PRESENTER'S GUIDE

"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

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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 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.

- **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 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 <u>immediate</u> 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 <u>both</u>... 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 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.
  - 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 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.

- **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.

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- **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 <u>is</u> 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.
  - And the power to stay safe!