer - oversees operations for sampling, decon, security*
- f. Planning Officer - prepares research brief on the material present, PPE and hazards involved*
- g. Logistics Officer - provides equipment as well as food and water for long duration incidents*
- h. Finance Officer - purchases needed materials and evaluates use of funds*

SIMULATIONS

Time Requirement:	Tabletop exercise and hands-on activities – 3 hours
Number of Facilitators:	2 or more to maintain ratio in Minimum Criteria

Materials

- Whiteboard or equivalent; markers
- Participant Guides
- SDS for acetone from Participant Guide (or another chemical)
- For contract programs, company ERP; for open enrollment MWC 'For training only ERP'
- NIOSH Pocket Guides
- DOT Guidebooks
- Open-space room which will allow groups mobility
- Spill Cart supplies (see Participant Guide)

Objectives

When they have completed this session, participants will be better able to:

- Use resource materials to determine physical, chemical, and health hazards
- Select appropriate PPE from that available on a spill cart
- Secure an incident area
- Plan a response
- Terminate the response and plan post-response steps

Teaching Methods

- Small-group activity
- Hands-on lab

Suggested Facilitator Preparation

- Read the Simulations session in the Participant Guide
- Prepare lesson plan
- Review exercises and activities
- Practice the lab
- Review manufacturer's information and instructions for equipment used during module
- Assemble supplies and equipment for hands-on simulation
- Prepare handouts
- For contract programs, review relevant SOPs and the facility ERP

Minimum Content Requirements

- Tabletop exercise
- Critique of response plans
- Hands-on activities (Level A or B required for open enrollment programs and strongly recommended for contract programs, with appropriate medical clearances)
- Critique of hands-on activities

Questions You May Be Asked

1. Facilitators should be prepared to discuss variations on the incident.
2. Participants will undoubtedly ask, "What if...". Thorough facilitator preparation for the many possibilities is very important.

Presentation of the Session

This session can be presented as follows:

Overview of Simulations

The simulations help to reinforce concepts that have been learned in this course.

Exercise - Spill Response Tabletop

Refer everyone to the scenario and maps in the Participant Guide. Participants will read and answer assigned questions in a small group and a selected note taker will report the responses back to the class after about 45 minutes. The class will critique each group's response.

Answers

Part - A - Size-up and Chain of Command

1. Who is the emergency coordinator (Incident Commander)?

The plant manager

2. Where will you do the size-up? Place characters on the map.

Through Bay 3 door

3. What should you be looking for during the initial size-up?

Placard to indicate fire hazard

Truck-trailer type and position

Good location for a command post

Location of sewer drain

Hazard recognition of the oxygen tank and confined space of the trailer

Determination of personnel in the area

4. Is there a hazardous material present? How do you know?

Yes, acetone is a hazardous material. It is flammable and a health hazard, according to SDS, NIOSH pocket guide and ERG.

5. Where will you secure the scene? Sketch this area on the map.
*Notify the guard at the guardhouse to close the gates to driveways.
 The trucks in the shipping area should not be allowed to leave.*
6. What type of protective clothing and respiratory protection do you need at this point?
 Select these items from the spill cart.
*Level B. Pressure-demand SCBA with extra air cylinder
 Natural rubber gloves,
 PVC disposable gloves
 PVC disposable boots
 Not on the cart, but needed anyway: hooded chemical protective clothing, outer
 chemical-resistant boots with steel shank.*
7. Where will you make the entry to the scene? Place characters on the map
 according to the entry procedures.

Make entry to the scene at Bay 1 for monitoring.

Part B - Monitoring I

The decision is made to send in two team members dressed in Level B to examine the spill area more closely and monitor. The entry team approaches the scene with a direct reading instrument.

8. What should the two-person team measure first—oxygen or flammables?
Oxygen should be measured first because their meter will not measure flammables in an oxygen-deficient atmosphere.

Part C - Monitoring II

The first reading above zero is obtained at the northwest corner of the entry to the bay. The readings are:

Oxygen: 20.4% **%LEL: 8.9%**

9. What should the two-person team do at this point?
Continue to approach the spill and monitor.

Part D - Monitoring III

The team continues to approach the spill and obtains the following readings in the air just above the pool of spilled material.

Oxygen: 19.9% **%LEL: 15.0%**

The team also measures the air at the lower part of the open door.

