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# **HAZWOPER: Monitoring Procedures and Equipment**

## **Leader's Guide, Fact Sheet & Quiz**

Item Number: 5133  
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***This easy-to-use Leader's Guide is provided to assist in conducting a successful presentation.***

## **PREPARING FOR THE MEETING**

Here are a few suggestions for using this program:

- a) Review the contents of the Fact Sheet that immediately follows this page to familiarize yourself with the program topic and the training points discussed in the program. The Fact Sheet also includes a list of Program Objectives that details the information that participants should learn from watching the program.
- b) If required by your organization, make an attendance record to be signed by each participant to document the training to be conducted.
- c) Prepare the area and equipment to be used for the training. Make sure the watching environment is comfortable and free from outside distractions. Also, ensure that participants can see and hear the TV screen or computer monitor without obstructions.
- d) Make copies of the Review Quiz included at the end of this Leader's Guide to be completed by participants at the conclusion of the presentation. Be aware that the page containing the answers to the quiz comes before the quiz itself, which is on the final page.

## **CONDUCTING THE PRESENTATION**

- a) Begin the meeting by welcoming the participants. Introduce yourself and give each person an opportunity to become acquainted if there are new people joining the training session.
- b) Introduce the program by its title and explain to participants what they are expected to learn as stated in the Program Objectives of the Fact Sheet.
- c) Play the program without interruption. Upon completion, lead discussions about your organization's specific policies regarding the subject matter. Make sure to note any unique hazards associated with the program's topic that participants may encounter while performing their job duties at your facility.
- d) Hand out copies of the review quiz to all of the participants and make sure each one completes it before concluding the training session.

# 5133 HAZWOPER: Monitoring Procedures and Equipment FACT SHEET

**LENGTH: 18 MINUTES**

## **PROGRAM SYNOPSIS:**

Hazardous materials and waste are a part of many work situations and can be found in many types of facilities and job sites. It is very important for employees to know how to recognize these potentially dangerous substances, and how to handle and dispose of them properly. In 1976, the EPA issued the Resource Conservation and Recovery Act (RCRA) to regulate the handling of hazardous waste "from cradle to grave". Since then, other regulations have followed, including OSHA's Interim Final Rule for Hazardous Waste Operations and Emergency Response (HAZWOPER) that gave OSHA the task of protecting HAZMAT workers. As part of these HAZWOPER regulations, there are varying requirements for employee training, depending on the employee's specific level of involvement with hazardous materials. This program will help employees understand how to use specific types of monitoring instruments to identify the existence of hazardous conditions in their work environment.

Topics include the dangers of contamination, direct-reading instruments, sampling collection devices, site characterization and the different types of exposure monitoring.

## **PROGRAM OBJECTIVES:**

After watching the program, the viewer should:

- Understand the importance of detecting hazardous materials in any work environment.
- Know about the different types of monitoring instruments as well as their respective strengths and weaknesses.
- Recognize the environments where IDLH conditions are present and be able to use appropriate instrumentation to reduce or eliminate exposure risks.
- Know when and why to use specific types of monitoring and the role of each type in identifying the existence of hazardous conditions.

## **PROGRAM OUTLINE**

### **THE DANGERS OF CONTAMINATION**

- **You'd better watch out, because you have an enemy.**
  - It has a thousand different names and no mercy.
- **Your nemesis doesn't know fear.**
  - It never sleeps.
  - It is literally inhuman.
- **It can injure or kill you with no remorse.**
  - Worst of all, you might not even know that you are under attack.
- **Contamination from hazardous materials is one of the most significant dangers that you face while on the job.**
  - You know that contamination could make you severely ill, even kill you.
  - But the danger doesn't stop there.
  - Once you are contaminated, you can expose others as well.
- **Without meaning to, you can unknowingly spread hazardous materials to your:**
  - Coworkers.
  - Family.
  - Friends.
  - Even pets.
- **Contamination doesn't always end with you and if you don't protect yourself, it won't.**
- **To combat the dangers of contamination, the Occupational Health and Safety Administration (OSHA) has developed a broad range of regulations.**
  - Foremost among these is the "Hazardous Waste Operations and Emergency Response" standard, commonly known as HAZWOPER.
- **HAZWOPER sets the guidelines for all hazardous materials activities, including:**
  - Storage.
  - Handling.
  - Disposal.

