Health, Safety and Environment (HSE) in Industrial Installations

Target: 2nd Year Engineering Students

Instructor: Dr. GRINE Wassila

Chapter 1: Risk Assessment and Accident Analysis

Description: Introduction to Safety Systems for Industrial Engineering

Five-Session Roadmap

- **Session 1:** Introduction to HSE & Fundamental Concepts
- **Session 2:** Prevention Stakeholders & Safety Performance Indicators
- **Session 3:** Risk Analysis Methodology
- **Session 4:** Root Cause Analysis Methods
- **Session 5:** Risk Families & Integrated Case Study

SESSION 1: Introduction to HSE & Fundamental Concepts

Date: 16/10/2025

18H30-20H00

Why HSE Matters: Historical Context Major Industrial Disasters:

- Seveso (1976), Italy: Dioxine cloud → Seveso Directive
- Bhopal (1984), India: Toxic gas leak → 15,000+ deaths
- Toulouse (2001), France: AZF factory explosion → 31 deaths
- **Evolution:**
- **Reactive to disasters → Proactive strategic approach**
- **HSE = Competitive factor, not just legal compliance**

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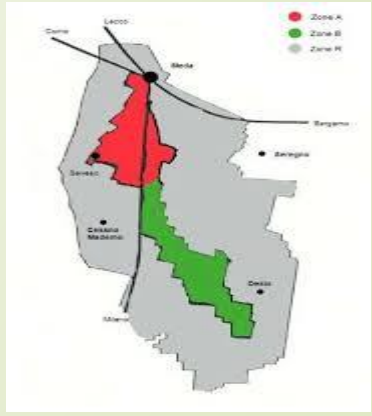

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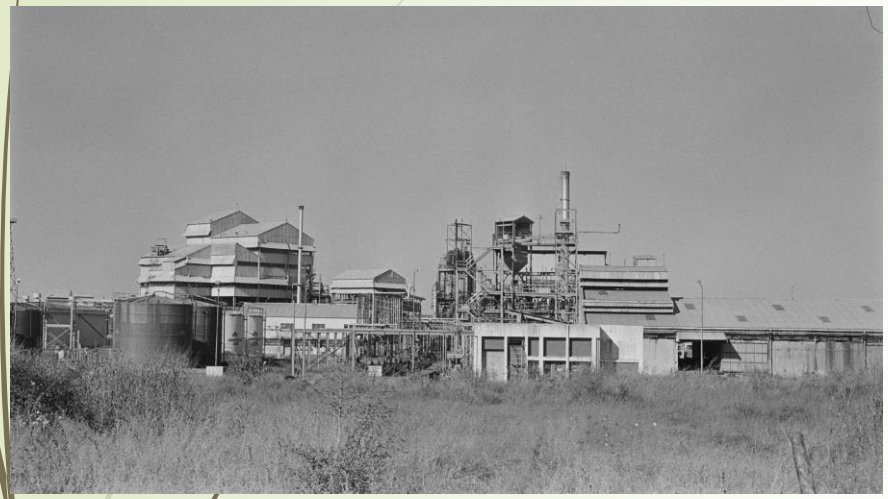

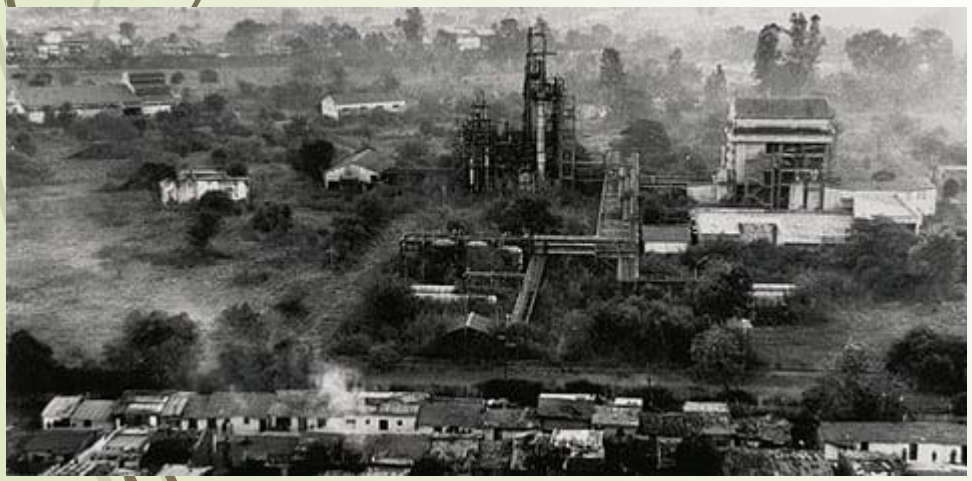

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HSE Management System Definition