Oxygen: 19.6% **%LEL: meter “pegs out,” goes to zero**

10. What should the spill team do now?
Leave the spill area and return to the support zone. The trailer is a confined space with an explosive atmosphere.
11. Are the two team members adequately protected?

The team members are adequately protected from respiratory and skin hazards but not the hazard of explosion.

12. Where should the Hot Zone and the Warm Zone be placed? Mark the zones on the map.

Hot zone surrounds the truck and Bay 1.

Warm zone includes half of Bay 2 and all of Bay 3.

Cold zone is northwest of Bay 3.

13. Is evacuation necessary? If “Yes,” describe who should be evacuated and how far away.

Yes, this is a potentially explosive spill. Evacuation of the whole plant should occur. Consult the ERG for distances.

14. How will you implement evacuation? Explain your answer.

Procedures for evacuation are defined in the ERP.

15. Should the overhead door in Bay 3 be closed? Explain your answer.

Bay 3 is upwind from the spill and should not be at risk. Acetone is heavier than air, so it should settle to the ground and not enter the building. Closing the door would create sparks. Having Bay 3 open allows it to be an observation post.

16. What should be done about the spill with the information you now have available?
The flow into the sewer gate should be prevented. If the acetone gets into the system, there is potential for an even greater explosion or fire.

Part E - Deciding on the Appropriate Response

The product is near the sewer grate but has not spilled into the sewer system. The decision is made to stop the flow of material before it enters the sewer drain.

17. How will the product flow be confined?

Use supplies from the spill cart.

The spill should be diked uphill from the sewer grate.

No entry to the trailer should be attempted – it is an IDLH situation.

18. How will the flow into the sewer system be prevented?

Cover the sewer grate with plastic and special sealing mat and dike around the grate.

19. What other procedures may be used?

A non-sparking (plastic) container should be placed under the drip from the trailer. No entry of the trailer should be attempted.

20. Should outside assistance be requested? Explain your answer.

Yes, the fire department and hazmat team are needed to suppress the explosive vapors.

A clean-up contractor will also be needed.

Part F - Using Off-Site Emergency Responders

A decision is made by the ABC Manufacturing Company plant manager to contact the fire department. The HazMat team and the engine company arrive.

21. Where should the ranking fire officer be met? Mark the area on the map.

At the main gate.

22. What should the fire officer be told?

Report on the current situation: the product, what's been done, and scope of assistance required.

Agree how the situation will be managed before entry is granted.

Consult with the ERP for specific agreements between the company and the fire department.

23. What should the spill team do after the information is relayed?

You should carry out the instructions of the Incident Commander.

24. Who is now the Incident Commander?

The fire chief.

This may vary among states. Be aware of state regulations and the specifics of the plant ERP.

Part G - Nearing Termination

The fire department uses foam to suppress vapors and begins airing out the trailer. A clean-up contractor, called by personnel at XYZ Chemical, arrives at the gate.

25. Who will relay information to the contractor?

The Incident Commander will coordinate the discussions with the spill team coordinator, truck driver, and the contractor.

26. What is the role of the spill team now?

Specified in the ERP; usually none, except spill team coordinator who should be available to the Incident Commander and the cleanup contractor.

27. What is the role of the fire department at this time?

Stand by until the fire hazard is removed.

28. What is the role of the contractor at this time?

Clean up after the hazard is mitigated or complete the mitigation started by the fire department

Part H - Termination

The contractor completes the mitigation and clean-up while the fire department waits until no fire hazard exists. The spill team is told to leave the scene.

29. What will each spill team member do to document his or her actions?

*Write up report as specified in the ERP.
Keep personal notes or make copies of report, where appropriate.
The XYZ Company must make an EPA report.
ABC Manufacturing may also be required to comply with state and local laws and regulations regarding incident reports.*

30. What tasks should be done to complete the termination of the response?

Recharge equipment and restock supplies. Follow-up investigation and critique principals.

Critique 1: Tabletop

Guidelines:

You will have approximately 20 minutes for the critique.

- Hear reports from each small group team on the tabletop exercise. Ask for a short report, detailing the site layout and how they would implement their response.
- When all groups have reported, distribute the answers to the tabletop exercise and spend approximately five minutes reviewing any questions or problems.

Exercise - Spill Response Hands-On Simulation

Facilitator Notes

Site: Select or create a site for the hands-on exercise that approximates as closely as possible the scene of the tabletop exercise. A slight downhill slope with a sewer grating at the base is ideal, but you might have to use some props to accomplish this. Colored tape in the ground can also serve as a prop to add some realism to the exercise.

