

REPUBLIC OF THE PHILIPPINES  
POLYTECHNIC UNIVERSITY OF THE PHILIPPINES  
STA. MESA, MANILA

**COLLEGE OF ENGINEERING**  
**COMPUTER ENGINEERING DEPARTMENT**



**CMPE 30163**

**BASIC OCCUPATIONAL SAFETY  
AND HEALTH**

**INSTRUCTIONAL MATERIAL**

**DR. ANTONIO Y. VELASCO**

**DR. REMEDIOS ADO**

**ENGR ROLITO MAHAGUAY**

# Chapter 1: Introduction to Basic Occupational Safety and Health for Computer Engineering

## LEARNING OBJECTIVES

- To know what is Occupational Safety and Health
- To learn the importance of Occupational Safety and Health for Computer Engineers
- To know what are the risks and technological advances caused by the products of engineering
- To know the different Types of Emergencies
- To know what to prioritize in case of emergencies
- To know how to prevent losses in emergencies

## Introduction

Safety engineering is the process of designing workplaces to prevent accidents. Engineering Safety Concepts provides detailed approaches and modes for accident reduction by using a risk management process to identify and "design out" hazards.

Accidents can and do happen. Workplaces and factories which may use machinery, chemicals, and other potentially hazardous elements, are always possible sites for accidents which may cause injury, or even death if a comprehensive engineering safety approach is not takingly.

The multidisciplinary nature of safety engineering means that a very broad array of professionals is actively involved in accident prevention or safety engineering.

## Technological Advancement and its Risks

- Engineers have played a major role in technological advancements that have created many changes for mankind. Some advancements have improved society; some have been detrimental. Some have aided life, others have created new economic, social, political, environmental, or safety and health problems. Communication and electronics technologies continue to shrink the world and change lifestyles. The Pony Express moved only small pouches of information at one time. Today, there are many communication satellites in orbit, transmitting millions of bits of information every second.

Because of technology, the number of materials and substances known to humanity has increased rapidly. Today there are approximately five million substances listed in the Registry Handbook. Nearly **100,000** chemical substances are now in use, with several hundred new ones entering the marketplace each year.

Not only has technological change introduced new methods, materials, products and equipment into use by society, but also new hazards. These are a few examples

- ❖ electricity replaced gas and oil lighting. Electricity may be less hazardous than gas and oil lighting.
- ❖ In **1930s**, asbestos became a widely used material for thermal insulation, roofing, brakes, and other applications.

In **1978** estimate by the US government said that 8 to 11 million workers had been exposed to asbestos. Of those, one million were significant to the point that half of these individuals could expect to die of cancer in the next 30 years.

The automobile arrived at the end of nineteenth century. Today, there are approximately 1.5 motor vehicles per American household. The use of these vehicles now results in roughly **45,000** traffic deaths and **2 million** disabling injuries each year in the United States.

## **What is Occupational Health and Safety?**

The occupational Health and Safety also commonly referred to as (OHS), is a multidisciplinary field concerned with the safety, health and welfare of people at the workplace. The term occupational health is referred to as occupational health and non-occupational safety for activities outside of work.

## **Significance of Safety Engineering for Engineers**

For a long time, society has sought to protect itself from risk. One means in recent times has been through laws requiring registration or licensing of professions, including engineers. The one justification for engineering registration law is “protecting public health, safety and welfare.” This concept assumes that those who appropriate education and experience and are able to sit for and pass an examination are qualified to provide the protection by the public.

The public expects the engineers to protect them against unnecessary and undesirable risks, particularly those brought on society through technological advancement and change. Spectacular failures erode public confidence in engineers. Examples include the following:

- ❖ Tacoma Narrows Bridge Near Tacoma Washington, in 1940.
- ❖ The March 1979 nuclear accident at Three Mile Island near Middletown, Pennsylvania.
- ❖ The Challenger space shuttle accident at Cape Kennedy, Florida, on January 18, 1986.

Engineering schools and the engineering profession are becoming more aware of the safety and health challenge. Engineers do have an important role in reducing risks placed

on society by modern technology, its products, and its wastes. Although engineers cannot bear the total blame for safety and health risks, engineers are able to help reduce them to levels acceptable to society.

9 Engineers should be able to recognize hazards and implement controls in every phase of the process;

- In planning
- Design
- Operations
- Maintenance
- Management Activities

Engineers should know how to eliminate, reduce, or control safety and health risks within their sphere of responsibility. Every engineer must know when and how to use other professions, including safety professionals, in analyzing and reviewing their procedures and design decisions. Every engineer needs to know when to say, ***“I don’t know; I need other expertise.”*** Engineers must work with society and other professions in meeting the health and safety challenge of registration laws: “to protect public health, safety and welfare.”

## OCCUPATIONAL SAFETY AND HEALTH

- According to National Safety Council statistics, there approximately 4,500 work related deaths each year, with a death rate of more than 3 per 100,000 for all industries.
- Annually, there are more than 3.5 million injuries involving one or more days away from work.
- Workplace injuries result in more than 100 million lost workdays each year.
- Each worker in the United States loses approximately two days each year from job-related accidents.
- In general, the trend in recent decades has been toward fewer worker deaths and a lower work-related death rate.
- At the same time, the number of workers has risen.
- Death, injury is, lost work days, and other statistics do not distinguish job-related injuries from job-related illnesses.
- It is often very difficult to establish that an illness job-related.
- Some illnesses have a long latency period between exposure and onset of

- disease.
- Workers may have had off-the-job exposures to health hazards, may have had exposure on different jobs. Or may have changed jobs.
- Some employers are reluctant to report occupational illnesses, and many employees and physicians fail to recognize a disease as being job related.
- These factors suggest that the preceding statistics about worker deaths and injuries may be underestimated.

## **TYPES OF EMERGENCIES**

- There are several types of emergencies.
- Some result from forces of nature, some involve fire and explosion, and others may involve system failures.
- Some emergencies entail traffic or transportation problems and some result from the behavior of people.

### **❖ NATURAL EMERGENCIES**

- Natural emergencies include floods, hurricanes, tornadoes, wind storms, snow, sleet, earthquake, mud slides, avalanches, volcanic eruptions, and even dust or sand storm.
- In some locations, an insect infestation may create an emergency
- A fire in a hotel, theater, or other high occupancy facility may injure many people.
- Explosions can damage buildings far from the explosion site and glass and other flying materials can inflict injury
- Fires involving hazardous materials have cause the evacuation of entire communities.
- Fires in compressed airlines can lead to explosions.

### **❖ SYSTEM FAILURES**

- There are many kinds of system failures that can create emergencies.
- For example, interruption of operations may create hazardous conditions i.e. a boiler overheating can cause dangerous conditions: failure of temperature-limit controls can lead to runaway processes.

### **❖ BEHAVIOR OF PEOPLE**

- The behavior of people can lead to emergencies.
- Some behaviors intend to cause harm; others do not, but have the same result.
- Strong feelings may lead to riot and mob behavior.

- Crowds rushing to sales when goods are in short supply and crowds fighting for tickets to public events or pressing to enter auditoriums and stadiums have led to disasters.

## PRIORITIES IN EMERGENCIES

- There are well-established priorities for emergencies, the first of which is safety of people.
- **(first priority)** The people may be employees, customers, visitors, or the public.
- Evacuation of people who could be injured and care for those injured have the highest priority.
- If a typhoon or flooding is imminent, people should be moved from dangerous areas.
- In emergencies, evacuation routes from buildings, sites, or communities must stay clear.
- The **second priority** is protection of property.
- This may involve turning off power, fuel, or supplies to prevent further damage.
- Processes may be shut down manually or automatically render them safe or to minimize loss of material and products.
- The **third priority** is cleanup and salvage.
- Spilled hazardous materials must be removed to make an area safe.
- Fires sometimes leave building walls standing without support, which could collapse on passersby.
- The **fourth priority** is restoring operations and returning things to normal.
- For companies and businesses, there are losses in income and production until operations begin again.
- After an emergency, the condition and safety of equipment must be checked and items must be repaired.

## PREVENTING LOSSES IN EMERGENCIES

- The main objective in dealing with emergencies is to be prepared to take proper actions.
- Preparedness for emergencies involves analysis to identify potential emergency situations, planning to detail the actions and participants, design to remedy physical deficiencies, training to ensure proper implementation, and having prepositioned contracts or agreements for specialized equipment or personnel.

## ANALYSIS

- It is not a simple task to identify what natural and human-made conditions may lead to emergencies.
- It is not enough to identify the scenarios that spawn emergencies.

- The situations that can result should be considered: whether is there danger to life, danger to property, or both and how severe the situation could become.
- There may not be enough time or resources to plan for every potential emergency, but the more situations one is prepared for, the better.
- Computer tools may help visualize potential problems in an emergency.
- For example, there are programs in analyzing the flow of people exiting a fire.

### Activity 1.

Directions: Answer the following questions with True or False before the number.

- \_\_\_\_\_1. OHS refers to an ethics does not change and is constant through cultures.
- \_\_\_\_\_2. You have the right to know the hazards in your job. Your employer or supervisor must provide you with the information you need to work safely.
- \_\_\_\_\_3. Workplace safety is based on staff recognizing, assessing and controlling hazards in the workplace.
- \_\_\_\_\_4. OHS important factor makes it easier for corporations to conduct business.
- \_\_\_\_\_5. Suppliers/business partners should not place priority on working with companies that operate in a fair and safety and healthy manner.
- \_\_\_\_\_6. OHS refers to the trend in recent decades has been toward fewer worker deaths and a lower work-related death rate.
- \_\_\_\_\_7. Improving corporate safety include employees are rewarded for success obtained through questionable means.
- \_\_\_\_\_8. Corporate safety officer is responsible for key knowledge/contact person for ethical issues.
- \_\_\_\_\_9. Critical training increase the percentage of employees who report incidents of misconduct.
- \_\_\_\_\_10. It refers to preventing losses in emergencies the main objective in dealing with emergencies is to be prepared to take proper actions.

## **CHAPTER 2: Occupational Safety and Health Power Dynamics and Hazards Control**

### **LEARNING OBJECTIVES**

- **To know the definition of Occupational Safety and Health**
- **To identify the forces influencing of OSH**
- **To analyze the forces generated by the OSH**
- **To know what are the sources of Hazard and how to control it**
- **To know how to eliminate Hazards in the workplace**
- **To know what are the safety devices engineers use to**

### **Definition of Occupational Safety and Health?**

Occupational Health and Safety is designed to create a safe, healthy work environment. It can generally be considered as two separate entities.

Occupational Safety covers the risk factor in your workplace, and potential safety hazards that could possibly cause injury. Occupational Health, on the other hand, looks at potential health concerns and wellbeing. Think of Safety as an employee's physical well-being, and Health as everything else, including mental health.

Whether you're stacking shelves, studying a PhD, working from an office, or using heavy machinery, there are health and safety risks. That being the case, your employer has a responsibility to minimize those risks and reduce the likelihood of any workplace accident or mistreatment. And, as we're about to explain, it's in more than just their legal interest to look after you.

