

Applied Environmental and Industrial Hygiene

Instructor:

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Required Text:

The Occupational Environment
Its Evaluation and Control

Edited by Salvatore DiNardi

Also known as the "White Book"

Available from AIHA – Call –(703) 849-8888

<https://www.aiha.org/webapps/commerce/>

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What is Industrial Hygiene?



- Industrial hygiene is the science of **anticipating, recognizing, evaluating, and controlling** workplace conditions that may cause workers' injury or illness.
- Industrial hygienists use **environmental monitoring** and analytical methods to detect the extent of worker exposure and **employ engineering, work practice controls**, and other methods to control potential health hazards.

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IH History

- The Industrial Hygiene Section of the American Public Health Association, now known as the Occupational Health Section, was established in 1914.
- Early in 1958 the board accepted a recommendation of the Committee on Certification Standards and invited the American Conference of Governmental Industrial Hygienists to join in planning and support of voluntary certification. The conference accepted, and a Joint Committee on Certification Standards was formed.
- Each of the associations delegated six members with high qualifications as industrial hygienists. In 1960, these 12 persons completed incorporation as a Pennsylvania corporation not-for-profit.
- Industrial hygienists having specified high qualifications of experience were given one year to apply for certification without examination. When that year elapsed on **July 1, 1962, 484 people had been certified.**

TODAY The American Industrial Hygiene Association has **over 12000 members**

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Definition of a Industrial Hygienist

Industrial hygienists are scientists and engineers committed to protecting the health and safety of people in the workplace and the **community**.

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Professional Industrial Hygienist

- is a person possessing either a baccalaureate degree in engineering, chemistry, or physics or a baccalaureate degree in a closely related biological or physical science from an accredited college or university
- has a minimum of three years of industrial hygiene experience

AIHA Definition

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Certified Industrial hygienist

- The **American Board of Industrial Hygiene** has established that successful candidates for certificates shall attain the status of **Diplomate of the American Academy of Industrial Hygiene** subject to compliance with requirements established by the American Board of Industrial Hygiene.
- (The active ABIH certification requires that the person be admitted to examination based upon academic training and **5 years experience** in the field, successfully pass a **one day examination**, and maintain active professional involvement by **re-certification on a 6 year cycle** following first certification.)

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Associated Certifications

- Certified Safety Professional – CSP
- Certified Hazardous Materials Manager – CHMM
- Certified Environmental Trainer – CET

ENVIRONMENTAL HEALTH AND SAFETY PROFESSIONAL

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IH Practice / Disciplines

- Proficiency is based on successful completion of 16 Subject areas / Rubrics

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Areas of Practice

The technical knowledge of industrial hygiene practice has been divided into sixteen areas:

- biohazards;
- biostatistics and epidemiology;
- engineering controls;
- non-engineering controls;
- ergonomics;
- ethics and management;
- analytical chemistry;
- sampling, monitoring and instrumentation;
- noise and vibration;
- ionizing radiation;
- nonionizing radiation;
- regulations, standards, and guidelines;
- thermal and pressure stressors;
- toxicology;
- general IH topics
including community exposures, hazardous wastes, risk communication, indoor environmental quality, and others (unit operations, process safety, and confined spaces).

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Air Sampling and Instrumentation

Selection, use and limitations of field air-sampling instruments, full shift and grab samples, including direct reading instruments.

Set-up, calibration and use (including quality assurance practices) of air-sampling apparatus and direct reading instruments.

Sampling strategy and Calculations related to sampling and calibration

Measurement of exposures to noise, ionizing radiation, nonionizing radiation, and thermal stressors

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Analytical Chemistry

Laboratory analytical procedures for work place environmental samples and related calculations.

Included are:

Gas chromatography

Infrared, visible and ultraviolet spectrophotometry

High performance liquid chromatography

Mass spectroscopy, atomic absorption spectrophotometry

Wet chemical methods, and microscopy

Laboratory quality assurance and chain of custody.

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Basic Science

General scientific concepts, chemistry, biochemistry, biology, anatomy and physiology, general physics and mathematics.

Properties of flammable, combustible and reactive materials (compatibility)

Calculations such as those relative to gas laws, airborne concentrations and unit-of-measure conversions and conditions of non-standard pressure.

