



**Personal Protective
Equipment
Facilitator Guide
March 2016**

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Midwest Consortium for Hazardous Waste Worker Training

Acknowledgments

The Midwest Consortium developed this course for Hazardous Waste Workers and Emergency Responders under grant D42 ES07200 and cooperative agreement number U45 ES 06184 from the National Institute of Environmental Health Sciences. Several member institutions of the Midwest Consortium contributed to the development of this program.

See <http://med.uc.edu/eh/academics/training/mwc> for a listing of contacts at each member institution and additional information. We encourage you to comment on these materials. Please give your suggestions to those teaching the program in which you are now enrolled, or forward them to the Midwest Consortium for Hazardous Waste Worker Training, University of Cincinnati, P.O. Box 670056, Cincinnati, Ohio 45267-0056 or click on 'contact us' at <http://med.uc.edu/eh/academics/training/mwc>

Warning

The Midwest Consortium has copyrighted this material for workers who must use personal protective equipment to reduce exposure to hazardous materials. A recipient of the material, other than the Federal Government, may not reproduce it without permission of the copyright owner. The material was prepared for use by facilitators experienced in the training of persons who are or who anticipate being employed at a worksite requiring use of personal protective equipment. Authors of this material have prepared it for the training of this category of workers as of the date specified on the title page. Users are cautioned that the subject is constantly evolving. Therefore, the material may require additions, deletions, or modifications to incorporate the effects of that evolution occurring after the date of this material preparation.

Disclaimer

The Occupational Safety and Health Administration (OSHA) rules help assure worker health and safety at work sites and during a range of emergency response activities that may require use of provided protective equipment as part of exposure control programs. This program is intended to increase skills of those using personal protective equipment.

Additional training is necessary to perform many activities. These activities include selecting, maintaining and repairing personal protective equipment. Participants should seek guidance on these activities by consulting health and safety personnel and reviewing the PPE program at the worksite.

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Course Overview – Facilitator Guide

This program was developed in response to the need for workers served by the MWC to gain in-depth skills regarding the range of PPE that may be used. By following the outline format and activities in this guide, you will be better able to enhance learning, stimulate class discussion, and maintain the training objectives.

The program is designed to be tailored for the needs of participants. It is expected that a 4-hour program might be useful, as well as a full 8-hour program. Breaks and lunch are not part of the training hours. For each agenda, it is the responsibility of the training center staff to develop the following:

- Agenda (retain in program file) Note: more than 8 hours of programming is shown here. Tailor the agenda to participant needs. The final agenda includes 8 contact hours (lunch and breaks are not included in training time.)
- Supplemental Exercises (if used more than once, the exercise must be sent to UC to be made part of the Exercise Manual for all centers.)
- Sufficient PPE resources to illustrate the points in the program and facilitate needed skills among participants

The Midwest Consortium for Hazardous Waste Worker Training is devoted to professional facilitator freedom while maintaining consistency of training.

It is recommended that a minimum of two experienced facilitators team-teach this course. Additional experienced station leaders may be required to "pull off" the lab activities effectively. If Levels A or B are used, the medical clearance is needed prior to the program, and participant to facilitator ratio must be no more than 5:1. (See the NIEHS Minimum Criteria here: <http://tools.niehs.nih.gov/wetp/>) To maximize learning and skill development limit the class to no more than 24 participants.

Facilitator Preparation

The program incorporates a variety of teaching methods to meet varied learning styles. Material presentation, discussion, small-group activities, exercises, demonstrations, and labs 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 chapter of the

Facilitator's 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, the Exercises and the content he/she is teaching. In addition, facilitators should be familiar with the OSHA Standard, 29 CFR 1910.120., .95 and .132 through .138.

Carefully review the Facilitator Guide before planning your session. Lesson outline forms may be helpful when drafting your presentation outline. Examples of lesson outline forms are shown on the following two pages.

Program materials include:

- Participant Guide
- Participant Exercise Manual
- Facilitator Guide

The exercises have been removed from the Participant Guide to reduce volume and provide checklists in a separate, more useful 'package' for participants. This also facilitates the development/use of exercises that are most relevant to the participants; for example, if all participants work at a facility where ammonia is the primary hazard, exercise could be focused on ammonia-related scenarios. Similarly, if training is done on-site, the available PPE would be used.

Lesson Plan Form 1

Teaching Methods for This Lesson Plan	Audiovisual Requirements
<ul style="list-style-type: none"> _ Lecture _ 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 _ CD ROM _ Web Sites: _ Whiteboard, chalkboard, or easel _ Hands-on simulation _ Other (describe):
Reference Materials	Special Space or Facility Requirements
	<p>(List any room size or special facility regulations here, such as set-up areas, equipment storage concerns, etc.)</p>
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.

