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1989 INDUSTRIAL HYGIENE
ANNUAL TRAINING
-CLASS OUTLINE-

INSTRUCTORS: Safety Department Personnel

PURPOSE:
1. Provide basic information on biomodes of entry and the prevention of harm due to employee exposures to VCM, lead, and noise.
2. Motivate employees to participate in that effort.

LOCATION: Safety Training Room

I. INTRODUCTION

A. Purpose of class - state in own words.

B. Schedule of events - Explain briefly.

II. BIOMODES OF ENTRY - Use Biomode of Entry outline.

III. VCM - Use VCM outline.

IV. LEAD - Use Lead outline.

V. NOISE - Use Noise outline.

VI. REVIEW - Recap general subjects covered.

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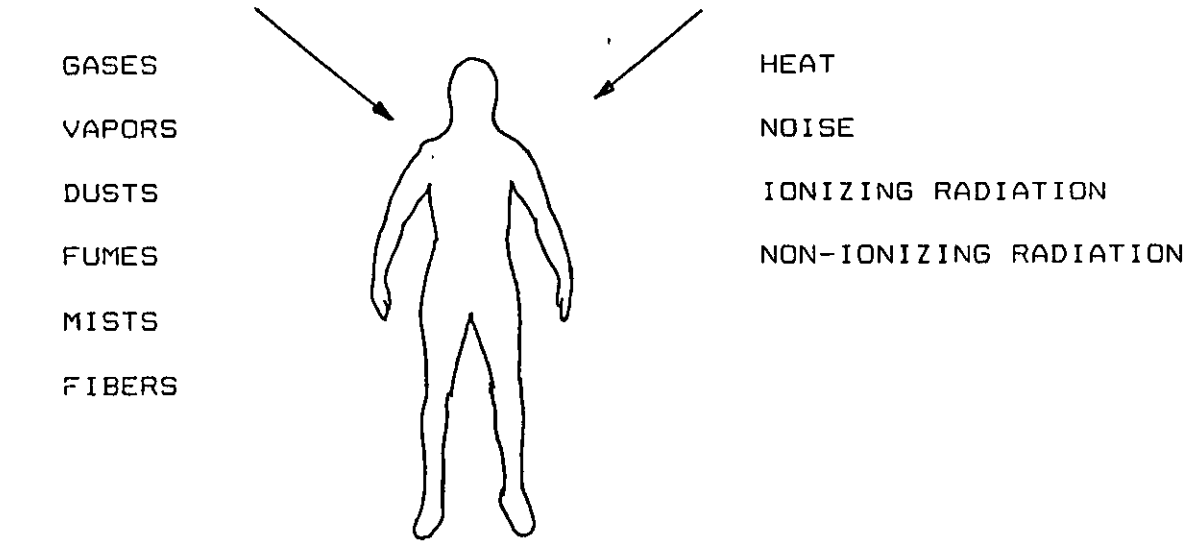
BIOMODES OF ENTRY



I. STATES OF MATTER

SOLID - A substance that does not flow perceptibly under moderate stress.

LIQUID - A fluid (flowing material) but without the tendency to separate.

GAS - A fluid that tends to expand indefinitely.

PLASMA - A collection of charged particles which has some of the properties of a gas, but is a good conductor of electricity and is effected by a magnetic field.

II. CHEMICAL AGENTS

GAS - A fluid that tends to expand indefinitely.

Examples: Oxygen
Nitrogen
Hydrogen
Vinyl Chloride Monomer

VAPOR - A gas that originated from a material that is normally a liquid.

Examples: Water vapor
Gasoline vapor
Plasticizer vapor

Note: Gases and Vapors have the same properties in air. They differ only in how they originate.

DUST - Finely divided solids, normally capable of being suspended in air.

Examples: Talcum powder
Lead carbonate
PVC resin "fines"

FUME - Small particles of a metallic oxide which originate from heating metals to the boiling point in the presence of oxygen. In forming , the metal vapor combines with oxygen, forming the fume particles, which tend to conglomerate and increase in size as they get farther from the source. Personal risk increases with decreasing distance from the source.

Examples: Welding fumes
Lead fumes

SMOKE - Particles resulting from incomplete combustion. They are chemically complex and among the finest of particles. They are a few hundredths of a micron in size and can easily get into the deepest part of the lung.