- **HSE: Health, Safety, Environment**

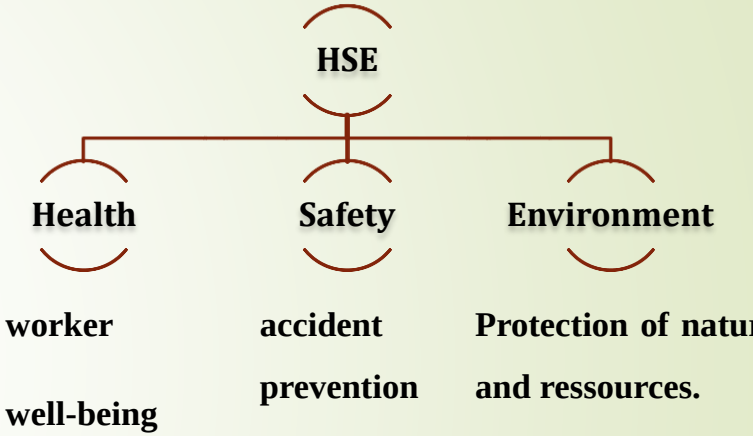
Integrated management system aiming to:

- Protect worker health and safety
- Prevent accidents and occupational diseases
- Reduce environmental impact of industrial activities

Comparative Table of the Three HSE Components

Component	Main Objective	Examples of Actions	Expected Outcome
Health	Preserve employee health	Ventilation control, cleaning, nuisance abatement, medical monitoring	Reduction in occupational illnesses
Safety	Prevent accidents and incidents	Personnel training, signage, equipment maintenance, emergency procedures	Reduction in accident numbers
Environment	Reduce the ecological impact of activities	Waste sorting and recycling, effluent treatment, energy efficiency	Conservation of natural resources

The Three Interdependent Pillars:



Note:

A balanced focus on Health, Safety, and Environment is essential for a successful HSE system.

H → S → E = Success & Sustainability

Neglecting any pillar undermines the entire system.

Core Concept 1 - Hazard

- **Definition:** Source or situation with potential to cause harm

Examples: **Toxic chemical, sharp blade, electricity**

- **Hazard Classification:**
- **Physical:** Noise, radiation, extreme temperatures
- **Chemical:** Toxic, corrosive, flammable substances
- **Biological:** Bacteria, viruses, mold
- **Ergonomic:** Posture, manual handling
- **Psychosocial:** Stress, harassment, mental load

Core Concept 2 - Risk

- **Definition:** Combination of likelihood and severity of harm from exposure to a hazard
- **Fundamental Equation**:

RISK = HAZARD × EXPOSURE

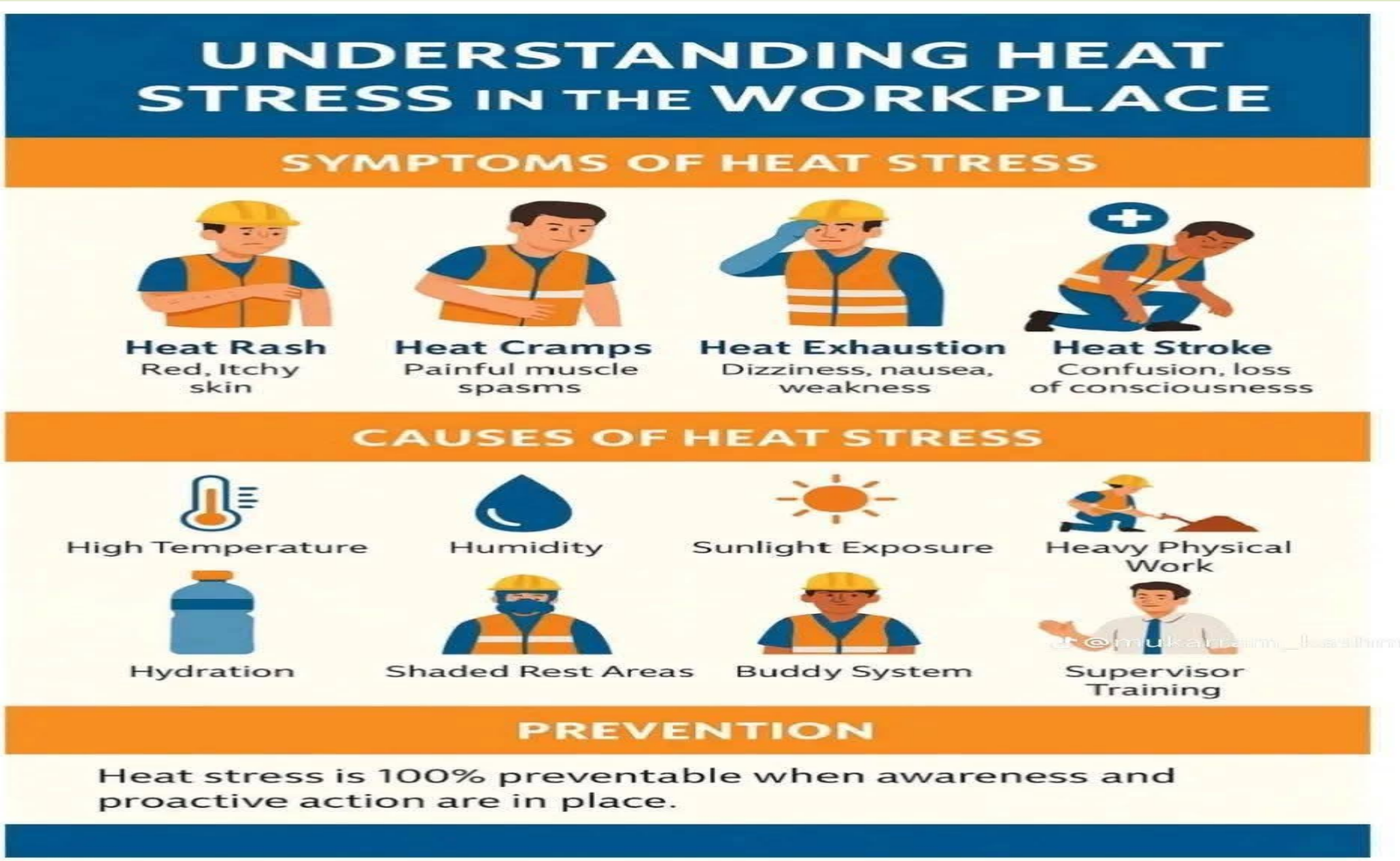
- **Exposure:** Frequency and duration of contact with hazard

Example: Flammable chemical (Hazard) stored in small quantity in appropriate container and rarely handled by trained personnel → Low Risk.

Same product spilled in large quantity in workshop → High Risk.