### **Current Issues**

The issues studied and regulated by occupational health and safety experts today vary widely by occupation. For example, physical threats like tall heights and heavy machinery might be of greater concern to construction workers, whereas mental health and repetitive stress injuries might be the focus of office environments. Even so, despite massive improvements to workplace standards, there are a number of safety and health concerns in America's workforce where much work can be done.

- **Falls**

Hundreds of people in the United States die from falls each year. It's the leading cause of fatalities among construction workers<sup>12</sup> —yet almost entirely



preventable. For many builders, working from tall heights is unavoidable, but with proper safety precautions, deaths and injuries can be avoided.

- Heat Illness

According to OSHA, dozens of workers die every year from working in extreme heat or humid conditions, and thousands more become ill. The biggest proportion of these instances happen in the construction industry, but it can happen to anyone working in an environment that isn't properly climate controlled.

- Repetitive Stress Injuries

An emerging area of concern related to occupational health is injuries caused by poor posture and repetitive motions. Many U.S. workers work almost exclusively on computers, mousing and typing for hours on end, resulting in the overuse of certain muscles and joints.

- Sedentary Behavior

As the workforce has moved from manual labor to desk jobs, the U.S. population has become increasingly sedentary. Office workers often sit for hours at a time during work hours—not to mention during their daily commute and leisure time.

- Workplace Violence

Many people envision workplace safety primarily in terms of traditionally risky industries like construction, deep-sea fishing, or logging. Indeed, these sectors experience some of the highest fatal accident numbers for U.S. workers. However, non-fatal injuries and illnesses tell a significantly different story.

### **Factors that contributes to Occupational Safety and Health:**

- Human

1. Skill Training
2. Safety Consciousness
3. Operation Method
4. Working Habits

- Management

1. Command and dispatch
2. Safety Rules and regulations

- 3. Safety education and training
- 4. Safety supervision
- Machine
  - 1. Equipment protection
  - 2. Equipment maintenance
- Environment
  - 1. Working space
  - 2. Natural factors

### **Importance of Occupational Health and Safety:**

- Mental Health and Well-Being
  - 1. Your employer must consider the conditions you work in. OH&S puts a care of duty upon every employer to make sure that their staff work in reasonable conditions, and that their mental health is a top priority.
- Increased Awareness and Safe Working Culture
  - 2. You don't spend thousands upon thousands of pounds putting your staff on mandatory training courses just for the sake of it. OH&S training courses, all the way from Working at Height to Supply Chain Management, are all designed to create awareness of workplace surroundings and create a safe working culture.
- Increase in Productivity
  - 3. Healthy staff are productive staff. When OH&S is implemented correctly, staff should feel protected, and loyal to their work. They know that they're being looked after while they're at work, and that they won't be putting their safety or their health at risk.
- Correct Training and Use of Tools
  - 4. Particularly on some of our Scaffolding Training Courses, our experts explain that shortcuts will always create workplace risks. This is true in just about every industry, but when heavy machinery is involved, the risk is much more significant.
- New Opportunities

5. OH&S will also create new opportunities in your workplace. Staff that have been trained can take on the responsibility of becoming mental health ambassadors, setting a good example and serving as a point-of-contact for their colleagues.

- Occupational Health and Safety with Safety & Access

6. Ultimately, Occupational Health and Safety will look after both your employees and your profits. In the past, too many workers have suffered tragic losses – OH&S strives to make workplace accidents a thing of the past.

## **Power Dynamics**

Power dynamics – the ways in which power works in a setting – can either sink a meeting and negatively impact relationships for years, or produce more shared power and capacity to get things done. A lot of the difference comes down to how we attend to power dynamics in meetings, how well we plan our meetings, how well we determine what happens within and outside of meetings, and how well we facilitate in the moment.

## **SOURCES OF POWER**

### **Interpersonal Sources of Power**

French and Raven identify five interpersonal sources of power:

- Reward power: Reward power is an individual's ability to influence others' behavior by rewarding their desirable behavior.
- Coercive power: Coercive power is an individual's ability to influence others' behavior by means of punishment for undesirable behavior.
- Legitimate Power: Legitimate power most often refers to a manager's ability to influence subordinates' behavior because of the manager's position in the organizational hierarchy.
- Expert power: Expert power is an individual's ability to influence others' behavior because of recognized skills, talents, or specialized knowledge.
- Power Dynamics Referent power: Referent power is an individual's ability to influence others' behavior as a result of being liked or admired.

### **Structural Sources of Power**

Much of the attention directed at power in organizations tends to focus on the power of managers over subordinates. An additional perspective is that the characteristics of the situation affects or determine power.

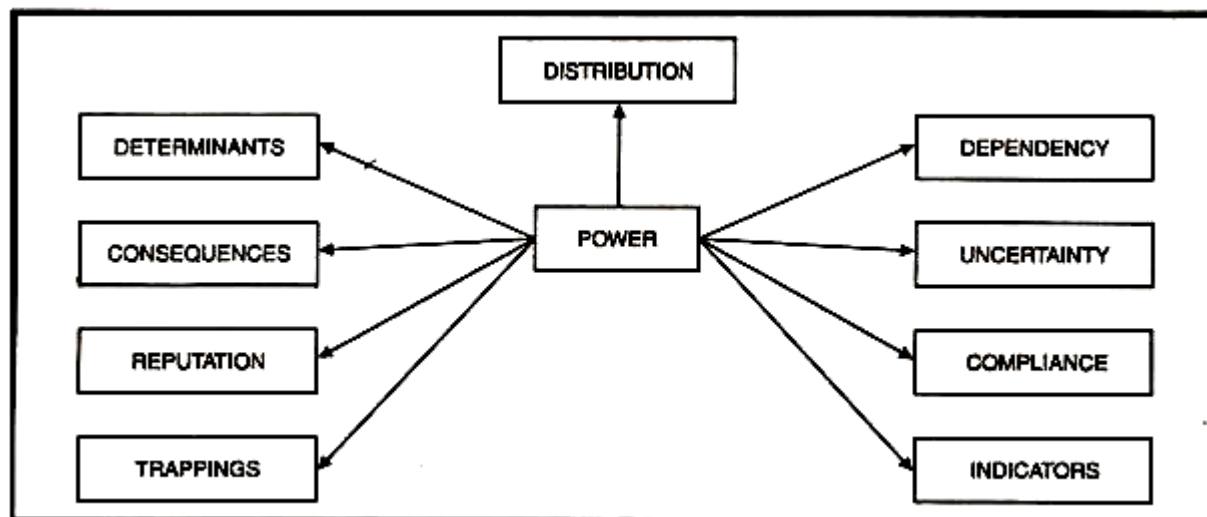
- Resources as power: Organizations need a variety of resources, including money, human resources, equipment, materials, and customers to survive.

- Decision making as power: The decision-making process in an organization creates more or less power differences among individuals or groups.
- Networks as power: The existence of structural and situational power depends not only on access to information, resources and decision making, but also on the ability to get cooperation in carrying out tasks.

### Basis of Power

- Coercion - The ability to deprive, that is, to decrease another's outcomes.
- Reward - The ability to control that which another party values, that is, to increase another's outcomes.
- Expertise - Possession of specialized knowledge.
- Information Possession of or control of access to important data concerning the organization and its environment.
- Legitimacy - Synonymous with authority, that is, the power which emanates from a person's position in the organization.
- Referent - Ability to exert charisma, to procure commitment

### Angles of Power Dynamics in an Organization that can be studied:



- Distribution Power  
The amount of power in an organization as well as in single interpersonal situation is variable and the amount of power changes over periods of time.

- **Dependency**  
A person or a group cannot have power in isolation. Each party to the power relationship is in a position to some degree to be able to control or influence other's conduct. Dependency of some kind is the basic characteristic of all the modern organizations.
- **Uncertainty**  
Organizations seek to avoid uncertainty as far as possible. People who can absorb uncertainty yield more power. The more the contingencies controlled by a unit, more is the power exercised by it.
- **Compliance**  
People, generally, comply with legitimate power as compared to all other types of power. Reward and coercive powers are generally used by managers as tools for compliance.
- **Power Indicators**  
Power is usually, more effective when it is not visible. Those who use power do not want others to know about it. Moreover, people who are using power fail to recognize what they are doing.
- **Determination of Power**  
One method of assessing power focuses on the potential to exert influence and consists of measuring how many determinants of power are available to each member.
- **Consequences of Power**  
The relationship between powers and consequences is very important. Since power is used to influence decisions, those with the greatest power should be the ones who obtain the most favorable decision outcomes.
- **Trappings**  
Trappings indicate the paraphernalia of power that people possess. From this point of view, every higher office has more power as compared to a lower office, e.g. title, office size, and location, special privileges etc.
- **Reputation**  
Power of an individual can also be assessed by his reputation in the organization as perceived by others. People are knowledgeable about power relationships and willing to report what they know.

### **Brief Explanation:**

The goal of the field, Occupational Safety and Health is to apprehend on any circumstances concerning the safety and health of a workplace, and to promote a safe work environment. Having said this, there are certain people assigned to administrate this field. People who study and analyze the situations regarding hazards and how to deal with such. The concept of power dynamics applies on the field. Power dynamics shows a great impact to occupational safety and health because it is responsible to investigate and understand the situations and when to apply certain regulations regarding hazards in the workplace. It can also affect the field of occupational safety and health conditions such as affecting the morale, skills, and confidence of the workers depending on how power dynamics is applied in the workplace. If power is abused, it may result to a negative environment in the workplace and this might result to decrease in productivity and development. On the other hand, if power is used and applied properly, it will boost the workers' morale especially if the conditions are favorable for them.

## **HAZARDS AND HAZARD CONTROL**

### **What is a HAZARD?**

- A hazard is “a condition or changing set of circumstances that presents a potential for injury, illness or property damage.”
- It is the “potential or inherent characteristics of an activity, condition or circumstance which can produce adverse or harmful consequences.”

Hazard control is any means of eliminating or reducing the risk resulting from a hazard. Hazard recognition is perceiving or being aware that a hazard does or can exist.

### **SOURCES OF HAZARDS**

- Some hazards are introduced by people. All too often hazards arise from engineering activities, such as planning, design, production, operations and maintenance.
- Hazards are seldom introduced by engineers or others deliberately; more likely, they are created inadvertently, unknowingly, or unintentionally.
- Many factors may contribute to the introduction of hazards: pressure to meet design or production schedules, job stress, poor communication, and lack of knowledge may influence hazard recognition and control.
- Also important are the lack of instruction, personnel, funds, management concern, and assistance from safety and health specialists.

## HAZARD FACTORS

### ❖ PLANNING AND DESIGN

#### 1. Failure to envision the use environment

**Ex.** The force required by an operator to push or pull an object may be adequate when a floor is dry. The task maybe hazardous when the floor is wet or shoes are muddy.

#### 2. Making inadequate assumptions.

**Ex.** Assuming a load is static when it is dynamic may result to failure. Football stands may not be capable of rhythmic loading as the crowd sways and stomps to the music of the band.

#### 3. Selection of materials

**Ex.** A material may be attractive, but may produce toxic substances if it catches on fire. A material may have adequate strength, but may have other properties, like creep or brittleness, that can lead to disaster.

