



SOS Safety Solutions

When Safety Matters, SOS Delivers



AN INTRODUCTION TO INDUSTRIAL HYGIENE

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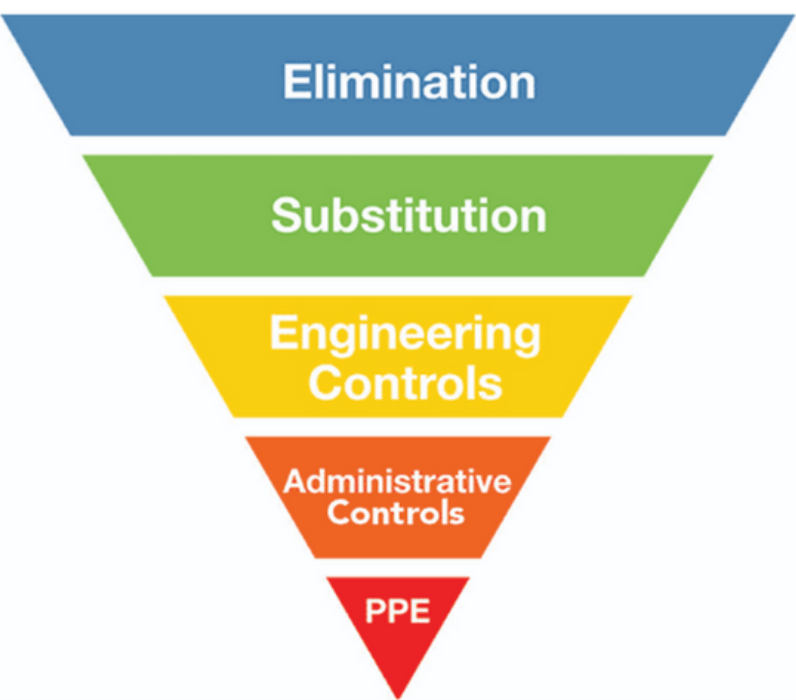
What is Industrial Hygiene?



Industrial hygiene is the science and practice of related to Anticipation, Recognition, Evaluation, and Control of environmental hazards. These hazards can cause varying levels of health effects, from mild irritation to severe long-term prognosis. Like general safety practice, industrial hygiene follows a formula known as the Hierarchy of Controls.

Hierarchy of Controls

The Hierarchy of Controls is a systematic approach to minimizing exposures to environmental contaminants.



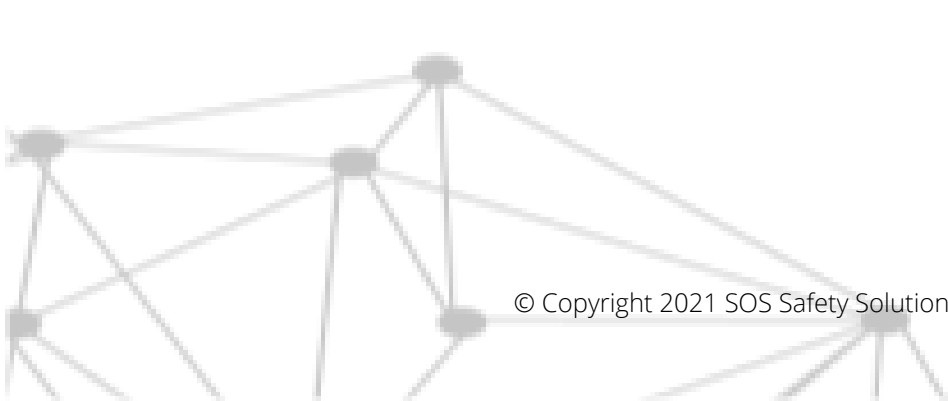
Elimination/Substitution- These are the most effective means of controlling a hazard, as they remove it entirely. While this is ideal, it's not always possible.

Engineering Controls- While engineering controls may not eliminate the hazard, they will physically prevent or minimize

exposure to a hazard. Local ventilation is an example of an engineering control. Dust or fumes may still be present, but effective ventilation can greatly reduce any exposure to personnel. Engineering controls are an excellent way to minimize hazards, but may not always be practical, or enough to sufficiently control exposures.

Administrative Controls- administrative controls are work practices that include things like shift rotation. Shift rotation reduces the amount of time, and therefore the amount of exposure to harmful hazards.

PPE- Personal Protective Equipment is the last line of defense to prevent exposure to environmental hazards. PPE should only be used to minimize hazards after all of the above options have been exhausted.



What hazards is Industrial Hygiene trying to control?



There are two broad types of exposure:

- Acute exposure- symptoms from this type of exposure can result from a single exposure.
- Chronic exposure- these types of exposures result in symptoms after repeated exposure. Sometimes days, months, or even years later.

In both of these exposures, effects can range from mild to severe.