## DETECTION & SURVEILLANCE

- **One of the most important areas that it addresses is "monitoring", which covers two broad activities:**
  - Detection.
  - Surveillance.
- **"Detection" determines what hazardous materials are present at a site. This includes:**
  - Airborne contaminants such as dust, gases and vapors.
  - Pollutants in water or soil.
- **Detecting airborne hazards is especially important, because the contaminants that you inhale are among the most dangerous.**
  - Many chemicals pass easily from the lungs into the bloodstream.
- **The "surveillance" part of monitoring deals with keeping tabs on hazardous chemicals over time.**
  - The object is to ensure that your work site won't have any unpleasant surprises in store for you later on down the line.
- **As you can see, monitoring is crucial when you are dealing with hazardous materials. Without it:**
  - No one would be able to evaluate dangers to your health.
  - You couldn't determine when and where protection is necessary.
  - The proper selection of PPE would be impossible.
- **Some of the most hazardous materials cannot be seen, smelled or felt.**
  - Monitoring for these chemicals requires the use of highly specialized tools.
- **Exposure monitoring instruments come in two varieties:**
  - "Direct-reading instruments", which provide instant information.
  - "Sampling collection devices", which store airborne contaminants in collection media for later analysis at a laboratory.
- **Each type of equipment has its own strengths and weaknesses.**
  - Used together, they often complement one another.

## DIRECT-READING INSTRUMENTS

- **The main strength of direct-reading instruments is that they provide immediate feedback.**
  - That's why they're used to detect conditions that OSHA designates as IDLH (immediately dangerous to life and health).
- **Direct-reading instruments do have weaknesses, though.**
  - Each one is sensitive to only a limited range of chemicals.
  - There is no single direct-reading device that picks up every contaminant.
- **Even highly sensitive direct-reading instruments cannot detect concentrations below one-half of one part-per-million.**
  - Certain chemicals are hazardous in quantities below this level.
  - A direct-reading device will not be able to measure them.
  - Direct-reading Instruments also may not be able to distinguish between multiple chemicals when they are present.

## SAMPLING COLLECTION DEVICES

- **Sampling collection devices are different from direct-reading instruments in a number of ways. With a sampling tool, you collect material which will be analyzed later in a laboratory.**
  - A lab can detect concentrations of hazardous materials in parts-per-billion, rather than the parts-per-million possible of direct-reading instruments.
  - As a result, laboratory analysis produces findings that are usually more reliable than information collected with direct-reading instruments.
- **The biggest drawback to using sampling collection devices is that you have to wait for the results; immediate feedback isn't possible.**
  - So, you can't use sampling collection instruments to detect IDLH conditions.
- **Together, direct-reading and sampling collection devices make up for each other's shortcomings.**
  - This is why you need both: to give you an accurate picture of all the hazardous conditions you may face.
- **Now that we have talked about the major categories of monitoring equipment, let's take a closer look at when and how they should be used.**
  - **It is important to monitor for IDLH if:**
    - You are going onto a new site.
    - Chemical concentrations have changed at your current site.
  - **Since IDLH conditions are by their very nature life threatening, you need to use direct-reading instruments for instant feedback about the on-site environment.**

## TYPES OF DIRECT-READING INSTRUMENTS

- **Direct-reading instruments come in a variety of shapes, sizes and sensitivities.**
  - Most of this equipment needs to be calibrated before it is used.
  - Calibration involves testing an instrument with a known quantity of a substance to see if the device gives a proper reading.