#### 4. Failing to consider the life of a product

**Ex.** A product may be safe when new, but may become dangerous during use. Use factors, such as heat, chemicals, weather, vibration, freezing, wear, abrasion, or other adverse conditions, can shorten product life.

### ❖ PRODUCTION AND DISTRIBUTION

- Hazards also can result from production and distribution activities that engineers plan or manage.
- It is not always possible to construct or produce items the way they are drawn or described on paper.
- Poor packaging design may contribute to the introduction of hazards during handling and shipping.
- Inadequate packaging could result in a release of hazardous materials to handlers, distributors, or buyers.

### ❖ MAINTENANCE AND REPAIR

- Hazards may come from insufficient, delayed and improper maintenance and repair. Controlling hazards related to normal use it not sufficient.
- Many designs fail to recognize hazards during setup, maintenance, and cleaning activities. Hazards during or resulting from maintenance, repair, or

cleaning, not just normal operation or use, must be recognized.

#### ❖ COMMUNICATION

- Poor communication or failures in communications can introduce hazards.
- Hazards can be introduced when changes in design, operations, and procedures are not communicated adequately to those impacted by them.
- The way information is communicated and the knowledge and understanding of receivers is important.
- Instructions and user manuals need the knowledge of the designer and others.
- Poor communication leads to errors, incidents and losses.

### PRINCIPLES OF HAZARD CONTROL

To minimize hazards, one must be able to

1. Recognize them
2. Define and select preventive actions
3. Assign responsibility for implementing preventive actions
4. Provide a means for measuring effectiveness

Together these four steps achieve hazard control.

Here are some examples of hazard sign and safety symbols in the work place





## **RECOGNITION OF HAZARDS**

- Safety engineering requires knowledge of hazards in many different topics.
- Safety engineering also requires a knowledge of engineering and systems.
- There is a need to develop skill at recognizing and understanding hazards.
- Sometimes one must anticipate hazards by knowing that bringing certain materials, activities, or conditions together produces hazards that otherwise are not present.
- One must consider the use environment and many different contexts.
- Only after hazards are recognize can one identify and select suitable controls.
- Historical data often helps in identifying or anticipating hazards that may exist or potentially exist.

## **PRIORITIES**

There are a set of priorities that many find helpful for selecting controls for hazards. Some refer to this list as “design order of precedence.”

The priorities, in order of importance are:

- Eliminate hazard
- Reduce the hazard level
- Provide safety devices
- Provide warnings
- Provide safety procedures (and protective equipment)

## **ELIMINATE THE HAZARD**

The highest priority in hazard control is to eliminate or avoid the hazard. As soon as it is eliminated, the potential for harm or loss is gone.

## **REDUCE THE HAZARD**

If one cannot remove a hazard, the degree of hazard often can be reduced. Two approaches are reducing the degree of severity or reducing the probability of occurrence.

1. Reduction in degree of severity lead to less injury, illness, or damage. For example, moving a fire hazard where it is distant from people is a reduction in degree of severity.
2. Reducing the probability of occurrence means that a hazard is less likely to result in an incident.

- One means to accomplish this is to use parts that have a longer life. Designing for lower failure rates or using redundancy are others. Avoiding single point failures is another.
- Redundancy – the probability of error or failure can be reduced by providing redundancy in an operation or system.
- Single point failure – a single point failure is a failure of a component or subsystem that results in failure of the entire system.

## SAFETY DEVICES

Safety devices are features or controls that prevent people from being exposed to a hazard that exists. Safety devices can reduce hazards in many cases.

- Machine guards are examples of safety devices. They prevent operators from entering a hazardous area.
- Fences, interlocks (i.e. washing machine lids), shielding, and enclosures are all forms of safety devices.

Here are some examples of safety devices often used by workers



- Noise cancelling headphones

- Protective Helmet
- Protective Eyewear
- Safety Gloves
- Dusk Mask

**Fail-safe** devices are safety devices designed to prevent exposure to hazards. They also prevent injury or damage when a system or machine fails.

Examples:

- Automatic fire doors
- Air brakes on trucks trailers
- Dead-man switch on a powered tool and
- Safety cans with spring closing lid for flammable liquids.

Fail-safe devices can be classified as:

- Fail-passive
  - A *fail-passive device*, such as an electrical circuit breaker or fuse, renders a system inoperative or deenergized until corrective action is taken.
- Fail-active
  - A *fail-active* device keeps a system energized but in a safe mode until corrective action is taken.
- Fail-operational
  - A *fail-operational* is even when the device is malfunctioning, it is still operable or has an alternative device/operation to perform the operation

## Activity: 2

Directions: Critical Thinking Analysis: Answer the question Freely you will explain it in writing or doing the word file for submission.

1. What are some examples of occupational safety and health of dynamic process? Give at least three. Examples.
2. What are the main objectives of occupational health and safety give at least 5 objectives?

## **CHAPTER 3: MINIMIZING OF HAZARDOUS ENERGY and OSH ACT AND OSHA**

### **LEARNING OBJECTIVES**

- To know the sources of Hazardous Energies
- To know the harmful effects caused by Hazardous Energies
- to know the proper protocols to minimize the risks of hazardous energies

### **SOURCES AND RISKS OF HAZARDOUS ENERGY**

#### **❖ SOURCES OF HAZARDOUS ENERGY**

- Energy sources including electrical, mechanical, hydraulic, pneumatic, chemical, thermal or other sources in machines and equipment can be hazardous to workers.

#### **❖ HARMFUL EFFECTS OF HAZARDOUS ENERGY**

During the servicing and maintenance of machines and equipment, the unexpected startup or release of stored energy could cause injury to employees. Workers servicing or maintaining machines or equipment may be seriously injured or killed if hazardous energy is not properly controlled.

- Injuries resulting from the failure to control hazardous energy during maintenance activities can be serious or fatal!
- Injuries may include electrocution, burns, crushing, cutting, lacerating, amputating, or fracturing body parts, and others.

Failure to control hazardous energy accounts for nearly 10 percent of the serious accidents in many industries.

### **CONTROL OF HAZARDOUS ENERGY**

Employers are required to train each worker to ensure that they know, understand, and are able to follow the applicable provisions of the hazardous energy control procedures.

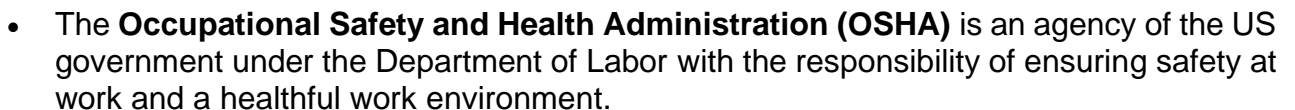
Occupational Safety and Health Administration (OSHA) Lockout/Tagout Fact Sheet describes the practices and procedures necessary to disable machinery or equipment to prevent the release of hazardous energy.



Proper lockout/tagout (LOTO) practices and procedures safeguard workers from hazardous energy releases. OSHA's Lockout/Tagout Fact Sheet describes the practices and procedures necessary to disable machinery or equipment to prevent hazardous energy release. The OSHA standard for The Control of Hazardous Energy (Lockout/Tagout) for general industry outlines measures for controlling different types of hazardous energy. The LOTO standard establishes the employer's responsibility to protect workers from hazardous energy. Employers are also required to train each worker to ensure that they know, understand, and are able to follow the applicable provisions of the hazardous energy control procedures:

- Proper lockout/tagout (LOTO) practices and procedures safeguard workers from the release of hazardous energy. The OSHA standard for The Control of Hazardous Energy (Lockout/Tagout) for general industry, outlines specific action and procedures for addressing and controlling hazardous energy during servicing and maintenance of machines and equipment. Employers are also required to train each worker to ensure that they know, understand, and are able to follow the applicable provisions of the hazardous energy control procedures. Workers must be trained in the purpose and function of the energy control program and have the knowledge and skills required for the safe application, usage and removal of the energy control devices.
- All employees who work in an area where energy control procedure(s) are utilized need to be instructed in the purpose and use of the energy control procedure(s), especially prohibition against attempting to restart or reenergize machines or other equipment that are locked or tagged out.
- All employees who are authorized to lockout machines or equipment and perform the service and maintenance operations need to be trained in recognition of applicable hazardous energy sources in the workplace, the type and magnitude of energy found in the workplace, and the means and methods of isolating and/or controlling the energy.
- Specific procedures and limitations relating to tagout systems where they are allowed.
- Retraining of all employees to maintain proficiency or introduce new or changed control methods.

## Definitions



- Occupational Safety and Health Administration (OSHA) is responsible for protecting worker health and safety in the United States. Congress created OSHA in 1971 following its passage of the Occupational Safety and Health Act of 1970 to ensure safe and healthy working conditions for workers by enforcing workplace laws and standards and also by providing training, outreach, education and assistance.
- OSHA conducts research and recommends solutions for the prevention of work-related illness.
- Congress enacted the OSH Act in response to annual workplace accidents that resulted in 14,000 worker deaths and 2.5 million disabled workers annually. Since its inception, OSHA has cut the work-fatality rate by more than half, and it has significantly reduced the overall injury and illness rates in industries where OSHA has concentrated its attention, such as textiles and excavation.

- OSHA covers most organizations, including private sector employers, federal government agencies, and state and local governments, which are protected by OSHA-approved state programs. However, it doesn't cover all employees, such as self-employed individuals or those who work in an industry in which a different federal agency regulates workplace hazards.

## **Human Factors in Occupational Safety and Health**

According to a definition shared by the World Health Organization, human factors “refer to environmental, organizational and job factors, and human and individual characteristics which influence behavior at work in a way which can affect health and safety.”

These factors can be further isolated to include several specific elements as follows:

1. Tasks, workload and work patterns.
2. Working environment and workplace design.
3. Workplace culture and communication.
4. Leadership and resources.
5. Policies, programs and procedures.
6. Worker competency and skill.
7. Employee attitude, personality and risk tolerance.

### **Core**

### **Elements**

- Management
- Commitment
- Employee involvement
- Workplace risk assessment
- Hazard prevention and control
- Safety and health Training Education
- OSH program evaluation

### **Brief Explanation**

Occupational safety and health standards are in place to mandate the removal, reduction, or replacement of job site hazards. OSH puts a care duty upon every employer to make sure that their staff work in reasonable conditions, and that their mental health is a top priority. Long hours, few breaks, little recognition, and impossible demands will quickly leave workers fatigued, stressed, and suffering from poor mental health. The most important reason to comply with OSHA regulations is because it ensures the continued safety of the employees. The safer the employees of a company feel at work, the more likely they are to enjoy coming to work every day, and the more productive they'll be on the job. Improved employee satisfaction enables the company to run more efficiently as a whole. Providing thorough job and OSHA training will also help reduce the frequency of workplace injuries in the company.

### Activity 3

Directions: Identify the following. Write your answer on the space provided.

\_\_\_\_\_1. Refers to the practices and procedures necessary to disable machinery or equipment to prevent the release of hazardous energy.