Instructional Resources

The instructional resources listed below will be useful in preparation and during the program. Many publications are available free from the U.S. Government Printing Office; other resources are available for a minimal cost. Many resources are also available on the internet.

1. *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*. October 1985. NIOSH/OSHA/USCG/DHHS (NIOSH) Publications No. 85-115, <http://www.osha.gov/Publications/complinks/OSHG-HazWaste/4agency.html>
2. *NIOSH Pocket Guide to Chemical Hazards*. NIOSH, <http://www.cdc.gov/niosh/npg/>
3. Hazardous Waste Operations and Emergency Response: Final Rule. (29 CFR 1910.120). March 6, 1989. OSHA, http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=standards&p_id=9765
4. Hazard Communication: Final Rule. (29 CFR 1910.1200), released March 26, 2012. OSHA, <http://www.osha.gov/dsg/hazcom/ghs-final-rule.html>
5. Occupational Noise Exposure (29 CFR 1910.95) https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=standards&p_id=9735
6. Personal Protective Equipment (29 CFR 1910.132) https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_id=9777&p_table=STANDARDS
7. Eye and Face Protection (29 CFR 1910.133) https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9778

8. Respiratory Protection (29 CFR 1910.134)
https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=12716
9. Head Protection (29 CFR 1910.135)
https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9785
10. Foot Protection (29 CFR 1910.136)
https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=standards&p_id=9786
11. Electrical Protective Devices (29 CFR 1910.137)
https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9787
12. Hand Protection (29 CFR 1910.138)
https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9788

SDS Dictionary Or see MWC website:

<http://med.uc.edu/eh/academics/training/mwc/glossary/glossary>

Presentation of Material

Graphics and Audiovisuals

Graphics are available and should be used to assist with in-class instruction. Graphics appear throughout the Participant Guide to illustrate respiratory protective equipment and protective clothing. Refer trainees 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 one-word slides, slides with term definitions, and slides as lecture outlines. These types of slides are not effective at keeping trainee attention. Effective slides contain color graphics and short review lists.

Resources

Appendices have been removed from the Participant Guide. You may want to provide the following on each table:

29 CFR1910

Hard copy of specific standards

An SDS dictionary or glossary posted at
<http://med.uc.edu/eh/academics/training/mwc/glossary/glossary>

NIOSH Pocket Guide

If available, provide an iPad or other device to access these resources on-line as well.

Exercises and Labs

Small-Group Activities and Exercises

Small-group activities and exercises are incorporated throughout this training course. Exercises are collected in a separate document, "PPE Exercise Manual". In the Facilitator's Guide, the discussion of activities is limited to instructions for presentation. The purpose of these activities and exercises is to involve trainees in clarifying information, identifying options, and applying skills.

You may allow trainees to complete the activities or exercises on their own, have them work individually and share their reactions in class, or work in small groups. Plan to allow sufficient time for trainees to complete activities.

Class 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 trainees will have no problems participating in group discussion, while others may have a hard time talking in front of the group.

Suggestions for facilitating group activities and discussions include:

- Allow trainees to freely express their values, attitudes, and opinions.
- Do not judge trainee's 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 voluntary group spokesperson present findings to the entire group.
- Keep the groups focused on the task at hand. Because small-group exercises can draw heavily on the trainees' personal experience, sometimes conversation can drift.
- Be alert to the potential for one person to dominate work in small groups. If you see this happening, facilitate participation by other members of the group.
- Keep the trainees alert and interested by encouraging participation. If the groups are not participating or giving only cursory answers, ask them probing questions linked to previous work or life experiences.

Labs/Simulations

Labs are designed to provide the opportunity for trainees to observe demonstrations and receive hands-on experience using equipment while reinforcing knowledge content. Most labs are set up as four rotating stations with an assistant facilitator at each station. Performance checklists are completed by the trainee during the lab exercises. At the end of each station exercise and before a rotation is made, performance checklists must be signed by the facilitator, collected, and retained by the training center as part of the trainee's permanent records.

Evaluation

The exercises throughout the program document activities of the participants and it is expected that everyone (with your help) will demonstrate mastery of each skill. During the skills, some participants may require extra time with you to be successful; your patience to assist each participant is most appreciated.

Introduction

Time Requirement: Presentation – 30 minutes
 Discussion/Presentation

Number of Facilitators: 1

Materials

- Participant Guide
- Open-space room which will allow groups mobility with protective equipment
- Whiteboard, chalkboard, or easel
- Markers or chalk

Objectives

When completed, participants will be better able to:

- Describe the hierarchy of controls.
- Provide an overview of requirements for PPE programs
- Describe employer responsibilities for employee-owned PPE
- Describe employee responsibilities for use of PPE

Teaching Methods

The introduction combines presentation with discussion. It is important as a facilitator to gauge the level of knowledge of the participants. You may do this during the introduction.