- **Let's take a look at some direct-reading instruments that you might use. "Oxygen indicators" use electrochemical sensors to determine the oxygen level of the air around you.**
  - If the oxygen level falls below 19.5%, there will not be enough oxygen for you to breathe.
  - If the level rises above 25%, the atmosphere will become combustible (and there will be a significantly greater chance for a spark or other ignition source to cause a fire or explosion).
- **Oxygen Indicators are crucial in confined spaces, where often the air:**
  - Is not refreshed regularly.
  - Could be very different than what we are used to breathing.
- **"Combustible gas indicators" (CGIs) detect gases which have the potential to ignite.**
  - A CGI burns a small quantity of gas by exposing it to a heated filament.
  - The hotter the filament gets, the greater the concentration of the gas in the air.
- **The "gas chromatograph" (GC) is another direct-reading instrument.**
  - It forces air through a substance that absorbs contaminants.
  - Various chemicals will evaporate from the absorbing medium in different periods of time.
  - The duration that chemical traces remain in the medium indicates what chemicals they are.
  - This allows a gas chromatograph to separate a complex mixture into its component parts.
- **"Photo-ionization detectors" (PIDs) take samples of airborne contaminants and strip them of their electrons.**
  - The PID does this by bombarding the contaminants with ultraviolet light (this process is called ionization).
  - Because different gases ionize at different frequencies of UV light, the PID can accurately tell you what contaminants have been detected.
- **"Radiation detectors" are another type of direct-reading instrument.**
  - They are sensitive to a range of emissions, from the moderately hazardous alpha and beta particles to the extremely dangerous "gamma rays."
- **"Energetic" gamma rays can often penetrate several centimeters of lead.**
  - If you suspect radioactivity at your site, the first thing you need to do is monitor for gamma rays.
- **"Colorimetric indicator tubes" are perhaps the most widely used direct-reading devices.**
  - They are accurate, inexpensive and easy to use.
  - You do not need to calibrate them.
- **The procedure for using colorimetric tubes is uncomplicated.**
  - Just break off both ends of a tube, then insert it into a specially-designed hand-pump.
  - When you squeeze the pump, air is drawn through the tube, which changes color according to how much of the contaminant is present in the air.
  - Once you've taken a reading, you simply throw the used tube away.
- **There are many more kinds of direct-reading instruments than we have time to review here.**
  - Talk to your supervisor about any other direct-reading tools that you may need to use.

#### **SITE CHARACTERIZATION**

- **Once you have chosen your direct-reading tools, you need to "characterize" the site.**
  - In addition to monitoring for IDLH, you will need to look for general hazard, ranging from open pits to things that might fall on you.
- **Wear appropriate PPE and remember that unsafe conditions can develop quickly. Be especially aware of places where:**
  - You could trip or fall.
  - Something could fall on you.
- **When you begin to monitor for IDLH, pay particular attention to places where the air might be still. These are high risk areas, and include:**
  - Gullies.
  - Enclosures.
  - Spaces between hills.
- **"Confined spaces," should also be examined closely. Proper precautions should be in place for any hazards that are discovered in places like:**
  - Storage tanks.
  - Boxcars.
  - Silos.
  - Mine shafts.

#### **GENERAL ON-SITE MONITORING**

- **When IDLH conditions are under control, the next step is usually to conduct "general on-site monitoring."**
  - "General on-site monitoring" means monitoring for all contaminants, whether they pose an IDLH threat or not.

- You need to evaluate all the environmental conditions at the site.
- **Use direct-reading instruments to identify areas that you suspect are contaminated.**
- Then use a sampling pump to collect air directly from the area itself, as well as from locations that are downwind.
- **Remember, the contaminants that you gather will need to be sent out to a laboratory for analysis after being stored in "collection media" such as:**
  - Impingers.
  - Sorbent tubes.
  - Filter cassettes.