\_\_\_\_\_2. The person who can remove a Lockout/Tagout? (LOTO)

\_\_\_\_\_3. The person are the only ones that are authorized to hanged or clear a Lockout/Tagout

\_\_\_\_\_4. It refers to an employee who has been trained, examined and is knowledgeable of the company's lockout/tagout procedure a hazardous energy control and has been designated as such.

\_\_\_\_\_5. It refers to the servicing and maintenance of machines and equipment, the unexpected startup or release of stored energy could cause injury to employees.

\_\_\_\_\_6. Who must an authorized employee notify before hanging or removing a lockout/tagout?

\_\_\_\_\_7. The practices and procedures safeguard workers from the release of hazardous energy.

\_\_\_\_\_8. What information must be attaché to all lockout locks.

\_\_\_\_\_9. The only purpose of Lockout/Tagout is to protect the employee from \_\_\_\_\_ energy including electrical, mechanical, hydraulic, pneumatic, chemical, thermal or any other types of energy.

\_\_\_\_\_10. The key to energy sources including electrical, mechanical, hydraulic, pneumatic, chemical, thermal or other sources in machines and equipment can be hazardous to workers.



## **CHAPTER 4: ECONOMICS OF SAFETY AND HEALTH AND CONFINED SPACES HAZARDS**

### **LEARNING OBJECTIVES**

- **To know the perspective of OSH**
- **To learn how market theory impacts work safety and health**
- **To analyze the effects of economics on injuries, illness and fatalities.**
- **To know what are the confined spaces**
- **To know the hazards of confined spaces**
- **To know how to control or minimized hazards brought by confined spaces.**

### **Perspective of Occupational safety and health**

The economic perspective on occupational safety and health (OSH) encompasses both causes and consequences: the role of economic factors in the etiology of workplace ill-health and the effects this has on the economic prospects for workers, enterprises, nations, and the world as a whole. It is therefore a very broad perspective, but it is not complete, because neither the causation nor the human significance of OSH can be reduced to its economic elements. The purpose of this paper will be to indicate the most important contributions economic analysis has made to our understanding and management of OSH, and to suggest directions for future work in this area.

Occupational health and safety (OSH) management can – and should – be viewed in monetary terms as part of a business system. When a company employs skilled health and safety personnel and calculates the potential loss of work hours caused by injury and illness into cost analyses, the true value of occupational health and safety in the workplace becomes startlingly clear.

An expert in OSH management should be able to build an economy of health and safety that is seamlessly integrated into the company culture.

## MAJOR ELEMENTS

An effective occupational safety and health program will include the following four mains

elements: management commitment and employee involvement, worksite analysis, hazard prevention and control, and safety and health training.

### 1. Management Commitment and Employee Involvement

The elements of management commitment and employee involvement are complementary and form the core of any occupational safety and health program.

Management's commitment provides the motivating force and the resources for organizing and controlling activities within an organization. In an effective program, management regards worker safety and health as a fundamental value of the organization and applies its commitment to safety and health protection with as much vigor to other organizational goals.

Employee involvement provides the means by which workers develop and/or express their own commitment to safety and health protection for themselves and for their fellow workers.

In implementing a safety and health program, there are various ways to provide commitment and support by management and employees. Some recommended actions are described briefly as follows:

State clearly a worksite policy on safe and healthful work and working conditions, so that all personnel with responsibility at the site (and personnel at other locations with responsibility for the site) fully understand the priority and importance of safety and health protection in the organization.

- ☐ Establish and communicate a clear goal for the safety and health program and define objectives for meeting that goal so that all members of the organization understand the results desired and measures planned for

achieving them.

- ☐ Provide visible top management involvement in implementing the program so that all employees understand that management's commitment is serious.
- ☐ Arrange for and encourage employee involvement in the structure and operation of the program and in decisions that affect their safety and health so that they will commit their insight and energy to achieving the safety and health program's goal and objectives.
- ☐ Assign and communicate responsibility for all aspects of the program so that managers, supervisors, and employees in all parts of the organization know what performance is expected of them.
- ☐ Provide adequate authority and resources to responsible parties so that assigned responsibilities can be met.
- ☐ Hold managers, supervisors, and employees accountable for meeting their responsibilities so that essential tasks will be performed.
- ☐ Review program operations at least annually to evaluate their success in meeting the goals and objectives so that deficiencies can be identified and the program and/or the objectives can be revised when they do not meet the goal of effective safety and health protection.

## 2. Worksite Analysis

A practical analysis of the work environment involves a variety of worksite examinations to identify existing hazards and conditions and operations in which changes might occur to create new hazards. Unawareness of a hazard stemming from failure to examine the worksite is a sign that safety and health policies and/or practices are ineffective.

Effective management actively analyzes the work and worksite to anticipate and prevent harmful occurrences. The following measures are recommended to identify all existing

and potential hazards:

Conduct comprehensive baseline worksite survey for safety and health and periodic comprehensive update surveys and involve employees in this effort.

- ☐ Analyze planned and new facilities, processes, materials, and equipment.
- ☐ Perform routine job hazards analyses.
- ☐ Assess risk factors of ergonomics applications to workers' tasks.
- ☐ Conduct regular site safety and health inspections so that new or previously missed hazards and failures in hazard controls are identified.
- ☐ Provide a reliable system for employees to notify management personnel about conditions that appear hazardous and to receive timely and appropriate responses and encourage employees to use the system without fear of reprisal.

This system utilizes employee insight and experience in safety and health protection and allows employee concerns to be addressed.

- ☐ Investigate accidents and " incidents so that their causes and means of prevention can be identified.
- ☐ Analyze injury and illness trends over time so that patterns with common causes can be identified and prevented.
- ☐ Use OSHA's Computer-Disk, Read-Only-Memory (CD-ROM) (2) to review case studies that might be pertinent to worksite analyses and hazard identification.

### 3. Hazard Prevention and Control

Where feasible, workplace hazards are prevented by effective design of the job site or job. Where it is not feasible to eliminate such hazards, they must be controlled to prevent unsafe and unhealthful exposure. Elimination or control must be accomplished in a timely manner once a hazard or potential hazard is recognized. Specifically, as part of the program, employers should establish procedures to correct or control present or potential hazards in a timely manner. These procedures should include measures such as the following:

- ☐ Use engineering techniques where feasible and appropriate.
- ☐ Establish, at the earliest time, safe work practices and procedures that are understood and followed by all affected parties. Understanding and compliance is a result of training, positive reinforcement, correction of unsafe performance? and if necessary, enforcement through a clearly communicated disciplinary system.
- ☐ Provide personal protective equipment when engineering controls are infeasible.
- ☐ Use administrative controls, such as reducing the duration of exposure.
- ☐ Maintain the facility and equipment to prevent equipment breakdowns.
- ☐ Plan and prepare for emergencies, and conduct training and emergency drills, as needed, to ensure that proper responses to emergencies will be "second nature" for all persons involved.
- ☐ Establish a medical program that includes first aid onsite as well as nearby physician and emergency medical care to reduce the risk of any injury or illness that occurs.

#### 4. Safety and Health Training

Training is an essential component of an effective safety and health program. Training helps identify the safety and health responsibilities of both management and employees at the site. Training is often most effective when incorporated into other education or performance requirements and job practices. The complexity of training depends on the size and complexity of the worksite as well as the characteristics of the hazards and potential hazards at the site.

##### Employee Training

Employee training programs should be designed to ensure that all employees understand and are aware of the hazards to which they may be exposed and the proper methods for avoiding such hazards.

##### Supervisory Training

Supervisors should be trained to understand the key role they play in job site safety and to enable them to carry out their safety and health responsibilities effectively. Training programs for supervisors should include the following topics:

- ☐ Analyze the work under their supervision to anticipate and identify potential hazards.
- ☐ Maintain physical protection in their work areas.
- ☐ Reinforce employee training on the nature of potential hazards in their work and on needed protective measures through continual performance feedback and, if necessary, through enforcement of safe work practices.
- ☐ Understand their safety and health responsibilities.

## FACTORS

### ☐ THE WORKPLACE

o the workplace is an environment in which most adults spend a substantial fraction of their time. It has the potential to have both positive and negative influences on their health and well-being – sometimes with lasting effects.

Factors influencing health include the following:

- ☐ Workplace factors affecting health
- ☐ Temperature and humidity.
  - ☐ Adequate (indoor) heating is important to provide thermal comfort in cold weather (normally to at least 16 °C if work is mainly sedentary, and to at least 13°C where physical effort required). Particular cold stresses may occur in certain occupations, e.g. food preparation, open air working;
  - ☐ Protection is also needed against heat stress from high ambient temperatures, high thermal radiation and/or high levels of humidity (laundries, foundries etc.).
- ☐ Ventilation.
- ☐ Adequate air movement and rate of air exchange is important to maintain air quality
- ☐ Ergonomics / physical arrangement of work area & equipment.
- ☐ These are factors that allow people to work comfortably and in safety. For example, for office workers, the height and

orientation of computer screens, chairs which provide postural support.

- ☐ Space, lighting and cleanliness of the work area.

- ☐ Safety factors

- ☐ MAINTENANCE/GOOD REPAIR.

- o Especially important for safety equipment and equipment which could create a risk if faulty

- o Routes for safe movement of people and vehicular traffic, including provision of unobstructed emergency exits

- ☐ PHYSICAL ASPECTS.

- o Doors, gates, windows should be suitably constructed and fitted with safety devices if necessary (e.g. to prevent risk of fall if above ground level, shatterproof glazing in doors etc.). Use of such measures as fencing, rails and covering of pits/tanks to prevent risk of falls from height.

- ☐ CONTROL OF HAZARDOUS AGENTS.

- o Welfare Facilities for the welfare of workers and visitors include:

- ☐ lavatories and washing facilities;

- ☐ provision of drinking water;

- ☐ facilities for rest and to eat meals.

- ☐ SPECIFIC HAZARDS

- o Many work environments contain sources of hazardous substances (chemicals, dust, fumes, biological agents), which may cause exposure by inhalation, dermal absorption, splashing into eyes, or ingestion. These are covered by specific legislation (see COSHH below).

- o One of the most common forms of workplace injury arises from slips and trips. Care to remove tripping hazards is especially important where there is public access. Falls from height, especially off ladders, is one of the major contributors to workplace deaths and serious injuries.

- o Musculoskeletal disorders relating to workplace activities are common, and include injuries from manual handling (heavy lifting etc. – a major cause of days off work) and repetitive strain injuries (RSI). Display screen equipment (e.g. computer) can give rise to musculoskeletal disorders, including RSI, and eye strain.

- o Asbestos is the largest single cause of work-related fatal disease and ill

health in Great Britain, though it is now mostly the result of past exposures.

o Powered hand tools etc. can cause 'vibration syndromes', and vibration from a machine or passing through the seat of a vehicle can cause or aggravate whole back pain. Noise can damage hearing, but it can also be a serious nuisance affecting concentration and physiological parameters.

o Most electricity deaths are caused by contact with overhead or underground power cables. Non-fatal shocks can cause severe and permanent injury.

o Pressure systems – systems containing a fluid under pressure (e.g. Pressure cookers, boilers, steam heating systems) – account for about 150 incidents / year in England, mainly due to equipment failure through poor design, incorrect operation or poor maintenance.

o Radiation risks are usually strictly controlled. Ionizing radiation risks may arise from exposure to x-rays or radionuclides e.g. medical imaging, as well as from radon gas from the ground. This also includes damage and cancer risk from UV radiation (e.g. from sun).