Suggested Facilitator Preparation

- Review the Participant Guide
- Prepare an outline for notes

Minimum Content Requirements

- Hierarchy of controls
- 29 CFR 1910.132
- 29 CFR 1910.120 (PPE)

Questions You May be Asked

1. Trainees might remark, "We did not do it this way at my last job. 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 do I do when my employer tells me there is no budget to get new equipment, but the facepiece no longer fits me?" Be prepared to facilitate a discussion on strategies to improve the company respirator program through discussions with

employee or management representatives. Emphasize that the law requires that employers provide adequate protection from respiratory hazards.

3. “Why doesn’t everyone eliminate hazards?” This is done when possible, but sometimes there are no engineering controls that are useable. One example is during response to an emergency—it may not occur near the fume hood!

Hierarchy of Controls

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

- Eliminate the hazard
- Substitute a less-hazardous alternative
- Employ an engineering control (such as local ventilation, for instance)
- Employ an administrative control (such as limiting the work time in a hazardous area)
- Wear PPE.

Ask what types of controls are in place where participants work. List where all can see.

Then ask about the PPE that is or will be used. List where all can see.

Ask participants what they want to learn from the program. Display the list for recheck throughout the program and again during the Closing.

PPE—General Requirements

Discuss the general requirements. Facilitate participant comments about hazard assessment and training.

PPE—More Specific Program Requirements

Discuss requirements of the written personal protective equipment program required under HAZWOPER as part of the employer’s health and safety program.

Bring out differences with the more general program—e.g., medical evaluation.

Respiratory Protection

Time Requirement: Presentation – 1.5 hours
 Demonstration and Workshops – 2.5 hours

Number of Facilitators: 1 (2 or more for Lab)

Materials

- Participant materials (Participant Guide, Exercise)
- Open-space room which will allow groups mobility with protective equipment
- Four tables set up as lab stations
- SCBA units (one per trainee)
- Plastic wash basins (1 per every 2 trainees)
- Soap and disinfectant
- Sponges
- Paper towels

- Air-purifying respirators
- Cylinder of breathing air (1 breathing air cylinder per trainee)

NOTE: If this is a contract program to learn about site-specific RPE, replace the materials list with the SOP for use. Develop a lesson plan based on the SOP to achieve the overall objectives.

Objectives

When completed, participants will be better able to:

- Describe the appropriate uses for respiratory protection
- Evaluate scenarios to determine if respiratory protection is required
- Identify the requirements of a respiratory protection program
- Demonstrate the donning, use and doffing of respirators
- Identify the elements of respirator training that should be provided by the employer

Teaching Methods

The presentation of the respiratory protection section is done by combining presentation, 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 trainees should be avoided, because many of their questions will be answered during the lab.

Suggested Facilitator Preparation

- Read the chapter, Personal Protective Equipment – Respiratory Protection, in the Participant Guide.
- Prepare an outline for notes.

- Review exercises and activities including answers.

Respirator Protection Factor

Respiratory Protection lab

Donning and Doffing SCBA

Fit testing an APR

Inspecting and Cleaning Respirators

Wearing an airline with escape unit

Respiratory Protection Scenarios

- Review background reading materials listed at the end of the chapter.
- Review manufacturer's information and instructions for equipment used during module.
- Assemble supplies and equipment for lab stations.
- Review 29CFR1910.134, Respiratory Protection.

Minimum Content Requirements

- Selection-when respiratory protective equipment should be used and what type
- Use-respirator fit, medical fitness required
- Care and maintenance of respirators
- Donning and doffing SCBAs and APRs
- Labs

Questions You May Be Asked

1. Trainees might remark, "We did not do it this way at my last job. 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 tells me there is no budget to get new equipment, but the facepiece no longer fits me?" Be prepared to facilitate a discussion on strategies to improve the company respirator program through discussions with employee or management representatives. Emphasize that the law requires that employers provide adequate protection from respiratory hazards.

4. "We use SABA, not SCBA." SABA is the global term that includes SCBA. Useful video clips at <https://www.youtube.com/watch?v=5p2VSdejjvA>

Respiratory Protection

OSHA standard 29CFR1910.134 covers Respiratory Protection.

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
- Illustrate that some of the situations mentioned might need air from outside the work area, while for others the air could be 'cleaned' before inhalation.
- Show drawings of these two basic types in the manual, or demonstrate with equipment you have for the program.

Air-Purifying Respirators

- 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.

Filters and Cartridges

Ask "What do you know about filters 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 Air-Purifying Respirators

- Discuss characteristics of gas masks and PAPRs.
- Discuss the limitations of single use filtering facepiece respirators.

Atmosphere-Supplying Respirators (ASR)

Supplied-Air Respirators (SAR)

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

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.

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 assure that your respirator fits?" and "How do you know when you have a 'good' fit?"