Chemical Exposures

Gases- these are low-density particles that rapidly diffuse (ex: chlorine)

Vapors- these are liquids with a high vapor pressure (ex: gasoline)

Dust- solid particles that become airborne. This includes powders or other materials that have been sufficiently pulverized. (ex: respirable crystalline silica)

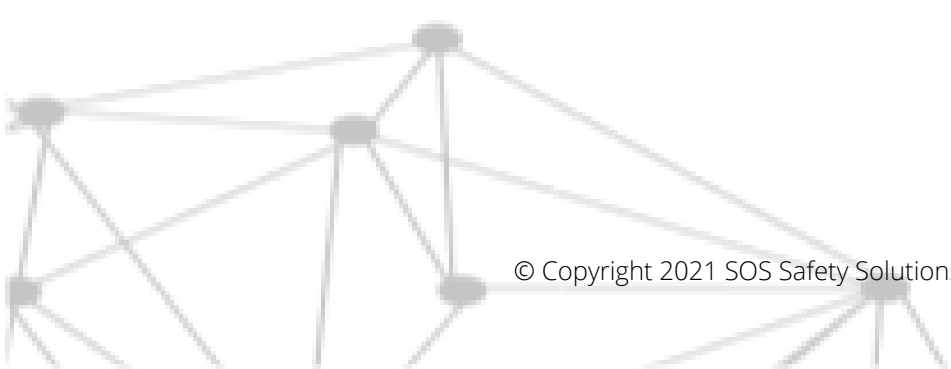
Fumes- vaporized solids that have re-condensed (ex: metal particles that have become airborne during welding)

Mists- liquid droplets that have become aerosols

Fibers- particles with a 3:1 length-to-width ratio (ex: asbestos)

How do these exposures enter the body?

- Inhalation of airborne contaminants
- Absorption through the skin
- Ingestion by eating
- Injection





Sampling for hazards

Sampling for hazards is generally done on an individual worker to assess the specific risks of their job. However if a hazard is localized, and affects multiple workers, an area sample may be performed. Sample results are then compared to relevant standards. In the United States, these standards include:

- Occupational Safety and Health Administration (OSHA)- legally enforceable exposure limits.
- National Institute for Occupational Safety and Health (NIOSH)
- ACGIH- American Council of Governmental Industrial Hygienists

All of the above-referenced standards are centered on two thresholds:

- Action Level (AL) - this is the level at which a company is required to take action. Actions taken at this level should include the development of a written exposure control plan, reasonable reduction of exposures through the Hierarchy of Controls, ongoing monitoring of the environment and/or personnel, and providing PPE for use on a voluntary basis.
- Permissible Exposure Level (PEL) - At this level, it is required to reduce exposures as much as practicable, provide ongoing health monitoring for exposed personnel and require PPE wherever levels cannot be controlled at levels below the PEL.

Note: While OSHA exposure limits are legally enforceable, the recommendations from NIOSH and ACGIH are generally more stringent. It is advisable to limit all exposures as much as practicable.

Specific Types of Hazards

Physical Hazards

Physical hazards are exposures that cause direct physical reactions from the body. These types of exposures include:

- Noise
- Vibration
- Radiation
- Extreme temperatures
- Extreme pressure



Noise is sampled utilizing a Time Weighted Average (TWA). A TWA takes a sample and compares the measurements to a similar 8-hour shift. Noise exposures follow the same AL/PEL thresholds as chemical exposures:

- Action Level: The action level for noise is 85dBA. An employee exposed to a TWA above 85dBA for a single day is required to be part of a hearing conservation program. A hearing conservation program consists of baseline testing and ongoing monitoring to ensure an employee is not experiencing hearing loss associated with their job. Additionally, hearing protection must be provided for optional use.
- Permissible Exposure Level: The PEL for noise is 90dBA. When an environment is measured to be above a TWA of 90dBA, a company is required to include all of the requirements at the Action Level as well as do everything practicable to reduce the overall noise exposure. Additionally, hearing protection must be required for exposed employees.

Ergonomics Hazards

Ergonomic hazards place unnecessary stress on the soft tissues of the body. These types of hazards include:

- Reaching
- Twisting
- Slouching
- Lifting excessive loads

Often, changes to a workstation or job task can help greatly reduce the stress associated with these types of activities.

Biological Hazards

Biological hazards include threats from living organisms. Biological hazards include, but are not limited to:

- Mold
- Yeast
- Fungi
- Bacteria
- Viruses
- Other Potentially Infectious Materials (OPIM)

A prominent example of a biological hazard is bloodborne pathogens. Any employee with reasonable expectation exposure to blood or other potentially infectious materials is required to be trained, as outlined in a written Exposure Control Plan.

Resources



“Industrial Hygiene.” OSHA.gov, Occupational Safety and Health Administration.

https://www.osha.gov/sites/default/files/training-library_industrial_hygiene.pdf. 03/31/21