Examples: Tobacco smoke
Gasoline smoke
Smoke from "burning out" PVC-contaminated pipes

MIST - A suspension of small droplets of liquid in air.

Examples: Hair sprays
Fog (as on a "foggy day")

FIBER - Any relatively small solid that is at least three times as long as it is wide.

Examples: Fiber Glass insulation
Asbestos insulation
Cotton fiber
Wool

III. OCCUPATIONAL DISEASE - HISTORY

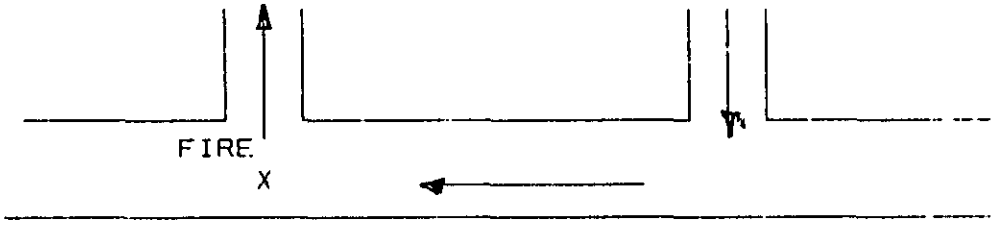
Occupational disease caused by exposure to chemicals is one of man's oldest problems.

ANCIENT EGYPT

In the "Valley of the Kings," embalming became a very important occupation. Although most records of the time have been lost (or destroyed by accident or intent), those that remain indicate that the embalmers died at an early age because of arsenic poisoning.

MINING

Greek and Roman historians record that certain exposures seemed to be related to occupations. An example was mining, where it was thought that the air in the mines was bad for some unknown reason. Crude attempts at ventilation seemed to help:



IV. THE EFFECT ON THE INDIVIDUAL

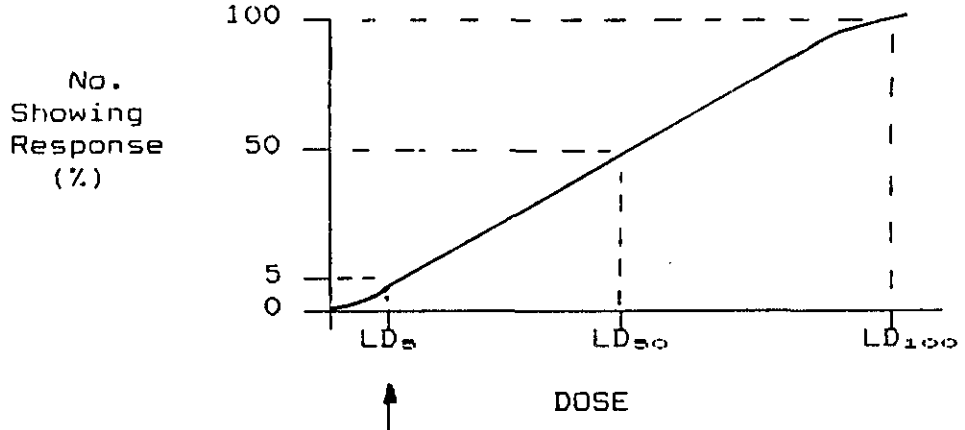
DIFFERENCES AMONG CHEMICALS

Some are worse than others. For example, a small of aspirin can relieve pain; a larger dose can injure or even kill.

DIFFERENCES AMONG INDIVIDUALS

A wide difference exists among individuals! The body has a lot of built-in defenses and some people, due to health, etc., have a greater ability to "throw off" chemicals. All, however, are susceptible to some degree.

DOSE/RESPONSE



"THRESHOLD" - There appears to be one for each chemical.

EXPOSURE SEVERITY

The severity of any exposure to a chemical depends on the concentration and the time of exposure. If the total intake exceeds the individuals ability to cast the material off, some injury occurs.

SAFE USE OF CHEMICALS

A basic principle of industrial hygiene is that any material may be used safely, provided it is properly controlled. Not all factions of society agree; politics, ignorance, and fear enter into the picture and make it appear uglier than is necessary.

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V. BIOMODES

There are four principal ways for materials to enter the body:

INHALATION

This is the principal means! Each minute, you inhale between 32 to 64 liters of air. Were this safety training room air-tight and you were locked alone inside, you would have enough air to last about 44 hours.