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

Review qualitative and quantitative fit-testing, including:

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

Refer to illustrations in Participant Guide or demonstrate.

Review positive- and negative-pressure user checks including:

- Purpose for check.
- Methods.
- When checks are to be done.

Refer to illustrations in Participant Guide or demonstrate.

Discuss difficulties that may occur while using respirators.

Assigned Protection Factors/Maximum Use Concentration

Review how respirators are selected.

Discuss:

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

Exercise - Respiratory Protection Factor Exercise

Number of Facilitators Required: 1

Time Requirement: approximately 40 minutes (20 for exercise and 20 for report-back)

Materials:

- NIOSH Pocket Guide and worksheet in Exercises.
- Participant Guide.

Procedure:

This exercise provides practice in determining whether a respirator is appropriate to wear in a given atmosphere. Perform this exercise in small groups.

1. Calculate the MUC.
 - The APF for the respirator (full-face SCBA in demand mode = 50) is found in the APF table in the Participant Guide.
 - The PEL (75 ppm) and IDLH (1000 ppm) for the chemical may be found in the NPG.
 - Use the MUC equation on the same page as the exercise in the Participant Guide to calculate the MUC (calculated value is 3750 ppm).
 - However, MUC must be compared to the IDLH concentration. Only a *positive pressure* SCBA or SAR with escape bottle may be used in an IDLH atmosphere (notice the much-higher APFs in the APF table.). If the calculated MUC is higher than the IDLH (as it is in this case), the actual MUC will be the IDLH concentration.
2. Find the minimum safe respirator.
 - Use the NPG to find the PEL (50 ppm) and the IDLH (300 ppm).

- Exposure is above the IDLH, so only a self-contained breathing apparatus equipped with a full facepiece and operated in a pressure-demand or other positive-pressure mode, or a pressure-demand SAR with a full-facepiece in combination with an auxiliary pressure-demand SCBA may be worn.

NOTE: tailor this exercise to situations/compounds of interest to the participants. Carefully prepare answers prior to the session.

Cleaning, Storage, Inspection and Maintenance, of Respirators

Discuss the significance of maintaining respiratory equipment. Refer to the lists and procedures shown in the Participant Guide to review procedures for cleaning, storing, inspecting and maintenance of respirators.

Minimum Requirements for a Respiratory Protection Program

Ask "What criteria should be required for a respirator program?"

- List responses.
- Refer to the list in the Participant Guide for points to consider. Also refer to the Sample Respirator Program provided by OSHA:
http://www.osha.gov/dcsp/compliance_assistance/sampleprograms.html#Respiratory Protection

Medical Fitness to Wear a Respirator

Ask "Why should a physician 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.

Exercise – Respiratory Protection Lab

Number of Facilitators Required: 2 or more

Time Requirement: approximately 2 hours

Materials:

- NIOSH Pocket Guide and worksheet in Exercises.
- List of chemicals generated during “Introduction to Chemical Hazards”.

Procedure:

Introduction

The purpose of providing two-and-a-half hours of workshop is to give the trainees an opportunity to wear and become familiar with SCBAs, APRs and air-line egress units, and cleaning and inspection procedures. Also during this time, trainees 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.

The four stations include:

1. Donning and Doffing SCBA.
2. Fit-Testing APR.
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 he/she can answer questions as needed. Each station has a checklist to guide the trainee and facilitator as to what occurs at the station. After the trainee does the required tasks and completes the checklist, he/she brings the form to the station leader, who signs off, indicating that the trainee has completed the station.

It is Consortium policy that all "open-enrollment" trainees 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 trainees 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 trainees and maintained by the training institutions. Make copies of the checklist from your master facilitator guide. Each trainee 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 trainee
- Extra facepieces in various sizes
- Minimum of 1200 lbs. of air pressure for each trainee
- Manufacturer's procedures for donning and doffing SCBA
- One table for every four trainees
- Paper towels and mild cleaning solution, or moist wipes.

- Performance checklist (see Exercises) with clipboard and pen for each trainee

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 trainees) 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 trainee.
- With your guidance, have trainees 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 trainees wear the SCBA.
- Give trainees 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 trainees 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 trainees complete the Lab Performance Checklist, which you will review and sign.

Station 2: Qualitative Fit-Testing an APR

Materials:

One APR per trainee - assorted sizes and brands

Cartridges to match APRs-various types and brands

Qualitative fit-testing supplies:

- Ventilation smoke tubes-stannic chloride (not recommended by NIOSH)
- Aspirator bulbs
- Isoamyl acetate or banana oil ampules
- Saccharine kit (3M™ makes a kit with saccharine/bitter mister.)
- Anti-fogging solution
- 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 trainee

Organization:

Depending on class size, determine whether to have one or two groups.

