

## **MAJOR PROGRAM POINTS**

### **"MONITORING PROCEDURES AND EQUIPMENT"**

**Training for the  
OSHA HAZARDOUS WASTE OPERATIONS  
and EMERGENCY RESPONSE (HAZWOPER) REGULATION**

**Quality Safety and Health Products, for Today... and Tomorrow**

# **OUTLINE OF MAJOR PROGRAM POINTS**

The following outline summarizes the major points of information presented in the program. The outline can be used to review the program before conducting a classroom session, as well as in preparing to lead a class discussion about the program.

- **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 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.
  
- **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 gases, vapors and dust.
  - 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 where protection is necessary.
  - The proper selection of PPE would be impossible.
  
- **Some of the most hazardous materials can not 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.
  
- **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 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.**
- **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 the air:**
  - Is not refreshed regularly.
  - Could be very different than what we are used to breathing.
  
- **“Combustible Gas Indicators” (CGIs) detect gases which could 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.
  - Because CGIs contain a potential ignition source, they should never be used in any area where the oxygen content is unknown.
  
- **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 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.**
  - Check with your supervisor to learn about any other Direct-Reading Tools that you may need to use.
- **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 hazards... 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.
  
- **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.
  
- **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" 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.**
- **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 work day:**
  - 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 work day 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 ten hours.
  - These start and stop times will be 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.
  
- **There is a saying that “knowledge is power.” To have the power to prevent contamination, you need the knowledge that only monitoring can provide.**
  - Learn all that you can about all of the Monitoring techniques and the substances they detect.
  - Find out what Direct-Reading and Lab-Analysis Equipment you will be using.
  - Make sure that you are thoroughly trained on how to use various kinds of monitoring tools, including calibrating them if necessary.
  - Talk to your supervisor, and other experts, about the conditions at your work site.

- **Knowledge is power. When you learn how to Monitor for hazardous materials, that knowledge gives you:**
  - The power to detect hazards that would otherwise remain invisible.
  - The power to eliminate problems before they get out of hand.
  - The power to stay safe!