Materials: Assemble as many of the materials on the Spill Cart list from the tabletop exercise as possible and the publications that will be needed by the Research Support Team. A stopwatch may be useful to time the components of the exercise.

Critique: Videotaping of the entire exercise may be useful. Permitting the participants to critique their own performance is more meaningful than extensive facilitator critique. Become familiar with the briefing papers and review the guidelines for critiquing. Your comments need to be consistent with the written materials.

Organization:

- Form the teams. If there are not enough participants, combine team responsibilities. Note that observers are required; it is best if trained personnel fill this role, not participants. One observer may oversee multiple stations.
- Hand out briefing papers and make job assignments.
- Observers will receive the checklists. Ask each observer to fill out the checklists completely and be prepared to summarize the findings.
- Checklists can also be used for self-evaluation by all the team members after the hands-on tasks have been completed.
- One facilitator must act as the Incident Commander. All groups should communicate with the Incident Commander. It is important for the facilitator to be prepared and not ask them to perform tasks beyond the Operations level.
- Note: At the Operations level of training, none of the participants are prepared to act as the Incident Commander.

Briefing Paper: Operations Leadership Team

Your first step is to elect a team leader. All other team members are the leader's assistants and are delegated by the leader to act on his/her behalf.

Responsibilities of the team are as follows:

- Coordinate with the Incident Commander.
- Coordinate activities with all teams (security, research, dike/confine, and decon).
- Establish a staging site and a chain of operations-level communication (and notify all affected parties) and maintain ongoing communications with all teams.
- In consultation with each team, arrange for personal protective and respiratory equipment and supplies, using only what is available from existing supplies.
- Participate in termination procedures for the response.
- Keep an accurate log of all response activities, and maintenance records.

Your Operations team may, after consultation with the Incident Commander, move anywhere on the site, but you must wear appropriate protective equipment if you enter the warm or hot zones.

Briefing Paper: Site Security Team

Your first step is to elect a team leader. The team leader carries out the site security detail, and must report periodically to the Incident Commander.

Responsibilities of the team are as follows:

- Use appropriate materials and labels to mark off perimeter and access points.
- Maintain security and keep unauthorized persons out of restricted areas.
- Assist with evacuation, and assist the Incident Commander when requested.

You are authorized to go anywhere on site, except into the restricted areas. You may enter restricted areas if authorized by the Incident Commander and wearing the appropriate levels of PPE and respiratory protection.

Briefing Paper: Research Support Team

Your first step is to elect a team leader. The team leader is in charge of your task, and must report periodically to the Incident Commander.

Responsibilities of the team are as follows:

- Prepare a research brief on the hazardous materials involved. Include: incompatibilities, flammability and explosion hazards, first aid requirements and other relevant information.
- Advise the Incident Commander on appropriate personal protective equipment and respiratory protection from the available supplies.
- Perform any other research when directed by the Operations Leader.

Briefing Paper: Dike and Confinement Team

Your first step is to elect a team leader. The team leader is in charge of your task, and must report periodically to the Incident Commander (this can be done by radio, if necessary).

Responsibilities of the team are as follows:

- In consultation with the Incident Commander, execute an emergency response which includes diking and confining the spill material utilizing the materials available.
- Suit up and enter the hot zone, carrying out the response, and when complete, proceed to the decon line for decontamination.
- Perform any other tasks in the hot or warm zone if and when directed by the Incident Commander.

Briefing Paper: Decontamination Team

Your first step is to elect a team leader. The team leader is in charge of your tasks, and must report periodically to the Incident Commander (this can be done by radio, if necessary).

Responsibilities of the team are as follows:

- In consultation with the Incident Commander, prepare and construct a decontamination line capable of effectively decontaminating the entry teams utilizing the materials available.
- Don the necessary protective equipment and respiratory protection, and when directed, performing the decontamination of the Dike and Confinement team members.
- Perform any other decon tasks if and when directed by the operations team leader.

