Personal Protective Equipment
For Law Enforcement

Personnel Protective Equipment

Course Objectives

1. The participant will be able to choose which respiratory protection should be used for a given hazard.

2. The participant will be able to list and describe the three types of respiratory protection used by emergency services.

3. The participant shall list the advantages and disadvantages of the APR.
Personal Protective Equipment

Course Objectives

4. The participant shall describe why the respirator Check is necessary.

5. The participant shall describe the difference between chemical and biological agents.

6. The participant shall list and describe the types of harm.

7. The participant shall describe three ways a chemical can attack personal protective clothing.

8. The participant shall list and describe the levels of protection.

9. The participant shall list three references in selecting personal protective clothing.

10. The participant shall successfully don an APR and chemical protective clothing.
Respiratory Protection

- A component of Personal Protective Equipment (PPE)
- Several Types:
  - Self Contained Breathing Apparatus (SCBA)
  - Supplied Airline Respirators (SAR)
  - Air Purifying Respirators (APR)

All respirators must be approved for the specific contaminant the employee is exposed to. Approval is done jointly by:

Mine Safety and Health Administration (Department of Labor)

&

National Institute for Occupational Safety and Health (NIOSH) (Department of Health and Human Services)
Respiratory Protection

• The type of respiratory protection to be used is determined by:
  - Hazards Present
  - Concentration of Hazards
  - Type and Duration of Hazard(s)
  - Form of Hazard
  - Pre-existing Medical Conditions

Respiratory Protection

• Positive pressure is when the pressure inside a face piece is greater than pressure outside.
• Positive pressure is needed to prevent contaminants from entering a mask when there is an inadequate seal. SARs and SCBAs both utilize positive pressure.
Types of Respirators

Air Purifying or Filtering:
The APR is used where there is enough oxygen present (approx. 20%), but the air in the area is contaminated with gases, vapors, and/or dust. These respirators filter out dangerous materials or divert air through a chemical filter.

**WARNING** - Some substances can not be safely filtered out, requiring you to wear a Supplied Air Respirator (SAR).

Types of Respirators - APR

**Advantages of APRs:**
- ✓ Lightweight
- ✓ Longer working time
- ✓ Less restrictive in confined areas
- ✓ Minimal training is required
- ✓ Low maintenance
- ✓ Inexpensive
**Types of Respirators - APR**

**Disadvantages of APRs:**

- Longer working time
- Must know exact chemical
- Must know exact concentrations of chemical
- Chemical(s) must have adequately warning properties
- Cannot be used in IDLH atmospheres

**Types of Respirators - APR**

**Air Purifying Respirators**

- APRs filter air that is consumed during normal breathing by the wearer
- APRs use a filtering system designed for use with specific chemicals to keep contaminants from being inhaled by the wearer
THE PHYSICAL REQUIREMENTS

Respirators places a strain on the wearer’s cardiovascular system. All workers must exert a greater degree of effort to inhale and exhale when wearing a respirator.

Some people are claustrophobic and cannot wear respirators.

OSHA requires that anyone assigned a task requiring the use of respirators be examined and certified as being able to safely wear the respirator. Furthermore, the worker and supervisor must have a basic understanding of respirator selections, operations, fitting, limitations and maintenance.

IMMEDIATELY DANGEROUS TO LIFE AND HEALTH - IDLH

An IDLH level represents a maximum concentration from which one could escape within 30 minutes without experiencing any escape-impairing symptoms or any irreversible adverse health effects.

IDLH levels are published for many substances by OSHA and NIOSH.

In practice, when the concentration of a toxic substance in a given area is known, IDLH levels may be used for determining whether self-contained breathing apparatus is needed when entering the area. If the concentration exceeds the IDLH level, positive-demand, self-contained breathing apparatus should be used.
**PROPER FITTING**

The proper fitting of a respirator is determined by a fit tests and seal checks. Fit tests can be “Qualitative” or “Quantitative”. Some OSHA Standards have specific requirements for fit testing.