## ☐ STRESS

o Stress is an over-used and imprecisely defined term. However, it is clear what most people mean by it, and there is a large body of research that shows a link between markers of stress and subsequent ill health. The UK Health and Safety Executive defines stress as 'the adverse reaction people have to excessive pressure or other types of demand placed on them.' It can be tackled in similar way to any other form of workplace

hazard – by identifying contributing causes and attempting to reduce them. Factors that often appear important include:

- ☐ lack of control over the way work is done;
- ☐ work overload (or underload);
- ☐ lack of support from managers;
- ☐ conflicting or ambiguous roles;
- ☐ poor relationships with colleagues (including bullying);
- ☐ poor management of organizational change.

## INFORMATION

☐ Occupational health and safety (OSH) management can – and should – be viewed in monetary terms as part of a business system. When a company employs skilled health and safety personnel and calculates the potential loss of work hours caused by injury and illness into cost analyses, the true value of occupational health and safety in the workplace become startlingly clear. An



expert in OSH management should be able to build an economy of health and safety that is seamlessly integrated into the company culture.

o Create a safe work environment

□ In 1970, the U.S. government introduced the Occupational and Safety Health Act. Created to assure safe and healthful working conditions for working men and women, its authorized enforcement of standards developed under the act and provided for research, information, education, and training in the field of occupational safety and health, according to the Occupational and Safety Health Administration (OSHA) website.

□ Along with this law that primarily covers private sector companies in the U.S., Congress created OSHA within the U.S. Department of Labor. While each state has its own distinct safety and health standards and regulations, all workplaces are still covered by the OSH Act.

□ The Business Benefits page of the OSHA website lists these cost savings that can be achieved when an employer invests in changes to improve workplace health and safety:

□ Lower workers' compensation costs and medical expense

□ Avoidance of OSHA penalties

□ Reduced costs to train replacement employees

□ Reduced costs to conduct accident investigations

□ Significant improvements to the company's productivity and financial performance

□ A health and safety policy must be enforced in order to be successful, which is the job of the OSH expert. The policy and any updates also have to be communicated clearly to employees. Regular meetings are one way to offer a refresher of safety regulations and also allow employees to ask questions or voice concerns. Employers can order the official OSHA health and safety poster and place it in a common area where employees can have a permanent, visual reminder of the safety and health rules and regulations at their workplace.

□ Calculating the costs of health and safety

o Because of tight budgets, companies sometimes try to spend the minimum amount possible to comply with safety regulations. However, cutting costs by investing in lower quality work equipment, machinery, and tools can lead to a higher risk of financial loss resulting from a workplace injury or accident

o In his article "The Economics of Workplace Safety" for Occupational Health & Safety online, R. Todd Swinderman reports that "planning safety upgrades based upon price alone results in the lowest-quality equipment achieving the minimum compliance – often with no reasonable options to rectify the problems other than spending more on another solution – rather than focusing on long-term life cycle cost.

So, in reality, accidents caused by shortsighted and economically driven solutions harm people, degrade the environment, and reduce the company's bottom line."

- o This reasoning is exactly why OSH personnel should show management the hard numbers that reveal the potential financial impact of injured or sick employees on a company's bottom line.

- o OSHA offers a free interactive tool called "Safety Pays" that companies can use to calculate the average financial loss caused by injured or sick workers taking a leave of absence or working only part-time. A workplace safety expert can use this tool to provide management with estimates of both direct and indirect costs associated with an employee's injury or sickness.

- o Costs can vary widely depending on the employer, but OSHA's website lists some examples of the types of indirect costs that Safety Pays can help estimate:

- ☐ Any wages paid to injured workers for absences not covered by workers' compensation.

- ☐ The wage costs related to time lost through work stoppage associated with the worker's injury.

- ☐ The overtime costs necessitated by the injury.

- ☐ Administrative time spent by supervisors, safety personnel, and clerical workers after an injury.

- ☐ Training costs for a replacement worker.

- ☐ Lost productivity related to work rescheduling, new employee learning curves, and accommodation of injured employees.

- ☐ Clean-up, repair, and replacement costs of damaged material, machinery, and property. In addition to these indirect costs, OSHA lists several more that cannot be determined by the Safety Pays tool but should be seriously considered by the employer:

- ☐ The costs of OSHA fines and any associated legal action

- ☐ Third-party liability and legal costs

- ☐ Worker pain and suffering

- ☐ Loss of goodwill from bad publicity

A comprehensive health and safety plan are a smart financial move for any company. OSH experts, including graduates of a bachelor of science in occupational safety

program, can help management identify workplace hazards and put together an effective injury and illness prevention program.

## **CONFINED SPACES**

- Confined spaces are enclosures having limited means of entry and exit. They can be storage tanks, tank cars, pressure vessels, boilers, bins, silos, and similar enclosures that have access through a manhole or door.
- Open pits, vaults, and vessels with limited ventilation, as well as underground utility tunnels, storm sewers, pipelines, septic tanks, and similar containers are also confined spaces.

## **CONFINED SPACES HAZARDS**

- There are three main hazards of confined spaces.
  1. oxygen deficiency. Oxygen deficient atmospheres are those with less than 18% oxygen.
  2. flammable and combustible gases, vapors, or dusts. Sources of heat or spark may ignite these materials, and a fire or an explosion may result.
  3. Toxicity. The toxic materials may have direct effects, such as pulmonary paralysis from hydrogen sulfide. They can be asphyxiants, such as carbon monoxide, that interrupts oxygen transport or they can be irritants at very low concentration and lethal at higher levels.
- Another hazard of confined spaces is a pressurized atmosphere that can produce injury when opened.
- Confined spaces may contain moving parts that can cause injury if external controls are not locked out and tagged out.

## **CONTROL TO MINIMIZED SPACE HAZARDS**

- Before entry, one must evaluate a confined space for hazards.
- It should be depressurized, connections to potentially hazardous materials must be isolated and sealed, energy sources must be locked out and tagged out, stored energy must be released or controlled to prevent inadvertent release, and the atmosphere must be tested for oxygen content, toxic materials and flammable gases and vapors.
- Ventilation systems for confined spaces can achieve several purposes.
- They must provide adequate breathable air supplies unless workers wear self-contained breathing equipment.

- There should be at least two workers involved in confined space work, one of whom should be an observer.
- The observer is the prime rescue person and cannot enter the space without a replacement observer.
- If heated processes, such as open flames, welding, and cutting, are used in a confined space, precautions for fire protection and removal of smoke and fumes are necessary.

#### **Activity 4 (ASSIGNMENT)**

Directions: Identify the following. Write your answer on the SEPARATE PAPER determine the possible solutions.

1. "restricted area due to radiation hazards
2. Pieces of programming code that is usually disguised as something else that causes unexpected and undesirable behavior to the computer and is often attached to files.
3. People that attacks computers or networks in the computer laboratory in an attempt to intimidate or coerce a government in order to advance certain political or social objective.
4. What tool of measurement would you recommend for a survey on ergonomics in teleworking or computer works Justify your answer.
5. OSH in the industry in our present generation cause a major concern? Discuss briefly.

### **CHAPTER 5: HEALTH, SAFETY COMMITTEE AND ELECTRICAL SAFETY HAZARD**

#### **LEARNING OBJECTIVES**

- To understand the role of information plays of OSH identify occupational safety and health partnership
- To know the right compensation system and the policy changes
- To know the role of health and safety committees
- To know what is Electrical Hazard
- To know the Different kinds of Electrical Hazards
- To know how to control Electrical Hazard
- To know how to properly apply first aid to electrical accidents
- To know how to access the situation when an electrical incident happens

## **Health and Safety Committee**

The health and safety committee (HSC) are essentially a forum for opening communication between workers and upper management. It allows staff to address concerns related to work health and safety issues.

### **Role**

- Facilitating cooperation between the employees and the employer
- Allowing members to instigate, develop, and implement health and safety control measures
- Formulating, reviewing, and disseminating safety standards and procedures
- Following any additional functions agreed upon by the committee and the employer

### **Responsibilities**

- Provide a forum for committee members to discuss WHS issues
- Develop plans or procedures to resolve the identified issues
- Recommend corrective actions to reduce hazards
- Address any additional health and safety issues
- Evaluate reports submitted by the HSRs

### **To be expected from HSC Meetings**

- Time to attend the meetings and complete their functions as committee members
- Normal pay for the time spent at the meeting and completing HSC functions
- Access to requested information about risks and hazards at the workplace
- Reports related to worker safety to help address WHS concerns

### **Brief Explanation**

Health and Safety Committees are formed in a certain company/organization to not only have employees be aware and participate in making the work environment safe and secure, but to also act as a group that could hold and keep the safety of the working environment together. Meetings dedicated to talking about the safety of the work environment are important, it is usually held monthly depending on the company/organization. The meetings held by the committee discusses possible issues in the working environment, ways on preventing/reducing the chances of mishaps or accidents and addressing the safety of the employees in general. The committee is comprised of workers and employees with a high enough position to be able to make

important decisions for their workmates/respective subordinates. Workers are given the chance to address their concerns with the upper management, while the upper management ensures that solutions will be given to the problems raised by the workers to avoid work-related injuries. Overall, the committee raises awareness, and are essential in reducing the stress of workers in their respective working place, raising morals and possibly even raising work production because of employees confident enough that the place they're working in is safe and secure, though it is also important to keep in mind that accidents occur at unexpected times, Health and Safety committees can only reduce the chances of it happening, not fully stop it.

## **Workers Compensation**

Workers' compensation is a publicly sponsored system that pays monetary benefits to workers who become injured or disabled in the course of their employment. Workers' compensation is a type of insurance that offers employees compensation for injuries or disabilities sustained as a result of their employment.

### **Rights**

- Workers who are injured or become disabled as a result of their job should be compensated
- Accepting workers' compensation benefits means the employee waives the right to sue their employer.
- Compensation plans offer coverage of medical fees related to injuries incurred as a direct result of employment.
- Workers' comp is not the same as unemployment benefits or disability insurance

### **Coverage**

- Medical Treatments
- Vocational Rehabilitation
- Death and Funeral services

### **Considerations**

- Excludes the possibility of a tort of negligence being issued by employees (in most cases)
- No penalty for reporting a workplace injury to an employer, but this stipulation is impossible to regulate on an individual level
- Workers' compensation should not be confused with disability insurance or unemployment income; it only pays workers who are injured on the job

## **Brief Explanation**

Workers Compensation is an insurance policy for workers, it is like a safety net that somewhat catches the employee, ensuring the employee will be compensated in case of a work-related injury. Workers compensation is different from the benefits of being disabled given by the company/organization. The benefits of a workers' compensation however are surrounded by rules and exceptions, making sure that the company or organization has everything straight and figured-out before going through the process of helping/compensating the employee. It is important for employees to look and go through their employer's considerations/coverage of Workers Compensation, making sure that employee's will not be cheated out by the system because of loopholes, reading and making sure that everything is covered will make sure that employees would not have to go through extraneous legal battles against the company/organization (though employees can still sue their employers if they wanted to) if an unfortunate incident were to happen. It is also important for employees to cover themselves by making sure that proof will be available just in case, Employers will verify and check whether the injury sustained is work related; not saying that the employees might cheat themselves into getting the benefits but there is no denying that there have been plenty incidents that does, as well as employers not covering the employees because of insufficient proof when questioned. Employees should have the mindset of accepting that something might go wrong in their working environment and always be ready to prevent it from happening, but it is a little reassuring that if something were to happen, an insurance will be there to help the employees out.

