

EXPOSURE MONITORING AND MEDICAL SURVEILLANCE

COURSE OUTLINE

- **On March 6th, 1990, the Occupational Safety and Health Administration put its HAZWOPER standard into effect.**
 - HAZWOPER stands for "Hazardous Waste Operations and Emergency Response."
- **HAZWOPER helps to protect you if you work:**
 - At hazardous waste sites.
 - At a hazardous waste treatment, storage or disposal facility.
 - In emergency response situations involving hazardous materials.
- **The goal of HAZWOPER is to minimize your risk of exposure to hazardous waste.**
 - This requires many safeguards, including "exposure monitoring" and "medical surveillance".
- **"Exposure monitoring" is concerned with the detection of any airborne contaminant that might be present where you work, whether it's a hazardous:**
 - Gas.
 - Vapor.
 - Dust.
- **Contaminants you inhale are among the most dangerous, because many chemicals pass easily from the lungs into the bloodstream.**
 - Exposure monitoring helps protect you by detecting these airborne hazards.
- **"Medical surveillance" means watching the health of everyone who regularly works around hazardous materials.**
 - Your medical surveillance began prior to your first day of work, and will continue for as long as you run the risk of exposure.
- **Both exposure monitoring and medical surveillance are ways to uncover potential threats to your health as early as possible.**
 - They are also crucial to determining what protective measures you need to take while performing your job.

- **Exposure monitoring helps:**
 - To locate unhealthy environments.
 - In choosing the right personal protective equipment (PPE).
- **Your company's doctor will decide what kind of medical surveillance you should have.**
- **The instruments used for exposure monitoring fall into two broad categories, and each type of equipment has strengths and weaknesses:**
 - Direct-reading instruments, which provide instant information on environmental conditions.
 - Sampling collection devices, which store airborne contaminants in "collection media" for later analysis at a laboratory.
- **The main strength of direct-reading instruments is that they provide immediate feedback.**
 - That's why these Instruments are used to detect what OSHA calls IDLH conditions..."immediately dangerous to life and health."
- **OSHA defines "IDLH" as an atmospheric concentration of any toxic, corrosive, or asphyxiant substance that:**
 - Poses an immediate threat to life.
 - Would cause irreversible or delayed adverse health effects.
 - Would interfere with an individual's ability to escape from a dangerous atmosphere.
- **Clearly, IDLH situations are matters of life or death.**
 - Under these conditions, direct-reading Instruments can give you the information you need to stay safe.
- **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 allows you to identify every contaminant that might be present at a site.
- **Also, even the most sensitive direct-reading instruments cannot detect concentrations of a chemical that are below one-half of a part-per-million.**
 - If a hazardous material is present in a smaller quantity than this, a direct-reading device will not pick it up.
 - This can be a serious problem, because certain chemicals are still hazardous in concentrations below this level.

- **Finally, if multiple chemicals are present in the same area, this may cause direct-reading instruments to give false readings.**
- **The attributes of direct-reading instruments are complemented by those of sampling collection devices.**
 - Although they don't give you immediate feedback in the field, sampling collection devices make up for this in a number of ways.
- **Collection devices can store contaminants in various media for later laboratory analysis.**
 - This allows for a broad range of tests.
 - A laboratory can detect concentrations of hazardous materials in parts-per-billion, rather than the parts-per-million possible of direct-reading instruments.
 - Also, laboratory analysis usually produces information that is more reliable than data from direct-reading instruments.
- **But there are drawbacks to using sampling collection devices.**
 - The biggest of these 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.
- **Direct-reading and sampling collection devices make up for each other's shortcomings.**
 - What one type of instrument doesn't do, the other type does.
 - This is why you need both to give you an accurate picture of all the hazardous conditions you may face.
- **If you are going onto a new site, or if something has changed at your current site, you will want to begin by monitoring for IDLH conditions and other atmospheric hazards.**
 - Since these conditions are life-threatening, you would use direct-reading instruments.

- **These instruments come in a wide variety of shapes, sizes and sensitivities. Depending on the conditions that you suspect exist, you might use:**
 - An "oxygen indicator."
 - A "colorimetric detector tube" (which changes color in the presence of a specific contaminant).
 - A "combustible gas indicator."
 - A "radiation detector" (to pick up alpha, beta or gamma radiation)
 - Other direct-reading devices.
- **Check with your supervisor to see what instruments should be used where you'll be working.**
 - You will also want to review the operating procedures for these devices.
- **Once you have chosen your monitoring tools, you'll need to "characterize" the site.**
 - In addition to monitoring for IDLH conditions you will need to look for general hazards, ranging from open pits to unstable piles of material.
- **Proceed as you normally would when entering a potentially dangerous area.**
 - Wear the right PPE.
 - Remember that unsafe conditions can develop quickly.
 - Be especially aware of places where you could trip or fall, or where something could fall on you.
- **When you begin to monitor for IDLH conditions, pay particular attention to places where the air might be still. These high-risk areas include:**
 - Hills.
 - Gullies.
 - Enclosures.
- **Also examine confined spaces, and make sure that the proper precautions are in place for any hazard that you enter, including:**
 - Mine shafts.
 - Storage tanks.
 - Box cars.
 - Silos.
- **When IDLH conditions are under control, the next step is usually "general on-site monitoring."**
 - This means monitoring for all contaminants, whether they pose an IDLH threat or not.