Set up an area with respirators, fit-testing chamber, and other supplies. Equipment should be displayed so trainees can handle it.

Instructions:

Each trainee 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 headstraps and clips

Demonstrate and perform fit-testing

Review and demonstrate various types of fit-testing (routine or periodic)

- Olfactory (smell)-isoamyl acetate or banana oil
- Taste sensor-saccharine or bitter

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

Fit-test each participant

Demonstrate cleaning and disinfecting techniques (optional)

Dips

Anti-fogging solutions

Doffing

Demonstrate proper doffing technique

Observe each trainee doff respirator

Review maintenance procedures briefly

Label respirators for trainee's exclusive use during the remainder of the program

Complete Lab Performance Checklist, which is reviewed and signed by the facilitator

Station 3: Inspecting and Cleaning Respirators

Materials:

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:

Trainees should pair up and share wash basins, sponges, soap, and disinfectant (maximum 2 trainees 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 trainees complete Lab Performance Checklist, which you will sign and keep.

Station 4: Wearing an Air Line with Escape Unit

Materials:

Four wash basins set up for cleaning respirators
SAR (one per trainee)
Minimum 1200 lbs. air pressure for each trainee
Egress units (one for each trainee)
Clipboard and pen for each trainee
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 trainees practice connecting to and disconnecting from egress unit.

Review, sign, and collect the trainees' completed Lab Performance

Checklists: The checklists are retained by the training center as part of each trainee's permanent record.

Exercise – Respiratory Protection Scenarios

Number of Facilitators Required: 1

Time Requirement: approximately 20 minutes (15 for exercise and 5 for report-back)

Materials:

- NIOSH Pocket Guide and worksheet in Exercises.
- List of chemicals of interest to the group.

Procedure: Working in groups, participants will evaluate the safety of wearing a respirator in given situations.

Scenario 1

Make a fit factor calculation:

APR for a full-face APR is 50.

$$\frac{\text{measured chemical concentration (ppm)}}{APF} = \text{parts per million (ppm)}$$

$$\frac{750 \text{ ppm}}{50} = 15 \text{ ppm}$$

The PEL of 50 ppm is greater than 15 ppm, so the full-face APR gives enough protection. The IDLH is greater than the measured concentration of 750 ppm, so an APR may be used.

Scenario 2

If you do a fit factor calculation as above, you would get a value of:

$$\frac{200 \text{ ppm}}{50} = 4 \text{ ppm}$$

Even though this is below the PEL, the measured concentration of 200 ppm is above the IDLH, so the APR may not be used.

Training—Respiratory Protection

Ask: Do all workplaces have identical Respiratory Protection Programs?

Use responses to discuss the need for site-specific training. Review the areas OSHA includes in site-specific training shown in the Participant Guide.

Summary—Respiratory Protection

Once again, refer back to the list created at the beginning of the program, and ask participants if they have any further questions on the subject of respirators.

Ask participants to name the advantages and disadvantages of different types of respirators.

Ask when a written respirator program is needed. It is needed even if respirator use is voluntary.

Review Questions—Respiratory Protection

1. When should chemical cartridges on air-purifying respirators be changed?

They should be changed according to the written respiratory protection plan. That might be when they get wet, when an end-of service life indicator changes color, if you begin to smell a chemical that has good warning properties or after a certain length of time.

2. What is a safe oxygen range? What is the importance of knowing this range?

A safe oxygen range is between 19.5% and 23.5%. If the oxygen concentration is not in this range, you must wear a self-contained breathing apparatus equipped with a full facepiece and operated in a pressure-demand or other positive-pressure mode, or a pressure-demand SAR with a full-facepiece in combination with an auxiliary escape

3. What indication are you given when the tank is getting low on an SCBA? What percentage of the tank is left?

An alarm sounds when the air in the tank falls below 33% of capacity.

4. What are the advantages and disadvantages of a half-face APR, an SAR and an SCBA?

Respirator	Advantages	Disadvantages
Half-face APR	Light, allows freedom of movement, more comfortable. Don't have to worry about mask fogging.	Can't be worn in IDLH atmosphere, or where eye irritants are present. May be difficult to tell when the cartridges need to be changed.
SAR	Don't have to worry about running out of air or cartridges being exhausted. Full-facepiece protects the eyes. Can be worn in IDLH atmosphere.	Hose can be blocked, cutting off air. Must have an escape bottle in IDLH atmosphere. Can only get so far from source of air. Mask can fog up.
SCBA	Full-facepiece protects the eyes. Can be worn in IDLH atmosphere.	Heavy. Have only a limited supply of air. Mask can fog up.

5. What are the types of fit tests? Why should you use one over another? Limitations?

Fit testing can be qualitative or quantitative.

Qualitative testing can be done without special equipment and trained personnel.

However, the test substances may be irritating, and a poor sense of taste or smell may make the test inaccurate.