INGESTION

The second most important mode.

EYE AND SKIN CONTACT

We are normally in direct contact with a wide variety of things all the time. Although the skin offers a limited amount of natural protection, it has no defense against certain types of materials.

INJECTION

Injection in this sense means the physical intrusion of the body by any foreign material via cuts, lacerations, punctures, and the like. Reaction of the body to the intrusion is usually swift.

VI. INHALATION

Most industrial hygiene-related standards (example: the OSHA VCM standard) are centered around inhalation.

TREE STRUCTURE OF THE INTERIOR OF THE LUNG

The lungs are not just two big balloons! They have a very complicated, tree-like interior structure.

As the airways branch, they get progressively smaller. They take no active part in the actual exchange process. For the most part, they are wet and ciliated. They terminate in extremely small sacs (alveolar sacs) where the actual exchange takes place.
The cillia (hair-like cells) which line the air passages play an important role in keeping the lung clean. They are in constant motion, moving foreign materials upward (through the "ciliary escalator") to the throat. From there, the material is normally swallowed. For this reason, much of the material that is inhaled also goes to the gut!

There are about 750 million of the small "alveole," each about 0.1 millimeter. It is at their interior surfaces that the air exchange process takes place, oxygen and nitrogen entering the bloodstream while carbon dioxide leaves it. The total combined area inside the alveole amounts to about 70 square yards (about equal to the area of the floor of the Safety training room). The amount of usable area can be seriously decreased by disease.

"CYANOSIS" - The condition that exists when the body has too much carbon dioxide and too little oxygen. Victims usually show a blue/gray skin color. Normal air contains about 21 percent oxygen, which is sufficient for a normal, healthy person under heavy stress. When the oxygen level drops below about 17-18 percent, there is a major risk that the body will not be able to get enough of it into the bloodstream.

Since it is branched, the lung acts like a crude filter, with the larger particles becoming trapped before the smaller ones, which may go all the way to the "alveole." Once trapped, particles tend to be flushed upward by the "cilia."

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PHAGOCYTES

In the area of the "alveole" are highly specialized cells known as "phagocytes." They tend to surround foreign particles which are then transported to the lymph system, ending up in lymph nodes, which are the storage areas for garbage from the lung. Without these cells, you'd be in big trouble!

LIMITATIONS OF THE LUNG

As you can see, the lung, although it has little or no protection against gases, does have a limited amount of protection against solids. Even then, if the limitations are exceeded, some amount of damage, however temporary, will take place.

RESPIRATORS

Since the lung has only limited natural protection, the use of respirators is frequently essential.

Air-Purifying Respirators - Remove contaminants from surrounding air.

Air-Supplied Respirators - Provide user with a source of uncontaminated air from a location other than the surroundings.

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VII. SKIN PROTECTION

The outer layer of the skin, which consists of a mixture of natural oils and dead cells, offers good protection against most of the naturally-occuring materials (including those dissolved in water) that we come in contact with. However, when the skin is cleaned, much of the protection is lost, making the natural openings, such as those around hair and sweat glands, more accessible.

Most solvents will penetrate the skin with ease. To prevent this, some barrier (personal protective equipment or clothing) must be used.

The skin is also susceptible to radiant energy, such as radiant heat and gamma rays from the sun. Again, a barrier, such and skin creams or clothing helps prevent injury.

VIII. EYE PROTECTION

Except for tearing, the eye has very little natural protection. Eye protection is advisable whenever any solid or liquid material may come in contact with them.

IX. SUMMARY

USE EYE PROTECTION

USE SKIN PROTECTION

USE RESPIRATORS

1989 VCM ANNUAL TRAINING
-CLASS OUTLINE-

VCM PROPERTIES AND USE

A colorless, sweet-smelling gas at normal temperature and pressure.

A liquid under pressure.

Main raw material used to make PVC.

HAZARDS

Fire

Low flashpoint - burns much like propane.
"Hotwork" - control carefully.
HCL - severe lung irritant produced.

AOL

Finger bone disease.
Prevented by wearing impervious gloves when handling residues containing liquid VCM.

FROST BITE

Skin contact with VCM can produce.

INHALATION

Breathing high concentrations can make you pass out.
HCL - Can cause severe lung damage or death.

LIVER CANCER

Angiosarcoma
No cure
No cases in Vista.