## **BASIC ELECTRICAL SAFETY**

- The use of electricity as a source of power has become extremely commonplace.
- There are very few homes that do not have electrical service.

## **HEATING**

- The fact that a material creates a resistance to electron flow gives rise to another important phenomenon for safety engineering.
- The temperature of a conductor will rise as the current flow increases.
- The energy lost to resistance changes to heat energy, a process called Joule heating.
- The increase in temperature depends on the amount of heat produced during Joule heating and how well heat transfers to the surrounding environment through convection, conduction, and radiation.

## ARCING

- Arcing occurs when current flows through air between two conductors that are not in direct contact.
- Arcing produces light as electrons move across the gap between the conductors.

## ELECTRICAL HAZARDS

- Electricity and electrical equipment create or contribute to a number of hazards.
- The most common ones are electric shock, heat, fire, and explosion.
- Electricity may produce other hazards indirectly such as unintentionally turning on an equipment.
- There are many other kinds of indirect hazards that electrical and electronic equipment create or to which they contribute.
- For example, failure of electrical power can make building interiors dark and can make exiting dangerous or impossible.

There are many Electrical Hazards that may occur when working with electrical equipment's, and here are a few examples.

### 1. ELECTRIC SHOCK

- Electric shock refers to current passing over or through a human body or its members and to the injuries that result.
- For electric shock to occur, a person must become part of an electric circuit; that is, a person must become a conductor between two points that differ in electrical potential.

Effects of electricity on the human body.

EFFECT	MEN	WOMEN
Slight sensation on hand	0.4mA	0.3mA
Perception threshold	1.1mA	0.7mA
Shock: not painful, muscle control not lost	1.8mA	1.2mA
Shock: painful, muscle control not lost	9mA	6mA
Shock: painful, let-go threshold	16mA	10.5mA
Shock: painful and severe, muscle contractions, breathing difficult	23mA	15mA
Shock: possible ventricular fibrillation	100mA	100mA
Death possible	0.1 to 0.2A	0.1 to 0.2A
Severe burns, breathing stops, extra crispy	0.2A to 1A	0.2 to 1A



## **2. HEATING AND FIRE**

- One of the leading causes of fire is electricity and electrical equipment.
- Many fires are caused when more current flows through conductors than their designed capacity, causing excessive heating that can ignite surrounding materials.
- Poor connections are another cause.
- As the contact areas between conductors become smaller, the current increases at the connections.
- This may increase temperatures at connections enough to cause components to glow.

## **3. EXPLOSIONS**

- Arcing in the presence of an atmosphere containing combustible dust or flammable vapors may cause an explosion.
- Even low-energy discharges of static electricity can initiate major disasters.

## **CONTROL OF ELECTRICAL HAZARDS**

- There are a variety of controls that can reduce or eliminate electrical hazards.
- Groups of controls are physical controls, switching devices, grounding and bonding, ground fault circuit interrupters, and procedures.
- Electrical hazard controls also may eliminate or reduce other hazards.

### **❖ PHYSICAL CONTROLS**

- Physical controls refer to materials used, design of components, and placement of electrical equipment.
- Shielding, enclosing, and positioning of electrical devices can reduce contact with humans, other equipment, or hazardous materials and environment.

### **➤ WIRE SIZE AND LENGTH**

- The longer a wire of a given cross section or size, the greater the resistance.
- Also, the higher the resistance, the more the wire will heat when current flows.
- Each gauge and type of wire has a recommended maximum length to limit its temperature and safe use.

### **➤ LOCATION**

- When possible, electrical equipment should be placed where people and other equipment cannot come into contact with it.
- For example, poles keep power distribution lines out of people's reach and above most vehicles and equipment.

- Buried power lines reduce the likelihood of contact even further.
- When distribution lines pass through or are located in the “people” zone, shields, conduit, and barriers should protect them.

## ➤ **OVERCURRENT DEVICES**

- Overcurrent devices limit the current that can flow through a circuit or electrical device.
- If current exceeds a given limit, the device shuts off power.
- Fuses and circuit breakers are two common overcurrent devices.

### **1. FUSES**

- When placed in a circuit and current in the circuit exceeds some limiting value, the material in a fuse (usually lead or lead alloy) heats above its melting point and separates, thereby stopping the flow of current.

### **2. CIRCUIT BREAKERS**

- Circuit breakers are a form of switch that opens when current passing through them exceeds some designed limit.
- There are two kinds of breakers, each with a different principle of operation.
- One type opens when the temperature of the breaker reaches a predetermined level.
- The second type is magnetic, which opens when a predetermined current level is reached.

### **3. SWITCHING DEVICES**

- In addition to overcurrent devices, other switching devices can reduce or eliminate electrical hazards.
- They include lockouts, interlocks, and thermal or overspeed switches.

#### **A. LOCKOUTS**

- Some switching devices use lockout devices and procedure. A lockout procedure involves placing a lock on a switch or other device to prevent the switch or equipment from being turned on or energized.

#### **B. INTERLOCKS**

- An interlock is a switch intended to prevent access to an energized or dangerous location i.e. washing machine lids.
- Interlocks are often attached to access doors, panels, and gates.
- When a door opens or a panel is removed, power to equipment is shut off by the interlock switch.

➤ **GROUNDING AND BONDING**

- Grounding and bonding control the electrical potential between two bodies. If there is a difference in potential between two bodies, a conductor between them will allow charge or current to flow.
- That flow may be dangerous, particularly as a source of ignition.

○ **GROUNDING**

- Grounding removes charge from the bodies.
- Grounding may protect people from electric shock.
- Although energized parts could shock someone who contacts them.
- If a device has a three-prong plug and someone has cut off the ground tab, the device is not grounded.
- Capacitors, chokes, and transformers retain electrical charge after external power is cut off.
- This charge will dissipate slowly, and one cannot tell by inspection if charge remains.
- In such cases, a grounding or shorting stick or hook can be used to discharge the energy.
- Because the tools will not remove all the charge at once, the tool may have to be applied several times to remove the charge.

○ **BONDING**

- Bonding equalizes charge between the two bodies; it does not remove charge from them.
- Bonding often controls static charge buildup.
- Bonding is not a protection for electric shock, because a person can still become a conductor between a charged body and a ground.

○ **GFCI**

- Another means to protect people from electric shock is a GROUND FAULT CIRCUIT INTERRUPTER (GFCI).
- GFCI is a fast-acting circuit breaker that quickly senses very low current levels.
- Some GFCIs sense as little as 2mA and shut off current in as little as 0.02s.
- A GFCI compares current normally flowing through the power distribution wire and the grounded neutral wire of a circuit.
- The current flowing through one must pass through the other for the circuit to work.

- If current is not equal, some electrical energy is flowing to the ground through other than the normal route, perhaps through a person.
- When the current is not equal, the GFCI detects this current differential and shuts off the current.

## **FIRST AID**

- Anyone working with electrical circuits and equipment should know rescue methods and first aid for electrical accidents.
- Too often, attempts at rescue in electrical accidents result in a rescuer becoming part of the circuit and an additional victim.
- Because respiratory arrest and fibrillation are common effects, knowledge of cardiopulmonary resuscitation (CPR) is essential for those who work with electrical circuits and equipment.
- Without immediate treatment for these injuries, chances of survival are minimal.

## **SCENE OF AN EMERGENCY**

### **❖ RECOGNITION**

- The casualty's body may still be in spasm and unable to release whatever cause the electrocution.
- There may be burns to the body where the current has entered and exited.
- The casualty may be unconscious.

### **❖ TREATMENT**

- Don't touch the casualty because they may be "live".
- Disconnect casualty from power source, either at the means by pushing away whatever is conducting the current using an insulating material, for instance a wooden stick.
- Check casualty's response
- Open airway
- Prepare for resuscitation
- Call for help
- Further action: prepare to treat any burns sustained by the casualty.

### **❖ AIMS**

- Ensure the casualty can be rescued without danger to anyone else.
- Disconnect the casualty from electricity source.
- Treat any further problems, such as burns.

## **FIRST AID GUIDE FOR SHOCK**

### **❖ RECOGNITION**

- Pale face
- Cold, clammy skin
- Fast, shallow breathing
- Rapid, weak pulse
- Yawning
- Sighing
- In extreme cases, unconsciousness

### **❖ TREATMENT**

- Lay the casualty down, raise and support their legs.
- Use a coat or blanket to keep them warm, but not smothered.
- Do not give them anything to eat or drink.
- Check breathing and pulse frequently. If breathing stops, apply CPR.
- And give lots of comfort and reassurance

## **STATIC ELECTRICITY**

### **❖ PHYSICS**

- Electrical charge will build up when there is a motion or friction between two insulated or partially insulated objects.
- The motion does not require rubbing or sliding.
- The likelihood of charge being created is usually greater when the two interfacing materials are different.
- Many activities produce static electricity.
- A common experience is static buildup on one's body from walking on carpet when the air is dry.
- A small arc occurs when a charged person touches another person or something at a different electrical potential.

### **❖ HAZARDS**

- The main hazard of static electricity is creation of an arc and ignition of certain vapor or dust mixtures in air.

### **❖ CONTROLS**

- One control is minimizing the buildup of charge.
- Using material that do not generate or store as much charge as others can help.

- Bonding and grounding are the simplest ways to minimize charge buildup.
- In locations where static charge from clothing could be dangerous, workers wear conductive clothing, particularly shoes.
- Clothing made from fabric that resist charge buildup or is treated with antistatic chemicals can reduce risk.

### **Activity 5. TEST YOUR COMPREHENSION**

#### Enumeration

##### 1. Effects of Electricity in to the human body

_____	_____
_____	_____
_____	_____
_____	_____

##### 2. Over current devices

_____
_____
_____

##### 3. The role of Safety Committee

_____
_____
_____
_____

##### 4. First Aide Treatment in Electrical Shocks

_____
_____

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5 Workers Right. Explain your answer.

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## **CHAPTER 6: SAFETY and HEALTH OF COMPUTER INDUSTRY AND LASER HAZARDS**

### **LEARNING OBJECTIVES**

- **To know how to LASER control in the workplace**
- **To know the risk assessment of the Local rules**
- **To know the different laser classifications**
- **To why workers use protective equipment while working**
- **Describe the OSH issues of workers in the computer industry.**
- **To know the safety matters in computer industry**

### **Safety and Health in the Computer Industry.**

Health and Safety refers to programs, guidelines and procedures that protect the safety, welfare and health of any person engaged in work or employment. The goal of any health and safety program is to create the ultimate safe work environment and to reduce the risk of accidents, injuries and fatalities on the job. Health and Safety risks in the computer industry when working with computers is that they may experience Excessive fatigue, Strain on the eyes, Back and Neck ache and pain around the upper limbs. That is why employees who regularly use computers as part of their job are obliged to comply with the health and safety (Display Screen Equipment) regulations 1992, to protect employees from any associated risks.