Quantitative testing requires special equipment and trained personnel. It can be used to calculate a fit factor for the respirator.

6. Why are routine positive- and negative-pressure checks important? How are they done?

To determine if there are leaks in the valves, to ensure good fit, to determine seal against skin, to assure equipment is in working condition each time it is used. They are done by covering the exhalation valve and breathing out (positive) or by covering the cartridges/filters and breathing in (negative).

7. Why is proper cleaning of respirators important?

To remove any possible contaminants or infectious agents.

8. List items that must be included in a written respiratory protection plan.

Written standard operating procedures for selection and use; Selection criteria based on hazards; Instruction and training for wearer in use and limitations; Fit testing; Cartridge change schedule; Where practical, no sharing of respirators; Regular cleaning and disinfecting; Clean, convenient, sanitary storage; If used routinely, inspection during cleaning and replacement of worn and deteriorated parts. (Emergency-use respirators will be inspected monthly and after each use.) Appropriate surveillance of work area conditions, employee exposure, and employee stress. Regular re-evaluation of the program; Medical evaluation for those who use respirators; Only approved or accepted respirators

9. Why are medical exams required for persons who use respirators? How often are they required?

Because it can be more stressful to work in a respirator, medical exams are required to determine fitness of wearer. They should be conducted annually, unless a physician believes that an interval of up to 2 years is appropriate.

10. List some situations in which respiratory protection would be required.

In an oxygen-deficient or oxygen-enriched environment, IDLH conditions, where the contaminant is unknown, concentrations in excess of the permissible or published exposure levels.

11. What is the importance of properly doffing your respirator?

Properly doffing your respirator keeps you from getting contaminants on your face or hands or in your nose or mouth.

Chemical Protective Clothing

Time Requirement: Presentation – 1.5 hours
 Demonstration and Workshops – 2.5 hours

Number of Facilitators: 1 (2 or more during exercises)

Materials

- Participant Materials (Participant Guide, Exercise)
- Chalkboard, marker board or easel with paper
- Markers or chalk
- Table
- 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 should be used in the field
- SCBA units (one per trainee)
- Cylinders of breathing air (1 breathing air cylinder per trainee)
- Supplied-air respirator
- Air-purifying respirators
- Fit test hood and materials
- Cleaning wipes
- Plastic wash basins (1 per every 2 trainees)
- Soap and disinfectant
- Sponges
- Paper towels

NOTE: If a contract program, tailor this to the needs of participants and the CPC identified for use during the hazard assessment.

Objectives

When completed, participants will be better able to:

- Identify use of several types of chemical protective suits
- Identify criteria used for selecting CPC
- Identify the different levels of protection of PPE
- Identify ways in which the effectiveness of CPC can be reduced
- Understand the advantages and disadvantages of commonly used chemical resistant materials
- Recognize precautions to take while wearing PPE
- Understand the need for inspecting, maintaining and storing PPE properly
- Demonstrate the donning and doffing of different levels of PPE

Teaching Methods

- Presentation
- Demonstration
- Small-group activity

Suggested Facilitator Preparation

- Read the Participant Guide
- Review background reading materials
- Prepare class notes
- Review exercises and activities

Levels of PPE

PPE Lab

Don and Doff Level A

Don and Doff Level B

Don and Doff Level C

Inspect and Maintain PPE

- Review manufacturer's information and instructions for equipment used during module
- Assemble supplies and equipment for lab stations

Minimum Content Requirements

The following are minimum content requirements for the PPE-Chemical Protective Clothing section:

- 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
- Use, care and maintenance of CPC
- Donning and doffing of PPE
- Activities

Chemical-Protective Clothing

- Ask "Why is protective clothing necessary?"
- Ask "What are the types of protective clothing you have used at a work site?"
- 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.

Types of Chemical-Protective Suits

- 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.

Selection of CPC and other PPE

Ask: What hazards are present at your current work site or at sites where you have worked in the past?

List responses where all participants can see them. Point out that different hazards will require different PPE.

Review the selection guidelines in the 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.

Characteristics and Properties of CPC

- List five precautions to consider when selecting CPC.
 - Have trainees make a list of five precautions to consider. This task should take about 3 minutes. Ask for volunteers to state what they considered.
 - List trainee responses where everyone in the class can see them. Add additional responses to complete the list.
- Use figures and CPC materials you brought to the program to illustrate penetration, degradation and permeation. Examples you have may underscore the need for inspection before use.
- Chemical Resistant Materials: Refer to the Participant Guide for a list of CPC materials and their advantages and disadvantages. Show examples if available.

Precautions When Wearing CPC

- Refer trainees to the Participant Guide for a list of precautions in the use of CPC.
- 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
 - Use of the buddy system

Exercise - Levels of PPE

This exercise may be performed in small groups. It can be tailored to the needs of participants.

