



Basics of Occupational Safety
Lecture Notes

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Chapter Sixteen

Industrial Hygiene and Confined Spaces



Responsibilities of Industrial Hygienists

The responsibilities of industrial hygienists include the following:

- Ensuring the health of employees
- Objectively recognizing, assessing, controlling, and preventing health hazards
- Helping employees understand precautions
- Making the health of employees a priority

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OSH Act Requirements Relating to Industrial Hygiene

The OSH Act established the following requirements relating to industrial hygiene:

- Use of warning labels
- Use of personal protective equipment
- Medical testing
- Records management
- Accessibility of information about monitoring activities open to employees
- Available of such records to employees
- Notification of exposure to environmental stressors

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Prominent Workplace Hazards

The most prominent hazards in the workplace are:

- Chemical
- Physical
- Biological
- Ergonomic

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Routes of Entry for Toxic Agents

The main routes of entry for toxic agents are:

- Inhalation
- Absorption
- Ingestion

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Airborne Contaminants

The most common types of airborne contaminants are:

- Dusts
- Fumes
- Smoke
- Aerosols
- Mists
- Gases
- Vapors

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Asbestos Hazards

Asbestos, once thought to be a miracle material, is now known to be an extremely hazardous substance. It has been tied to:

- Respiratory cancer
- Scarring of the lungs
- Cancer of the chest
- Cancer of the abdominal lining

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Proper Handling of Asbestos

When identified in the workplace, asbestos should be handled by:

- Removal
- Enclosure
- Encapsulation

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Understanding Exposure Thresholds

The three most important concepts to understand concerning exposure thresholds are:

- Timed weight average (TWA)
- Short-term exposure limit
- Exposure Ceiling

Indoor Air Quality Standard (ANSI Z9.8)

The American National Standards Institute (ANSI) developed its own indoor air quality standard [ANSI Z9.8].

Key concepts in the standard are:

- Application flexibility
- Acceptable air quality
- Tobacco smoke

Hazard Recognition Procedures

Hazard recognition procedures include the following:

- Determine the exposure threshold for each hazardous substance in the workplace.
- Determine the level of exposure to each
- Determine which employees are exposed and for how long
- Calculate the TWAs

General Prevention and Control Strategies

General prevention and control strategies include the following:

- Substitution
- Process changes
- Isolation
- Moisture to reduce dust
- Exhaust methods
- Control methods
- Medical programs
- Education and training

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NIOSH Broad Functions

The National Institute for Occupational Safety and Health (NIOSH) is part of the Department of Health and Human Services (DHHS). Its two broad functions research and education in the areas of:

- Toxic materials
- Human tolerance levels

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Toxic Substances

A toxic substance is one that has a negative effect on the health of a person or animal. The effect produced by a toxic substance depends on:

- Its properties
- The amount of the dose
- The level of exposure
- The individual's resistance

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Routes of Entry of a Toxic Substance

The route of entry of a toxic substance is an important consideration. Common routes of entry include:

- Ingestion
- Injection
- Absorption
- Inhalation

Dosage Terms

- The *dose threshold* is the minimum dose of a toxic substance required to produce a measureable effect.
- A *lethal dose* is one that is highly likely to cause death.
- A *lethal concentration* of an inhaled substance is the concentration that is likely to cause death.

Types of Exposure

Exposures to toxic substances are either *acute* or *chronic*.

- Acute exposure involves sudden exposure to high concentrations of the substance in question.
- Chronic exposure involves limited but continual exposure to the substance in question.

Classifying Airborne Contaminants

Airborne contaminants are classified according to the type of effect that they have on the body. There are:

- Irritants
- Asphyxiants
- Narcotics
- Anesthetics

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Carcinogen Defined

A *carcinogen* is any substance that can cause a malignant tumor or a neoplastic growth. Other terms used synonymously for carcinogen are:

- Tumorigen
- Oncogen
- Blastomogen

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Toxic Substance Standards

Pertinent standards relating to toxic substances include:

- The OSHA Chemical Process Standard
- The EPA Clean Air Act
- The Superfund Amendments and Reauthorization Act
- The Hazardous Materials Transportation and Uniform Safety Act

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OSHA's Confined Space Standard

OSHA's Confined Space Standard defines a hazardous atmosphere as one "that may expose employees to the risk of:

- Death
- Incapacitation
- Impairment of ability to self-rescue
- Injury
- Acute illness"

Elements of a Confined Space Management Policy

A confined space management policy should have the following elements:

- Administration
- Controls
- Training
- Permitting
- Work-team requirements

Threshold Limit Value

Threshold limit value (TLV) refers to airborne concentrations of substances and represents conditions under which it is believed that nearly all workers may be repeatedly exposed day after day, without adverse effect. TLV's are expressed as:

- Time-weighted average
- Short-term exposure limit
- Ceiling

Material Safety Data Sheets (MSDS)

Material safety data sheets are an excellent source of help for safety and health professionals concerned about the potential hazards of a given toxic substance. Information in an MSDS is presented in eight sections:

- General information
- Hazardous ingredients
- Physical and chemical characteristics
- Fire and explosive hazard data
- Reactivity data
- Health hazards
- Safe handling and use
- Control measures

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Concepts Relating to Explosive Materials

Important concepts relating to explosive materials include:

- Flammable substance
- Combustible substance
- Flash point
- Auto-ignition temperature
- Oxygen limits
- Volatility

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OSHA's Hazard Communication Standard (29 CFR 1910.1200)

OSHA's Hazard Communication Standard (29 CFR 1910.1200) requires organizations to fully inform employees and on-site contractors of the presence of hazardous substances in the workplace and to provide safe-use training.

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