## Safety and Health in the Computer Industry.

The computer is an essential instrument in various jobs and activities, for grown-ups and youngsters. In any case, long periods of using a computer can increase your chance of building up a physical issue. Wrong PC use can cause muscle and joint agony, overuse injuries of the shoulder, arm, wrist or hand, and eye fatigue. In the course of recent years, a large number of inquiries have emerged concerning the connections that may exist between the utilization of PCs and the wellbeing and security of the individuals who use them. Some health effects for example, joint torment and eyes strain following an all-inclusive period clustered composing at a screen and console are perceived as a fact by many. In any case, demonstrating with any level of surely the more drawn out term wellbeing effects of PC use stays risky. Not least this is on the grounds that broad PC use is as yet a moderately present-day wonder, with the limits among PCs and other electronic gadgets likewise proceeding to obscure.



Information technology (IT) is highly promoted as an instrument for advancing safety in medical services. Amusingly, little consideration has been paid to the issues of wellbeing in medical services IT. Computer scientists have broadly examined the issue of guaranteed execution in safety-critical computing systems. They have



developed an applied methodology and set of strategies for use in settings where wrong or deviant activity (or results from right activity that are atypical in setting) may jeopardize clients, people in general, or the climate. Notwithstanding, these techniques are not normally utilized in medical services IT, which for the most part has been created without explicit thought of the exceptional elements and special prerequisites for safe tasks.

## **Temperature and Humidity**

Adequate (indoor) heating is important to provide thermal comfort in cold weather (normally to at least 16 °C if work is mainly sedentary, and to at least 13°C where physical effort required). Particular cold stresses may occur in certain occupations, e.g. food preparation, open air working.

## **Ventilation**

Adequate air movement and rate of air exchange is important to maintain air quality.

## **Ergonomics / Physical arrangement of work area and equipment**

These are factors that allow people to work comfortably and in safety. For example, for office workers, the height and orientation of computer screens, chairs which provide postural support.

- Space, lighting and cleanliness of the work area.
  - Safe Electrical Layout for office workstations.
  - Maintenance/Good repair. Especially important for safety equipment and an equipment which could create a risk if faulty.
- 
- Safety and health programs are recommended for all workplaces—from office buildings and construction jobsites to dairy farms and other industrial settings. These workplace safety programs protect your employees and empower them to confidently complete tasks without fear of injury or death.



Besides the most devastating (and incalculable) cost of a human life, OSHA states that businesses spend nearly \$170 billion per year on costs associated with workplace injuries and illnesses. But companies that develop effective safety and health programs can cut those costs by anywhere from 20 to 40 percent. Combine that decrease in costs with the less quantifiable benefits of higher morale, better productivity, and improved reputation, and the benefits of implementing a company safety program become even more compelling.

## **SAFETY CULTURE:**

Creating a culture of safety can be difficult, but there are five key elements that must be present for a safety and health program to get off the ground.

- **EMPLOYEE TRAINING AND EMPOWERMENT**

Before you can expect employees to follow best practices, you must educate them and empower them to hold each other accountable. Dedicate a day to safety training when you share safety tips and plan activities that keep your employees interested. There are plenty of online safety training ideas and resources to help get you started.

As far as accountability goes, consider implementing a policy such as stop-work authority, which gives any employee (regardless of job title) the ability to stop a task if it becomes risky. Putting safety in the hands of every worker can help you foster accountability at all levels of your organization.

- **HAZARD IDENTIFICATION AND CONTROL SYSTEMS**

Once your employees are trained, a safety management process must be put in place for them to easily identify hazards and take steps to contain them. For example, if workers will use an aerial lift on a job site, hazards like power lines and uneven ground should be identified and addressed before any work is done. It's true that not all hazards



- **FOCUS ON COMPLIANCE**

Organizations like the Occupational Safety & Health Administration (OSHA) and the American National Standards Institute (ANSI) were created to keep workers safe and promote jobsite safety. They outline best practices for all types of jobs and, in the case of OSHA, each best practice is actually a law.

Complying with OSHA's regulations is the best way to ensure you're doing everything you can to keep your workers safe. They even provide compliance resources organized by industry as well as email newsletters and a searchable database by safety topic.

- **CONTINUOUS IMPROVEMENT**

Safety and health programs don't fall into the "set it and forget it" category. Not only are new regulations being released all the time, but new employees will join your team. Thus, it's important to adopt a continuous improvement mindset when it comes to safety.

Hold frequent safety meetings, retrain more tenured employees as you train new hires, and consider doing a full safety and health program audit each year. Also, encourage employees to share their concerns with you. These concerns can most likely be turned into safety topics that will resonate with your entire team.

- **LEADERSHIP AND ORGANIZATIONAL BUY-IN**

For a safety and health program to be effective, there must be institutional buy-in from the top down. Workers will be faced with situations every day that force them to decide between a safe course of action and an unsafe one. Good safety leaders motivate workers to make the right decision even when no one is watching.



Like all forms of leadership, becoming a good safety leader starts with honest, consistent communication. Set high but attainable standards for your team. Offer an incentive for following your organization's safety management system. And, if an incident that requires disciplinary action occurs, always communicate the “why” along with the “what” when addressing it.

### • **THE SAFETY MANAGER ROLE**

Though safety leadership roles may be taken on by various workers, a safety manager is typically the official face of safety within an organization. Safety managers try to minimize workplace injuries and illnesses by training workers, staying up-to-date on current safety news, writing policies, and ensuring compliance.

- What is a safety manager's job role?
- The responsibilities of a safety manager vary by industry, but generally they are responsible for:
  - Identifying and monitoring health and safety hazards within the workplace
  - Training employees to minimize and/or avoid any risks associated with their jobs
  - Reviewing health and safety legislation to ensure compliance with the most recent standards
  - Performing safety inspections of the workplace environment
  - Writing workplace-specific safety policies and best practices
  - Coordinating emergency drills and procedures
- Accidents can happen any time anywhere, some can cause injuries or worse death. With proper health and safety precautions we can prevent this from happening at our workplace. Therefore, by following the right health and safety precautions it protects the wellbeing of the employers and the employees. Workplaces that neglects health and safety risk prosecution, may lose staff, and may increase cost and reduce profitability. Also having a workplace with a psychologically safe and healthy workplace is one that promotes worker's mental wellbeing and does not harm employee mental health through negligent, reckless or intentional ways. A psychologically safe workplace would

be free of excessive fear or chronic anxiety. Lastly always follow this protocols or guidelines so we can have a safe, health and peaceful workplace.

## LASER CLASSIFICATIONS

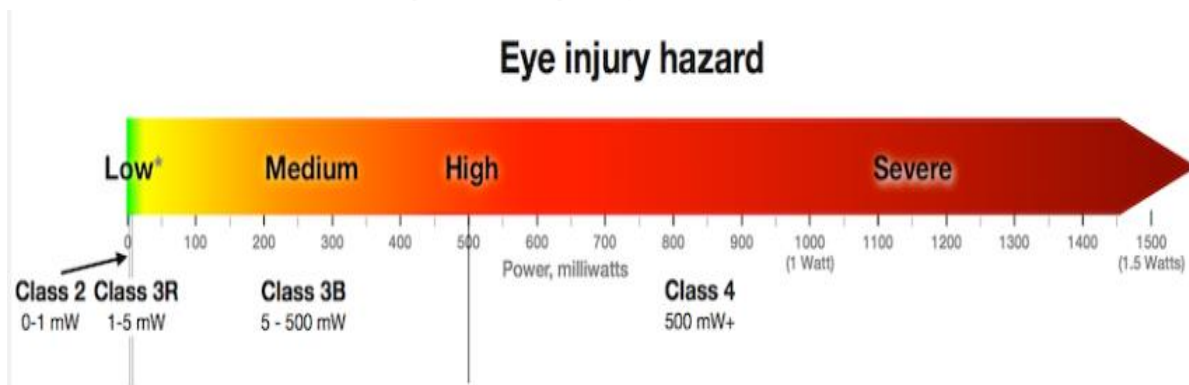
Lasers are classified for safety purposes solely based on their potential for causing injury to humans' eyes and skin.

Most laser products are required by law to have a label listing the Class. It will be listed either in Arabic Numerals (1 2, 3R, 3B, 4) or in Roman Numerals (I, II, IIIa, IIIb, IV).

There are 4 main classes:

- Class 2
- Class 3R
- Class 3B
- Class 4

The first 2 Classes are relatively safe for eye exposure, the last two hazardous.



The table at the previous slide tell how eye injury hazard descriptions are valid for exposures relatively close to the laser. Because the beam spreads, less light will enter the pupil at greater distances. The hazard decreases the farther a person is from the laser, and the shorter the exposure time. For example, a 1mW Class 2 laser beam is eye safe for unintentional exposures after about 2ft, a 5mW/ Class 3R laser beam is eye safe after about 52ft, a 500mW Class 3B beam is eye safe after about 520ft, and a 1500mW Class 4 beam is eye safe after about 900ft.

## CLASS 2 (II) LASER SAFETY INFORMATION

Class 2 lasers are considered safe for normal operation. Class 2 lasers' output power is below 1 milliwatt. All Class 2 lasers emit visible light only.

In Australia, the U.K., and many other countries, only Class 2 lasers can be sold as "pointers" or for pointing purposes.

A Class 2 laser is relatively weak. It normally would not harm an eye unless a person deliberately stared into the beam. Laser protective eyewear is normally not necessary. A Class 2 laser is not a skin or materials burn hazard.

However, even a Class 2 laser can be a distraction, glare or flash-blindness hazard for pilots and drivers. NEVER aim any laser towards an aircraft or vehicle that is in motion. This is unsafe and is illegal -- you could be arrested and jailed.

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However, even a Class 2 laser can be a distraction, glare or flash-blindness hazard for pilots and drivers. NEVER aim any laser towards an aircraft or vehicle that is in motion. This is unsafe and is illegal -- you could be arrested and jailed.

## CLASS 3R (IIIA) LASER SAFETY INFORMATION

Class 3R lasers are considered safe when handled carefully. There is only a small hazard potential for accidental exposure. For visible-light lasers, Class 3R lasers' output power is between 1 and 4.99 milliwatts.

In the United States, both Class 2 and 3R lasers can be sold as "pointers" or for pointing purposes. (In Australia, the U.K., and many other countries, laser pointers are restricted to Class 2 only.)

A Class 3R laser is low powered. It normally would not harm eyes during a momentary exposure of less than ¼ second. This is within the aversion response, where a person turns away and/or blinks to avoid bright light.

Do not deliberately look or stare into the laser beam. Laser protective eyewear is normally not necessary. A Class 3R laser is not a skin or materials burn hazard.