- **First, you need to evaluate the environmental conditions at the site.**
 - Use direct-reading instruments, such as organic vapor analyzers and photo-ionization detectors, 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.
- **A sampling pump is a suction device that traps airborne particles in a collection medium.**
 - Depending on how they are designed, pumps can sample air at rates that vary between 10 cc's and 3 liters per minute.
 - If the pump is properly calibrated, an accurate flow rate can be determined by markings on the air intake tube.
- **The contaminants that you gather are stored in collection media, such as:**
 - Impingers.
 - Sorbent tubes.
 - Filter cassettes.
 - These are sent out to a laboratory for analysis.
- **Another way to detect contaminants involves going outside of the site, and is called "perimeter monitoring."**
 - Perimeter monitoring detects airborne contaminants that might escape from the site.
 - It lets you evaluate how effective your containment procedures really are.
 - Because it takes place outside of known contaminated areas, perimeter monitoring does not usually require you to wear PPE.
 - Often, perimeter monitoring makes use of "fixed-location sampling equipment" placed at the edges of the property.
- **Your monitoring program will also have to keep tabs on changes that occur over time.**
 - This is called "periodic monitoring."
- **The objective of periodic monitoring is to determine if:**
 - The concentration of a contaminant has changed over time.
 - A new contaminant has appeared.
 - Either of these conditions might mean an increased risk of exposure.

- **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.
- **Direct-reading instruments are used to conduct periodic monitoring, and include:**
 - Photo-ionization detectors.
 - Organic vapor analyzers.
 - Oxygen indicators.
- **While IDLH and periodic monitoring look at entire sites or work areas, "personal monitoring" focuses on you.**
 - This is done by collecting samples of airborne gases, vapors and particles from the area near your nose and mouth.
 - This area is called your "breathing zone."
- **The instruments used for personal monitoring are attached to the clothing in your breathing zone. they include passive devices such as:**
 - Organic vapor monitor badges.
 - Personal pumps (which draw airborne contaminants through a flexible tube for storage in a collection medium).
- **Normally, personal monitoring devices are used to record exposure data during the course of a full shift.**
 - At the end of the work day, each device is retrieved.
 - Its collection medium is then sent to a laboratory for analysis.
- **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 even change color to warn you if you are nearing a dangerous level of exposure.

- **Before laboratory technicians can analyze the collection medium from a personal monitoring device that you've used, they 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 recorded by your personal monitoring device occurred over an hour... or ten hours.
 - These start and stop times will be usually be recorded by your supervisor or an industrial hygienist.
- **The results of personal monitoring are important in determining what long-term exposure risks may be present in your environment.**
 - This information is also needed by doctors who are conducting medical surveillance.
- **Even with exposure monitoring, workers who frequently handle hazardous waste can develop health problems, such as:**
 - Respiratory distress.
 - Heat stress (from wearing PPE and/or working under extreme temperatures).
 - Reactions to hazardous substances.
 - High levels of psychological stress.
- **By keeping a close watch on the health of every worker, the effects of these problems can be lessened.**
 - This is the goal of medical surveillance.
- **According to the HAZWOPER regulations, you are subject to medical surveillance if:**
 - You will be exposed to a chemical at or above its published exposure limit for 30 days or more during the year, regardless of respirator use.
 - You will wear a respirator for 30 days a year, or more.
- **Medical surveillance is also required if:**
 - You have been injured, or become ill due to overexposure to a hazardous substance.
 - You are a member of a hazardous materials response team.

- **Medical surveillance includes five types of examinations:**
 - Pre-employment screenings.
 - Periodic examinations.
 - Examinations upon termination or re-assignment.
 - Emergency examinations, carried out if you are injured or are exposed to hazardous materials.
 - Any additional examinations that the doctor thinks are necessary.
- **Pre-employment screening provides a baseline for monitoring your health.**
 - Information from the screening is also used to determine your ability to wear PPE.
- **Periodic examinations are used to monitor changes in the state of your health, as well as to determine exposure levels.**
 - OSHA recommends that these exams be conducted every year, and requires them at least once every two years.
- **You will also be examined should your job be terminated, or if you are reassigned to another site.**
 - If you have developed a medical problem that you didn't have prior to working with hazardous materials, the exam will allow the doctor to determine which substance caused the illness, as well as what treatment you need to receive.
- **If you are exposed to a hazardous material an emergency examination will be made to determine what immediate medical assistance you may need.**
- **Because some substances are more of a threat than others, additional examinations over and above those required by OSHA may be necessary.**
 - Whether you would receive such examinations depends on the specific chemicals that are present at your site.
- **Any of these exams can include medical tests, such as:**
 - Blood-pressure readings.
 - Neurological exams.
 - Chest x-rays.
- **You may also be asked to provide various samples for analysis, including:**
 - Blood.
 - Urine.
 - Stool samples.

- **Each medical test and examination must occur at a reasonable time and place.**
 - This work will be paid for by your employer.
 - The doctor performing this medical surveillance will be a licensed physician (who probably specializes in occupational medicine).
- **Following any medical examination, your employer will be provided with the physician's "written medical opinion". Results of the examination will contain:**
 - Descriptions of any medical conditions that would endanger your health if you worked around hazardous materials.
 - A list of tasks that could make you sick or injure you, based on your physical condition.
 - An assessment of your ability to wear a respirator.
 - A statement that you have been informed of the examination results.
- **Your employer will not, however, be informed of any findings unrelated to your job.**
 - You will receive a copy of the doctor's written opinion for your own records as well.
- **Exposure monitoring and medical surveillance:**
 - Two approaches to identifying hazards in the workplace.
 - Two methods of determining the precautions you should take on the job.
 - Two more ways that the HAZWOPER Standard makes your job safer!