CHROMOSOME DAMAGE

Lab studies show high VCM exposure may cause

EXPOSURE GOAL

Keep VCM exposure as low as possible
Do your part to protect yourself
VCM leaks must be contained.

SAFE LIMITS

1 ppm, 8-hour time weighted average.
5 ppm, averaged over any 15 minute period.

LEAKS

No VCM leak is acceptable!

Indicators:

Icing
Hissing noises
Condensation
Odor - Don't depend on nose.
Measurements with instruments

RESPIRATORS

Must be used above 1 ppm.

Type depends on concentration:

Up to 1000 ppm: air-line respirator
Above 1000 ppm or unknown: Scott Air-Pak

Facial Hair Policy

PERSONAL PROTECTIVE EQUIPMENT AND CLOTHING

Depends on nature of hazard. May include:

Respirator
Impervious gloves
Impervious clothing
Faceshield
Goggles

EMERGENCIES

Be prepared - Know what to do!

Leave endangered area unless you are required to stay and handle the emergency.

MONITORING

AREA MONITORING

Continous monitors

Portable instruments

PERSONNEL MONITORING

Used to measure actual exposure to VCM.
Wear badges as intended.
Fill out card.
You will be notified in writing of any overexposures.

BIOLOGICAL MONITORING

Done to see if any medically significant problems related to your work exist.
Take advantage of the program - participate!

RECORDS

AIR MONITORING - 30 years.

MEDICAL - length of employment plus up to 30 years.

1989 LEAD ANNUAL TRAINING
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LEAD PROPERTIES AND USE

Fine, light-colored powders.

Handled in 50-lb bags.

Used as heat stabilizers or lubricants in Compound.

LEAD POSIONING

BIOMODES OF ENTRY

Inhalation
Ingestion

POSSIBLE DAMAGE TO

Nervous system
Reproductive system
Blood system
Kidneys

Note: Can be fatal!

WANRING SIGNS

Stomach pain
Loss of appetite
Nausea
Metallic taste
Constipation
Fatigue
Tremors
Irrational behavior
Insomnia
Convulsions
Headaches

If you notice any of these and are concerned that they may be connected with your work:

1. Tell your super
2. Tell the plant nurse

SAFE LIMITS

50 micrograms of lead per cubic meter of air, 8-hr TWA

Limit becomes lower for over 8 hours of work

RESPIRATORS

3M Airhats required for certain jobs

Charging blenders
Color Weigh Room work

Check air flows each shift. Don't use if flow fails the test.

Turn in for cleaning and repair, as required by schedule.

DUST CONTROL

Keep all vent hoods and exhaust fans "on." Remember that your body has but limited protection. Don't overload it!

Report inoperative or defective fans and hoods immediately.

Avoid crushing bags.

Don't clean with compressed air. Its use is illegal with lead!

PERSONAL HYGIENE

Use disposable coveralls when job requires it.

Use vacuum cleaners set up by department for cleaning clothes.

Wash hands, face, and arms before eating, drinking, smoking, or using cosmetics.

Don't take food, drink, or tobaco products into lead areas.

MONITORING

PERSONAL MONITORING

Used to measure actual exposure to lead.
Wear pump and filter cassete as intended.
Fill out card.
You will be notified in writing of any overexposure.

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BIOLOGICAL MONITORING

Done to see if any lead health exist.

Participate!

RECORDS

Same as with VCM.

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1989 NOISE ANNUAL TRAINING
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HEARING LOSS

Cannot be repaired.

A natural part of aging.

Can be hastened by excessive exposure to noise.

PLANT NOISE

Many high noise areas in plant - posted.

Note: Don't depend completely on warning signs!

High noise can occur anywhere.

FREQUENCY DIFFERENCES

LOW - Does least damage, but hardest to block.

HIGH - Easiest to block, but does the most damage.

NATURAL DEFENSES

Little natural defense against high noise!

USE HEARING PROTECTION!

SAFE LIMITS FOR NOISE

90 Dba, 8-hr TWA

87 Dba, 12-hr TWA

Remember: The louder the noise, the less time is required to do damage.

HEARING LOSS PREVENTION

BE ALERT FOR HIGH NOISE.

USE HEARING PROTECTION.

HAVE AUDIOGRAMS (HEARING TESTS) RUN ROUTINELY.