Operations Leadership Team - Checklist

<u>Assigned Roles</u>	Completed/Observed YES / NO
1. Elected a leader.	_____
3. Coordinated all the operations level teams.	_____
4. Established an operations level staging area.	_____
5. Maintained ongoing communications.	_____
6. Arranged for use of appropriate PPE.	_____
7. Coordinated activities with the incident commander.	_____
8. Participated in termination procedures.	_____
9. Kept a log.	_____

Other Actions Observed

Operations Level Activity
YES / NO

Notes

Site Security Team - Checklist

<u>Assigned Roles</u>	Completed/Observed YES / NO
1. Elected a leader.	_____
2. Marked off perimeter and access points.	_____
3. Maintained security at all times.	_____
4. Kept unauthorized persons out.	_____
5. Assisted in evacuation, if necessary.	_____
6. Assisted the team leader, as requested.	_____
7. Leader only: Assisted the Incident Commander as requested.	_____

Other Actions Observed

Operations Level Activity
YES / NO

Notes

Research Support Team - Checklist

<u>Assigned Roles</u>	Completed/Observed YES / NO
1. Elected a leader.	_____
2. Prepared information on the hazards, i.e., Incompatibilities, flammability, explosion hazards, first aid requirements, or similar.	_____
3. Advised the team leader on PPE.	_____
4. Performed other duties as requested.	_____
5. Leader only: Assisted evacuation, if necessary.	_____

Other Actions Observed

Operations Level Activity
YES / NO

Notes

Dike and Confinement Team - Checklist

<u>Assigned Roles</u>	Completed/Observed YES / NO
1. Elected a leader.	_____
2. Selected the appropriate materials from the available supplies	_____
3. Properly donned PPE.	_____
4. Entered the Hot Zone carefully to avoid contamination	_____
5. Minimized the possibility of contamination while in the Hot Zone.	_____
6. Diked the spill.	_____
7. Covered the drain.	_____
8. Minimized the possibility of contamination while leaving the Hot Zone.	_____
Other Actions Observed	Operations Level Activity YES / NO

Notes

Decontamination Team - Checklist

Completed/Observed
YES / NO

Assigned Roles

- 1. Elected a leader. _____

- 2. Constructed decon line from available materials. _____

- 3. Properly donned PPE. _____

- 4. Conducted decon minimizing possible contamination. _____

- 5. Decontaminated fellow team members. _____

- 6. Performed decon termination procedures. _____

Other Actions Observed

Operations Level Activity
YES / NO

Notes

Critique

Guidelines:

- Ask for comments from the observers of the hands-on exercise. When this segment is completed, ask the observers to submit the checklists.
- Open a discussion for comments from participants and facilitators/observers. What was learned? What could be improved? Is more training needed?
- The entire exercise is a learning experience. Videotape playback can help participants recognize successes and problem areas.

Use a blackboard or an easel with paper to record insightful or key points.

Summary – Simulations

Review objectives:

- Use resource materials to determine physical, chemical, and health hazards
- Select appropriate PPE from that available on a spill cart
- Secure an incident area
- Plan a response
- Terminate the response and plan post-response steps

Review Summary content in Participant Guide

Answer questions

CLOSING AND PROGRAM EVALUATION

This concludes the program and includes the posttest.

Time Requirement: 1 hour

Number of Facilitators: 1 or more, consistent with the ratio in Minimum Criteria

Materials

- Whiteboard or equivalent; markers
- Posttest
- Evaluation forms

Objectives

- Review anything remaining in the 'parking lot' to ensure complete
- Answer questions
- Administer the posttest
- Review need for additional training for technician level activities and the need for annual refresher
- Thank participants. Identify key rights and responsibilities workers have under OSHA

Teaching Methods

- Discussion

Suggested Facilitator Preparation

- Review questions raised during the program by participants.

Minimum Content Requirements

- Review 'parking lot' for any items
- Complete posttest and grade if 'successful completion' is determined on-site
- Complete evaluation forms
- Answer last questions
- Thank participants

Questions You May Be Asked

1. "What happens if I do not take a refresher?" If needed for a job, you will not be eligible. Some employers 'stretch' the requirement to 18 months, if the refresher is taken ASAP, but it is a gamble.

2. "What if there is no more training, but I have to plug/patch?" Generally, we find that employers provide the additional training, but if not, share the requirements with your supervisor. See the OSHA website for information regarding filing a complaint.

Presentation of the Session

Thank participants for attending the program.

This is an opportunity for final questions and to ensure that the list of questions generated on day has been addressed during the program.

Evaluation is important to continued program improvement. This should not be rushed. Provide 15 minutes to complete the program evaluation forms and collect them prior to the posttest.