Exc

Exc

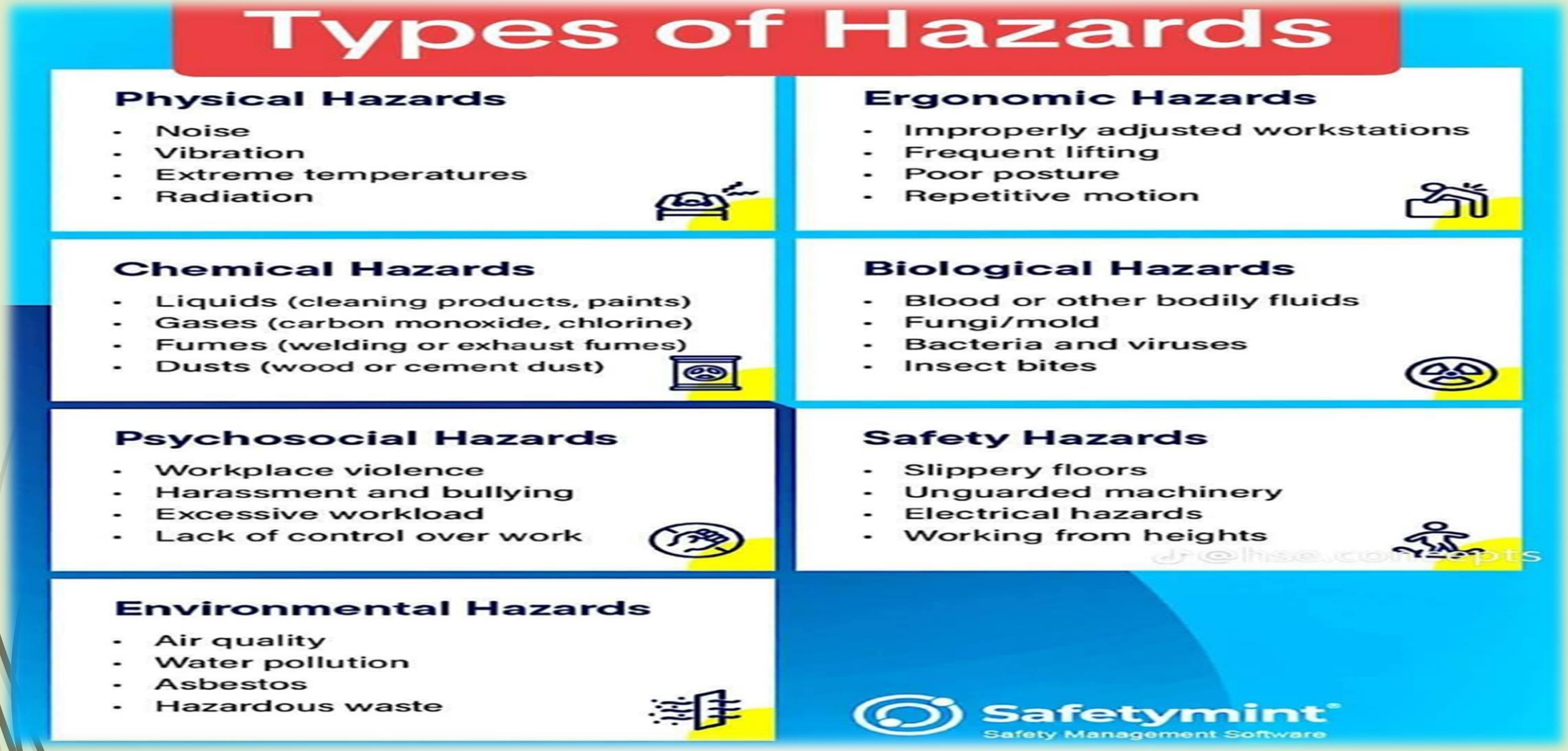

UNDERSTANDING HEAT STRESS IN THE WORKPLACE
SYMPTOMS OF HEAT STRESS
Heat Rash
Red, Itchy skin
Heat Cramps
Painful muscle spasms
Heat Exhaustion
Dizziness, nausea, weakness
Heat Stroke
Confusion, loss of consciousnesss
CAUSES OF HEAT STRESS
High Temperature
Humidity
Sunlight Exposure
Heavy Physical Work
Hydration
Shaded Rest Areas
Buddy System
Supervisor Training
PREVENTION
Heat stress is 100% preventable when awareness and proactive action are in place.

Interactive Activity 1 - Hazard Identification

- In breakout groups, list as many workplace hazards as you can and classify each one by type (Physical, Chemical, Biological, Ergonomic, Psychosocial, Electrical, Fire/Explosion, Environmental).

Slippery floors / Vibration / Fungi/mold / Unguarded machinery / Blood or other bodily fluids / Air quality/ Excessive workload / Working from heights / Noise / Insect bites / Asbestos / Poor posture / Bacteria and viruses /Radiation/ Hazardous waste / Liquids (cleaning products, paints) / Gases (carbon monoxide, chlorine) / Dusts (wood or cement dust) / Fumes (welding or exhaust fumes) / Improperly adjusted workstations / Frequent lifting / Repetitive motion / Workplace violence /Harassment and bullying /Lack of control over work/ Electrical hazards / Water pollution / Extreme temperatures.

Solution to the interactive activity 1



Summary of the Main Points – Session 1

Introduction to HSE:
An integrated management system that combines **Health, Safety, and Environment**.
Objective:
To protect workers, prevent accidents, and minimize environmental impact.
Key Concepts (Distinction between):
Hazard: The source of potential harm (e.g., chemical substance, electricity).
Risk: The probability of harm occurring upon exposure to a hazard (Equation: *Risk = Hazard × Exposure*).
Accident: An event that actually resulted in harm or damage.
Incident (Near Miss): An event that did not result in harm but served as a warning sign.
Conclusion:
Understanding these concepts is the first step toward building an effective safety culture.
The focus should be on **prevention** through identifying and analyzing risks before accidents occur.
Next Session Topic:
In the upcoming session "***Stakeholders in Prevention and Performance Indicators***"
we will discuss the responsibilities of each party (**employer, employee, and safety committee**) in maintaining safety,
and learn how to measure performance using indicators such as the **frequency rate** and **severity rate**.

And finally, I would like to share a piece of advice:

Stay alert. Stay safe. Your safety is your responsibility and a moral duty.

Thank you all for your attention