1. At XYZ Dumpgrounds, 15 barrels are unearthed and identified as dioxane. What level of protection should be used to remove the barrels?

Supplied-air respirator with full facepiece and level B. Dioxane is a carcinogen, and the IDLH level is 500 ppm.

2. Spent chlorine cylinders are being off-loaded from a semi. What level of protection should be worn?

Level B with air-purifying respirators.

3. You are to clean a pump “crusted over” with corrosion before the millwrights begin dismantling the unit. What level of protection is needed?

Level A.

4. You are scheduled to clean an empty culvert, where oxygen concentrations have been measured at 18% in the past. What level of protection should be worn?

Confined space, Level A.

5. You are assisting the safety coordinator with monitoring air concentrations around a lagoon, and you are told to draw the necessary equipment from the tool crib area. What PPE and safety equipment are needed?

Rubber boots and gloves and air-purifying respirator. (add: life vest)

6. You are moving 55-gallon drums of hydrochloric acid. During the past two days, workers have reported that the drum integrity is poor. What level of protection should be worn?

Level B.

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.

Exposure Specific Protective Clothing

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

Donning and Doffing PPE

Stress the following:

- PPE should be inspected every time it is donned and doffed

- All tape should include tabs for ease of removal. Use tape approved by the manufacturer.
- Positive and negative user checks of respirators should be performed every time a respirator is donned
- Be sure there are annual pressure checks for suits

Exercise – Don, Doff and Inspect Lab

The purpose of this workshop is to give trainees the opportunity to wear and become familiar with proper donning and doffing of Levels A, B, and C protective clothing and to teach trainees inspection procedures of the various parts, such as boots, hard hat, gloves, CPC suit, etc.

The 2-1/2 hours were allotted because of the time it takes to rotate four groups through Level A. Depending upon the number of SCBA units an institution has, may require Level B to be with the egress units and rotate turns wearing the two units within the Station's allotted time. Each institution must have at least six functioning SCBAs if a full class (24 trainees) is enrolled.

Each station requires one leader/facilitator who is experienced or very familiar with the clothing and respiratory equipment to be donned so that he/she can answer questions as needed. Each station has a checklist to guide the trainee and facilitator as to what occurs at the station. After the trainee has donned and doffed the suit and completed the checklist, you review, sign, and collect the checklist.

It is the Midwest Consortium's policy that all trainees will: wear Level A for at least 5 minutes, preferably ascending and descending some stairs or performing a task of comparable exertion, wear Level B for 5 minutes and have some physical task, and wear Level C for 5 minutes with some physical exertion. The Levels A, B, and C are to be worn by all trainees. Station 4, Inspection Methods, can be done in a large group if the institution has enough equipment to do fewer rotations of Level A.

If three stations are used (numbers 1, 2, and 3), the PPE lecturer should sign the Station 4 Lab Performance Checklist and write across the page "Inspection demonstrated in larger group." The full-face respirator would be washed at Station 3 (Level C) after doffing, as should the last group of Level A and Level B if there is no Station 4.

Lab Performance Checklists are part of the Consortium's documentation of training and must be collected from the trainees and maintained by the training institution, Copies of checklists may be given upon request by the trainee or his/her employer.

Before running a station, each station leader should wear the PPE and read through the checklists to know what is expected of him/her and the participants.

Stations 1-3: Donning and Doffing SCBA and Protective Clothing

Materials

- SCBAs (one per trainee)
- Extra facepieces in various sizes
- Minimum of 1200 lbs. air pressure
- Manufacturer's procedures for donning and doffing SCBA
- One table for every four participants
- Paper towels
- Mild cleaning solution
- Moist wipes
- Cylinders of air
- Levels A, B, and C protective clothing
- Tape recommended by the manufacturer should be used in the field
- Clipboards and pens
- Lab checklists
- Selected suits, gloves, boots, and hard hats

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 trainees) for donning and doffing.

Station 4

Allow trainees to handle all available clothing. Make specific points including:

- Suits
 - Types of seams
 - Hoods versus no hoods
 - Stress points
 - Sizes
 - Face shield not tested for permeation
 - Tape may degrade
- Gloves
 - Performance charts
 - Sizes
 - Damage
 - Inspection
- Boots
 - Steel Toes
 - Stitching, molded seams
 - Shank
- Hard Hats
 - Approved versus not approved
 - Bump caps
- Respiratory Protection

Review Questions—Chemical-Protective Clothing

1. What are some general types of PPE?

Respirators, boots, coveralls, gloves, hard hats, chemical-protective clothing

2. What is the purpose of CPC?

CPC prevents chemicals from coming into contact with the body.

3. TECP test for gas leakage showed 0.75%, did it pass?

No, TECP suits must leak less than 0.5%.