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Biohazards

- Principles of sanitation, personal hygiene
- Recognition, evaluation and control of biological agents or materials having the capacity to produce deleterious effects upon other biological organisms, particularly humans (virus, bacteria, fungi, molds, allergens, toxins, recombinant products, bloodborne pathogens, etc.)
- Infectious diseases that appear in workplaces including industry, agriculture, offices and health care facilities.

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Biostatistics & Epidemiology

Principles of epidemiology, techniques used to study the distribution of occupationally induced diseases and physiological conditions in workplaces and factors that influence their frequency.

Concepts of prospective and retrospective studies, morbidity and mortality and animal experimental studies, data and distribution of data.

Basic biostatistics and statistical and non-statistical interpretation of data in the evaluation of hazards.

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Community Exposure

- Air pollution
- Air cleaning technology
- Ambient air quality considerations
- Emission source sampling
- Atmospheric dispersion of pollutants
- Ambient air monitoring
- Health and environmental effects of air pollutants and related calculations.
- chemical emergency planning and response.

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Engineering Controls Ventilation

Control of chemical and physical exposures through engineering measures.

- local exhaust ventilation
- Dilution ventilation
- Isolation, containment and process change
- Mechanics of airflow, ventilation measurements
- Design principles and related calculations
- Engineering control of ionizing and nonionizing radiation
- Thermal stressors, and noise and vibration sources
- Principles of isolation, enclosure, absorption and damping

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Ergonomics

- Application of principles from anthropometry, human factors
- Engineering, biomechanics, work physiology, human anatomy
- Occupational medicine and facilities engineering of the workplace for the purpose of preventing injuries and illnesses.

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Health Risk Analysis and Hazard Communication

Understanding of principles and requirements for the interpretation and use of guidelines for the assessment of health Hazards

- American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs),
- Biological Exposure Indices (BEIs) and industrial ventilation guidelines,
- American National Standards Institute (ANSI) standards
- American Society for Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) guidelines
- American Society for Testing and Materials (ASTM) standards
- American Industrial Hygiene Association (AIHA) Workplace Environmental Exposure Level (WEEL) guides
- National Institute for Occupational Safety and Health (NIOSH) Criteria Documents and recommendations.
- Communication of recommendations by appropriate techniques to implement control actions is included.

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Management and Ethics

Acquisition, allocation and control of resources to accomplish industrial hygiene anticipation, recognition, evaluation and control objectives in an effective and timely manner.

- Establishment of policy
- Planning and budgeting
- Delegation of authority
- Productivity
- Accountability
- Communication
- Staff versus line authority
- Organizational structure
- Performance evaluation and decision making
- Ethics.

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Noise & Vibration

- Health effects resulting from exposure to noise and vibration.
- Computations related to combining noise sources and octave band measurements
- Audiometric testing programs
- Exposure measurement
- Evaluation and control.

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Non-Engineering Controls

- Personal protective equipment
- Selection, use and limitations of respirators and protective clothing
- Respirator fit testing, breathing air specifications
- Glove permeability
- Eye protection
- Administrative controls.

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Mercury Remediation



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Industrial Assessments and Restoration



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Asbestos Abatement



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Biohazard Remediation



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Radon Mitigation



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Lead Paint Abatement



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HAZWOPER Training



29

Petroleum Spill Clean-up



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Hazardous Materials Remediation



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Confined Space Entry



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Soil and Groundwater Investigation



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Hazardous Materials Transport



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Expert Witness / Forensics



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Hazardous Work Operations Training



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OSHA Regulations (Standards - 29 CFR) Air Contaminants. - 1910.1000

Standard Number: 1910.1000

Standard Title: Air contaminants.

SubPart Number: Z

SubPart Title: Toxic and Hazardous Substances

An employee's exposure to any substance listed in Tables Z-1, Z-2, or Z-3 of this section shall be limited in accordance with the requirements of the following

paragraphs of this section.

- (a) "Table Z-1." Limits For Air Contaminants
- (b) "Table Z-2." Limits For Air Contaminants (TWAs)
- (c) "Table Z-3" Mineral Dusts