<table>
<thead>
<tr>
<th>QUALITATIVE</th>
<th>QUANTITATIVE</th>
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<tbody>
<tr>
<td>✅ Upon issue and semi-annually</td>
<td>✅ Measure concentration inside mask</td>
</tr>
<tr>
<td>✅ Irritant smoke or banana oil</td>
<td>✅ Port drilled into mask</td>
</tr>
<tr>
<td>✅ Recite “Rainbow” passage</td>
<td>✅ Takes approximately 1 hour</td>
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<tr>
<td>✅ Subjective response</td>
<td>✅ Requires expensive equipment and trained personnel</td>
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<td>✅ Ensures correct fit for model</td>
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**Fit-Test**

- Need Gas-Tight Seal
- Faces Differ
- Situations Which Prevent Gas-Tight Seals:
  - Scars
  - High Check Bones
  - Facial Hair
  - Eye Glasses (Fullface Respirator)
**Fit-Testing**

- Initially & Annually Thereafter
- Loose Fitting Hood – No Fit-Testing Required
- Types of Fit-Testing
  - Qualitative Fit-Test – Pass/Fail
  - Quantitative Fit-Test – Measure Amount of Leakage

**Qualitative Fit-Test**

- Banana Oil;
- Irritant Smoke;
- Saccharin; or
- Bitrix™
Quantitative Fit-Testing

- Measure Amount of Leakage

Respiratory Check List

- Do a fit test.
- Receive training.
- Provide proper care.
- Measure hazard levels.
- Receive a Medical test.
- Review exposure limits.
- Select correct Respirator.
- Receive Annual Physical.
- Receive Annual Training.
- Check the Oxygen levels.
- Provide proper maintenance.
- Look for signs of deterioration.
- Follow policies and procedures.
- Wear only approved respirators that you have received instruction.
Levels of Personal Protection

• Level A
• Level B
• Level C
• Level D
Personal Protective Equipment  Level B
Personal Protective Equipment Level C

Chemical Protective Clothing

Penetration

Permeation

Degradation

Seam or zipper
Selection of CPC/Gloves

- Degradation
- Penetration
- Permeation
- Breakthrough Time
- Flammability – Not to Be Used in Flammable Environment (NFPA)

Degradation

- Physical, molecular change of material
- May shrink or swell, crack, or become brittle or soft.
- Result is reduction of chemical resistance.
Penetration

- Flow through openings in chemical protective material, such as:
  - Zippers
  - Seams
  - Holes
  - Imperfections in Protective Material

Breakthrough Time

- Time from Initial Chemical Contact till First Detection of the Chemical on the Other Side of Protective Material
- Could Be in Minutes or Hours
CHEMICAL PROTECTIVE CLOTHING

- Durability \textit{CONSIDERATIONS}...
- Flexibility
- Heat Transfer Characteristics
- Ease of decontamination
- Compatibility with other equipment
- Duration of use
- and COST!!

Selection of PPE

- Hazard Assessment
  - Type of Chemical & Physical State
  - Potential Route(s) of Exposure
- Decision Factors
  - Amount and Length of Exposure
  - Hazardous Properties of Chemicals
  - Work Function/Application/Tasks to Be Performed
  - Compatibility with Other Equipment
**LEVELS OF PROTECTION**

- Each ensemble must be tailored to the specific situation.

- Periodically reevaluate the level of protection as the amount of information about the site increases and workers perform different tasks.

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**Levels Of Protection**

- If you are entering an unknown environment, minimum level of protection is LEVEL B

- If you are entering an environment that is above the IDLH, minimum level of protection is LEVEL B

- If the product causes a significant dermal hazard, minimum level of protection is LEVEL A
LEVELS OF PROTECTION

• Reasons to upgrade:
  – Known or suspected presence of dermal hazard
  – Occurrence or likely occurrence of gas or vapor emission.
  – Change in work task that will increase contact or potential contact with hazmat.
  – Request of the individual performing the task.

Levels of Protection

• Reasons to downgrade:
  – New information indicating that the situation is less hazardous than was originally thought.
  – Change in site conditions that decreases the hazard.
  – Change in work task that will reduce contact with hazmat.
CONSIDER THESE THREE FACTORS WHEN ATTEMPTING TO INFLUENCE THE RATE AND DEGREE OF EXPOSURE:

TIME + DISTANCE + SHIELDING

Air-Purifying Respirator (APR)

• Air Cleaned Through Cartridge and/or Filter
• Does Not Provide Oxygen
  – Cal/OSHA Oxygen Deficient Atmosphere is <19.5% O₂
• Limited Protection Based on Type of Air Contaminate and Airborne Concentration