4. Why do you select CPC designed for specific chemicals?

CPC is designed for specific chemicals because different materials are resistant to different chemicals.

5. List three situations at a work site which require PPE. What level of protection (A,B,C,D) is required for each situation?

When a substance may be harmful to the skin and/or confined space entry may be required, Level A

When an SCBA is required, but less harmful to the skin, Level B

When direct contact with the substance will not harm the skin and an APR may be used, Level C

When the atmosphere contains no known hazard, Level D

6. What are the strengths and limitations of Levels A & B?

Level A offers highest protection for skin and protects from vapor exposure. Provides the highest level of respiratory protection. It is the bulkiest suit, and has the most limited vision.

Level B is less bulky and vision is less impaired. Provides the highest level of respiratory protection. It cannot protect against vapors or chemicals that are extremely harmful to the skin.

7. What are stress and problems associated with wearing CPC?

Materials do not breathe and heat stress and moisture buildup are problems. Suits are not protective at very high and very low temperatures. CPC may melt or burn if exposed to fire. CPC has a shelf life. Chemicals may penetrate, degrade or permeate CPC.

8. List 3 precautions to take while wearing PPE.

Any 3 of: Communication is difficult, motion is restricted, watch for signs of heat stress, wear proper sizes, avoid slips and falls, don and doff carefully to avoid damage and contamination, tape joints for levels B and C, avoid moisture condensation, avoid contact with puddles of chemicals or with sharp or abrasive objects, avoid potential fire areas, and coordinate dressout with your team

9. What are your concerns if you kneel in a puddle of chemicals?

CPC may become contaminated, or chemical may penetrate or permeate the CPC. The chemical may degrade the CPC.

10. When should PPE be inspected?

Before and after each use or as needed

11. When should PPE be replaced?

When pressure tests of TECP suits fail or when PPE is torn or damaged

PPE—Other types that may be required

Time Requirement: Presentation – 30 minutes
 Discussion/Presentation

Number of Facilitators: 1

Materials

- Participant materials (Participant Guide, Exercise)
- Easel and easel paper

Markers

Objectives

When completed, participants will be better able to:

- Use resources to find the OSHA requirements for other types of PPE
- Evaluate whether training requirements have been met

Teaching Methods

This session incorporates standards for other PPE into a participant review and feedback.

Suggested Facilitator Preparation

- Read the Introduction and the Instructional Resources and this Participant Guide and Exercise Manual.
- Prepare copies of the standards (or assure sufficient number of electronic devices are available)
- Prepare an outline for notes.

Minimum Content Requirements

- Review list of other PPE standards
- Exercise

Questions You May be Asked

1. Trainees might remark, "Where does other safety equipment come in—like fall protection?" That too is PPE, but is not part of this program. Facilitate a discussion about whether the same principles apply—hazard analysis, provided and maintained, appropriately fit, training, maintained.
2. "What do I do when my employer tells me there is no budget to get new equipment, but the facepiece no longer fits me?" Be prepared to facilitate a discussion on strategies to improve the company respirator program through discussions with employee or management representatives. Emphasize that the law requires that employers provide adequate protection from respiratory hazards.
3. "Why doesn't everyone eliminate hazards?" This is done when possible, but sometimes there are no engineering controls that are useable. One example is during response to an emergency—it may not occur near the fume hood!

Presentation of the Session

The session can be presented as follows:

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

Exercise – Other PPE Requirements

In this exercise, participants will work in groups to complete a work sheet on other PPE requirements. (See Exercise Manual)

Assign each group a relevant standard from the list. Facilitate a report back.

Summary—Other PPE Requirements

OSHA has specific standards for

Occupational Noise Exposure

Eye and Face Protection

Head Protection

Foot Protection

Electrical Protective Devices

Hand Protection

The general Personal Protective Equipment standard (1910.132) requires selection and use of all PPE is based on a documented hazard assessment and specifies the training required for all workers who must use PPE.

CLOSING AND PROGRAM EVALUATION

This concludes the program and may be done after the post-test depending on training center agenda.

Time Requirement: 30 minutes

Number of Facilitators: 1

Materials

- Chalkboard, marker board or easel with paper
- Markers
- Evaluation forms

Objectives

- Review initial list on questions to assure complete
- Review the reasons for PPE and the core of PPE programs (from last exercise)
- Answer questions

Teaching Methods

- Discussion

Suggested Facilitator Preparation

- Review list of questions raised by participants.

Minimum Content Requirements

The following are minimum content requirements for the section:

- Summarize
- Review initial questions
- Answer last questions
- Thank participants.

Questions You May Be Asked

1. “How do I get more training?” Most suppliers provide training and resource materials.

Presentation of the Session

Thank participants for attending the program.

Review the goals, and the basics of a PPE program.

This is an opportunity for final questions and to assure that the list of questions 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.