

COURSE NUMBER 55-0506 11

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2 HOURS

PPE FOR HAZ-MAT



# CHAPTER 4

## PERSONAL PROTECTIVE EQUIPMENT

Submitted for use by Athens-Clarke County Fire & Emergency Services  
By Lieutenant Keith Holloman and Sergeant Ken Parsons

## **Planning Pages**

### **Materials Needed**

**Awareness Level Training for Hazardous  
Materials (First Edition)**

**DOT Emergency Response Guidebook**

### **Lesson Preparation**

**Read Chapter 4 (pages 77-86)**

**Familiarize yourself with Dot Emergency Response  
Guidebook**

## **Chapter 4 : Personal Protective Equipment**

**Lesson Prerequisites : None**

**Objectives :**

**Course :**

After completing this course, the candidate should be able to identify and select the proper level of protective equipment for a given hazardous materials incident.

**Lesson :**

After completing this lesson, the candidate should be able to

1. Identify characteristics and qualities of the different levels of protective equipment.
2. Identify types of personal protective clothing
3. Identify types of personal protective breathing equipment

## **Chapter 4 – Personal Protective Equipment**

### **Presentation**

#### **Introduction/Motivation**

**Explain :** The importance of selecting the proper level of protective clothing and equipment in dealing with a hazardous materials incident.

**Tell :** Candidates that today's lesson is based on material found in Chapter 4 of the IFSTA Awareness Level Training for Hazardous Materials Textbook and the DOT Emergency Response Guidebook. This information will assist the student in meeting the objectives from NFPA 472 Standard for Professional Competence of Responders to Hazardous Material Incidents.

**Objective 1 :** Identify and describe the various levels of protective equipment (pg 32-36)

#### **a) Level A Protective Equipment**

- 1. Provides highest level of protection against vapors, gasses, mists and particles.**
- 2. Encapsulating suit covers SCBA as well as the wearer.**

- 3. Required when working with liquids, vapors and gasses that pose a severe threat of injury with contact.**

**b) Level B Protective Equipment**

- 1. Requires a garment(incl. SCBA) that protects against splashes from a hazardous chemical.**
- 2. Worn when vapor protective clothing (Level A) is not required.**
- 3. Depending on the chemical, special gloves/boots may be required.**

**c) Level C Protective Equipment**

- 1. Similar to Level B with the exception of respiratory equipment (ie. Air purifying respirators)**
- 2. Not used unless specific material is known and can be measured.**

**d) Level D Protective Equipment**

- 1. Requires no respiratory protection and minimal skin protection.**
- 2. Ordinary work clothes/uniforms**
- 3. Not adequate for first responders**

**Objective 2 : Identify and describe characteristics of the various types of personal protective clothing.**

**a. Structural Firefighting Clothing :**

**Designed for protection from heat, moisture and ordinary hazards associated with structural firefighting.**

**Offers minimal protection against hazardous materials**

**Neither corrosive resistant nor vapor tight**

**b. Chemical-Protective Clothing :**

**Designed to protect against specific chemical hazards and provides overall body protection.**

**Does not protect against all types of chemicals.**

**Three standards for the performance of suits**

- 1. vapor protective suits**
- 2. liquid-splash protective suits**
- 3. support function protective garments**

### **c. Vapor-Protective Suits**

**Designed to protect responders against exposure to specified chemicals in vapor and liquid splash environments.**

**Must be worn with a SCBA**

**Not compatible with all chemicals**

**Do not allow body heat to escape and can contribute to heat stress.**

**Impairs wearer's vision, communication and mobility.**

### **d. Liquid-Splash Protective Suits**

**Designed to protect users from chemical liquid splashes, but not against vapors or gasses.**

**Situation dependent : SCBA or full-face air purifying respirator may be worn**

**Not compatible with all chemicals**

### **e. Support-Function Protective Garments**

**Worn by personnel not working in "Hot Zone"**

**May be fully encapsulating and worn with SCBA**

**Does not allow body to give off excess heat**

**Limits user's mobility, vision and communication.**

#### **f. High-Temperature Clothing**

**Firefighter clothing designed for situations where heat levels exceed the capabilities of standard structural firefighting gear.**

**Three Basic Types :**

- 1. Approach Suits : High levels of radiated heat.**
- 2. Proximity Suits : Permits close approach.**
- 3. Fire Entry Suits : Highly specialized garments that allow wearer to work in total flame environment for short periods of time.**

**Does not protect against chemical hazards**

**Limits vision, mobility, communication and contributes to heat stress.**

## **Objective 3 : Identify Different types of protective breathing equipment.**

### **Four Basic types of protective breathing equipment**

#### **1. Open-Circuit SCBA**

**Most common SCBA used in the fire service.**

**Uses compressed air, exhaled air is vented to the outside.**

**Air supply duration varies due to design of unit, fitness of wearer and amount of physical exertion performed by user.**

#### **Four basic components of SCBA**

- 1. Backpack and harness assembly.**
- 2. Air Cylinder assembly**
- 3.Regulator assembly**
- 4. Facepiece assembly**

## **2. Open-Circuit Airline Breathing Equip.**

**Used in incidents where a longer air supply is required than what a typical SCBA could supply.**

**Up to a 300' airline is attached to an Open-circuit facepiece**

**Must be used in conjunction with an escape cylinder in case airline is cut.**

**Not commonly used by fire service personnel, but by specialized cleanup companies.**

## **3. Closed-Circuit SCBA :**

**Recycles exhaled air by mixing pure O<sub>2</sub> into it, thus allowing the wearer to rebreathe the air.**

**Have a duration of 30 min. to 4 hours and usually weigh less than standard SCBAs.**

**Operation is considerably more complicated and requires specialized training.**

#### **4. Air-Purifying Respirators :**

**Use ambient air that is purified through a filter before inhalation.**

**Three categories of A.P.R. :**

**1. Particulate-Filtering Respirators : Used for protection against dusts/mists.**

**2. Vapor- and Gas-Removing Respirators : Used for protection against specific gasses and vapors.**

**3. Powered Air-Purifying Respirators : Uses a blower to pass contaminated air through a product that removes the contaminants and supplies the purified air to the facepiece.**

## **Lesson Summary :**

### **Review :**

- 1. All levels of protective equipment along with the uses and limitations of each.**
- 2. All types of protective clothing and their uses and limitations.**
- 3. All types of protective breathing equipment and their uses and limitations.**

### **Summary :**

**There are many sources that can be consulted for determining which type of equipment to use and what level to use. Responders need to be familiar with the references available that recommend the appropriate equipment.**

**The Emergency Response Guidebook is a good reference to determine minimum protection guidelines for various incidents. This information can be found on the action guide pages in the health hazards emergency action section.**

References Consulted :

*Awareness Level Training for Hazardous Materials,*  
First Edition, Stillwater, Oklahoma :  
IFSTA/Fire Protection Publications 1995

*2000 Emergency Response Guidebook*

*NFPA 472 Standard for Professional Competence of  
Responders to Hazardous Materials Incidents*