#### PERIMETER MONITORING

- **Another way to detect contaminants involves going outside the site. This is called "perimeter monitoring."**
  - Perimeter monitoring detects contaminants that might escape from the site.
  - It helps you to evaluate how effective your containment procedures really are.
- **Often, perimeter monitoring makes use of "fixed-location sampling equipment" placed at the edges of the property.**
  - Because it takes place outside of known contaminated areas, perimeter monitoring does not usually require you to wear PPE.

#### PERIODIC MONITORING

- **"Periodic monitoring" keeps tabs on environmental changes that occur over time. It is used to determine if:**
  - The concentration of a contaminant has changed as time has passed.
  - A new contaminant has appeared.
- **Changes in contaminant levels can occur when:**
  - You are handling a number of contaminants at the same time.
  - Work has switched to another area.
  - A different type of work begins within the site.
- **All of these activities can cause the release of gases or vapors, which makes contaminant levels rise.**

#### PERSONAL MONITORING

- **As we discussed, IDLH and periodic monitoring look at entire sites or work areas. But you need to be monitored, too.**
  - This is called "personal monitoring."
- **By keeping an eye on how much of a chemical you come in contact with during every workday:**
  - Your company can determine when you are in danger of over exposure.
  - You can be assigned to a different job or work area to protect you, if necessary.
- **Personal monitoring is done by collecting samples of airborne gases, vapors and particles from your "breathing zone", the area near your nose and mouth.**
  - The instruments used for personal monitoring are attached to the clothing in your breathing zone.
  - They range from passive devices, such as organic vapor monitor badges, to personal pumps, which gather airborne contaminants through a flexible tube and store them in a collection medium.
- **Some personal monitoring devices, such as organic vapor monitor badges, are sensitive to a wide range of substances.**
  - Others will register only the presence of a single chemical.
  - A few will warn you if you are nearing a dangerous level of exposure, usually by changing color.
- **Normally, personal monitoring devices are used to record exposure data over the course of a full shift.**
  - Then at the end of the workday each device or collection medium is retrieved.
  - Its collection medium is then sent to a laboratory for analysis.
- **Before collection medium from a personal monitoring device can be analyzed, the lab technicians need to know the times you started and stopped work on the day that you used it.**
  - Without this information, the technicians can't determine if the exposure occurred over an hour or 10 hours.
  - These start and stop times will usually be recorded by your supervisor, or an Industrial Hygienist, prior to sending your monitor to the lab.
- **As varied as they are, the different kinds of monitoring all have one thing in common: your safety.**
  - Used together, these monitoring techniques are the best way to tell if your worksite contains dangerous levels of contaminants.
  - If you have any questions about monitoring, ask your supervisor.

**HAZWOPER: Monitoring Procedures and Equipment**

**ANSWERS TO THE REVIEW QUIZ**

1. a

2. b

3. a

4. b

5. d

6. a

7. a

**HAZWOPER: Medical Surveillance Programs**  
**REVIEW QUIZ**

Name \_\_\_\_\_ Date \_\_\_\_\_

*The following questions are provided to determine how well you understand the information presented in this program.*

1. Direct-reading instruments provide instant information.
  - a. True
  - b. False
  
2. Direct-reading instruments are designed to measure all possible contaminants.
  - a. True
  - b. False
  
3. IDLH stands for "immediately dangerous to life and health".
  - a. True
  - b. False
  
4. It is recommended that you use a combustible gas indicator in an area where the oxygen content is unknown.
  - a. True
  - b. False
  
5. Which of the following are characteristics of a colorimetric indicator tube?
  - a. Accurate
  - b. Inexpensive
  - c. Easy to use
  - d. All of the above
  
6. An "impinger" is a type of collection media.
  - a. True
  - b. False
  
7. Some personal monitoring devices will show a worker if they are nearing a dangerous level of exposure to a hazardous material.
  - a. True
  - b. False