However, a Class 3R laser can be a distraction, glare or flash blindness hazard for pilots and drivers. NEVER aim any laser towards an aircraft or vehicle that is in motion. This is unsafe and is illegal -- you could be arrested and jailed.

### CLASS 3B (IIIB) LASER SAFETY INFORMATION

Class 3B lasers are hazardous for eye exposure. They can heat skin and materials but are not considered a burn hazard. For visible-light lasers, Class 3B lasers' output power is between 5 and 499 milliwatts.

Class 3B is the same as the Roman numeral "Class IIIB" you may see on some lasers' labels. At this website, we primarily use the Arabic numerals, for convenience.

Class 3B visible-beam lasers are medium powered, from 5 to 499 milliwatts. A Class 3B laser can cause eye injury. The more powerful the laser, the greater the chance of injury.

Use of laser protective eyewear is suggested or recommended (depending on the laser's power level), as discussed elsewhere on this page.

A Class 3B laser can be a distraction, glare or flash blindness hazard for pilots and drivers. NEVER aim any laser towards an aircraft or vehicle that is in motion. This is unsafe and is illegal -- you could be arrested and jailed.

Always be aware of the beam location. Keep it away from people's eyes and heads. Watch out for reflected beams from glass and shiny surfaces. When outdoors, you must avoid aiming at or near aircraft.

### CLASS 4 (IV) LASER SAFETY INFORMATION

- Class 4 lasers are hazardous for eye exposure. They also can burn skin and materials, especially dark and/or lightweight materials at close range. They should be used with extreme care.

For visible-light lasers, Class 4 lasers' have an output power 500 milliwatts and above. There is no upper limit for Class 4 -- this is the most hazardous laser classification.

Class 4 is the same as the Roman numeral "Class IV" you may see on some lasers' labels. At this website, we primarily use the Arabic numerals, for convenience.

- Class 4 visible-beam lasers are high-powered. A Class 4 laser can cause a significant eye injury if the beam, whether direct or reflected, enters the eye.

Even staring at the diffuse reflection of a laser "dot" on a wall or other surface, may cause an eye injury within a few feet of the dot. Do not stare at the laser "dot" when it is close to you.

To prevent eye exposure, always be aware of the beam location. Keep it away from people's eyes and heads. Watch out for reflected beams from glass and shiny surfaces.

Use of laser protective eyewear is recommended

Since infrared (IR) and ultraviolet (UV) wavelengths are normally invisible, particular care must be taken when using these types of lasers. In addition to the recommended control measures that apply for each laser classification, the following should also be employed:

### **Infrared**

1. The collimated beam from a Class 3 laser should be terminated by a highly absorbent backstop wherever practicable. Many surfaces which appear dull visually can act as reflectors of IR.
2. The beam from a Class 4 laser should be terminated in a fire-resistant material wherever practicable. Periodic inspection of the absorbent material is required since many materials degrade with use.
3. Areas that are exposed to reflections from Class 3 or 4 lasers, at levels above the MPE, should be protected by appropriately screening the beam or target area with IR absorbent material. This material should be fire-resistant for use with Class 4 lasers.

### **UV**

1. Exposure to UV should be minimized by using shield material which attenuates the radiation to levels below the appropriate MPE for the specific wavelength.
2. Special attention should be given to the possibility of producing undesirable reactions in the presence of UV, for example, ozone formation.



## **ENGINEERING CONTROL**

- Area entryway controls must be in place in order to minimize potential for injury. The proper warning signs shall be posted.
- Fire safety equipment shall be readily available.
- Ensure operation of local and area ventilation systems where applicable.
- The laser should be used such that the beam path is above or below normal eye level (below 4.5 ft. or above 6.5 ft.) if possible
- The potential for specular reflections should be minimized by removal of all unnecessary reflective surfaces.
- Windows to hallways or other outside areas must be provided with adequate barriers or covers when necessary to keep the Nominal Hazard Zone (NHZ) within the room.
- The active laser never should be left unattended.
- Warning devices must be installed for lasers with invisible beams to warn of operation.
- The use of non-flammable materials and non-flammable anesthesia is vital.
- The beam should never be activated unless directed toward target tissue.
- A fire extinguisher or pan of water must be within close proximity to the laser procedure room. Please note that water should never be used on or near an electrical device.

## **SAFETY PRACTICES**

- Perform a laser system safety check prior to each case.
- Utilize a laser operator in addition to the physician using the laser.
- Avoid looking into the primary beam at all times.
- Do not aim the laser with the eye; direct reflections could cause retinal damage.
- Avoid looking into the primary beam at all times.
- Do not aim the laser with the eye; direct reflections could cause retinal damage.
- Clear all personnel from the anticipated path of the beam.
- Before operating the laser, warn all personnel of the potential hazard, and ensure all safety measures are satisfied
- Be very cautious around lasers that operate at wavelengths not visible to the human eye.
- Use proper eye protection when working.

### **ACTIVITY 6: DESIGN SIMULATION (use short bond paper)**

1. What are the indicators that should be taken into account in assessing the effective management of Health and Safety at Work?
2. Which aspects of an occupational health and safety management course are the best to cover through online approaches?
3. Think 1 existing laser design concept. Explain the hazards and risk of that particular design.

## **CHAPTER 7: GLOBALIZATION and TRIPARTITE SOLUTIONS**

### **LEARNING OBJECTIVES**

- To identify the roles of government, employers, and unions in occupational health
- To analyze the global efforts to improve safety and health.
- To identify the global perspective of occupational safety and health.

### **An Official Definition of Globalization by the World Health Organization (WHO)**

According to WHO, globalization can be defined as.” the increased interconnectedness and interdependence of peoples and countries. It is generally understood to include two inter-related elements: the opening of international borders to increasingly fast flows of goods, services, finance, people and ideas; and the changes in institutions and policies at national and international levels that facilitate or promote such flows.”

The ability of countries to rise above narrow self-interest has brought unprecedented economic wealth and plenty of applicable scientific progress. However, for different reasons, not everyone has been benefiting the same from globalization and technological change: wealth is unfairly distributed and economic growth came at huge environmental costs. How can countries rise above narrow self-interest and act together or designing fairer societies and a healthier planet? How do we make globalization more just?

According to Christine Lagarde, former President of the International Monetary Fund, “*debates about trade and access to foreign goods are as old as society itself*” and history tells us that closing borders or protectionism policies are not the way to go, as many countries doing it have failed.

Lagarde defends we should pursue globalization policies that extend the benefits of openness and integration while alleviating their side effects. How to make globalization more just is a very complex question that involves redesigning economic systems. But how? That's the question.

Globalization is deeply connected with economic systems and markets, which, on their turn, impact and are impacted by social issues, cultural factors that are hard to overcome, regional specificities, timings of action and collaborative networks. All of this requires, on one hand, global consensus and cooperation, and on the other, country-specific solutions, apart from a good definition of the adjective "just".

### **Types of Globalization**

Because of trade developments and financial exchanges, we often think of globalization as an economic and financial phenomenon. Nonetheless, it includes a much wider field than just flowing of goods, services or capital. Often referred to as the *globalization concept map*, some examples of globalization are:

- **Economic globalization:** is the development of trade systems within transnational actors such as corporations or NGOs;
- **Financial globalization:** can be linked with the rise of a global financial system with international financial exchanges and monetary exchanges. Stock markets, for instance, are a great example of the financially connected global world since when one stock market has a decline, it affects other markets negatively as well as the economy as a whole.
- **Cultural globalization:** refers to the interpenetration of cultures which, as a consequence, means nations adopt principles, beliefs, and costumes of other nations, losing their unique culture to a unique, globalized supra-culture;
- **Political globalization:** the development and growing influence of international organizations such as the UN or WHO means governmental action takes place at an international level. There are other bodies operating a global level such as NGOs like *Doctors without borders* or *Oxfam*;
- **Sociological globalization:** information moves almost in real-time, together with the interconnection and interdependence of events and their consequences. People move all the time too, mixing and integrating different societies;

- **Technological globalization:** the phenomenon by which millions of people are interconnected thanks to the power of the digital world via platforms such as Facebook, Instagram, Skype or YouTube.
- **Geographic globalization:** is the new organization and hierarchy of different regions of the world that is constantly changing. Moreover, with transportation and flying made so easy and affordable, apart from a few countries with demanding visas, it is possible to travel the world without barely any restrictions;
- **Ecological globalization:** accounts for the idea of considering planet Earth as a single global entity – a common good all societies should protect since the weather affects everyone and we are all protected by the same atmosphere. To this regard, it is often said that the **poorest countries that have been polluting the least will suffer the most from climate change.**

## Why Is Globalization Bad? The Negative Effects of Globalization

Globalization is a complex phenomenon. As such, it has a considerable influence on several areas of contemporary societies. Let's take a look at some of the main negative effect's globalization has had so far.

### The Negative Effects of Globalization on Cultural Loss

- Apart from all the benefits globalization has had on allowing cultural exchanges it also homogenized the world's cultures. That's why specific cultural characteristics from some countries are disappearing. From **languages** to traditions or even specific industries. That's why according to **UNESCO**, the mix between the benefits of globalization and the protection of local culture's uniqueness requires a careful approach.

### The Economic Negative Effects of Globalization

- Despite its benefits, the economic growth driven by globalization has not been done without awakening criticism. The consequences of globalization are far from homogeneous: income inequalities, disproportional wealth and trades that benefit parties differently. In the end, one of the criticisms is that some actors (countries, companies, individuals) benefit more from the phenomena of globalization, while others are sometimes perceived as the "losers" of globalization. As a matter of fact, a **recent report from Oxfam** says that 82% of the world's generated wealth goes to 1% of the population.

## **The Negative Effects of Globalization on the Environment**

- Many critics have also pointed out that globalization has negative effects on the environment. Thus, the massive development of transport that has been the basis of globalization is also responsible for serious environmental problems such as greenhouse gas emissions, global warming or air pollution. At the same time, global economic growth and industrial productivity are both the driving force and the major consequences of globalization. They also have big environmental consequences as they contribute to the depletion of natural resources, deforestation and the destruction of ecosystems and loss of biodiversity. The worldwide distribution of goods is also creating a big garbage problem, especially on what concerns plastic pollution.

## **TRIPARTITE**

A tripartite agreement is a legal agreement or contract between three individuals or parties. These agreements can be a useful tool when setting up a tripartite employment relationship to grow your international workforce.

### **What is a tripartite agreement?**

Consider a regular contract or agreement: One person agrees with someone else, to do something in return for an item of value (called 'consideration', in contract law). One of the most common forms of agreement is an employment agreement or contract. But sometimes, you may need to arrange an agreement between three different people or 'parties. This is where a tripartite – literally 'tri party' – agreement, can prove useful.

An example of a tripartite agreement is 'novation'. In novation, rights and obligations under the original contract are transferred from the original party, to a new third party. All parties must consent to novation.

### **When should you consider a tripartite agreement?**

**Intra-group transfers** - It is common for large companies to have branches in different countries which are set up as separate legal entities (e.g., subsidiaries). What if an employee seeks to transfer from country A to country B, within the same multi-national? This sometimes occurs as part of a permanent switch; at other times, it is a temporary 'secondment'. The original employer in country A, the new employer in country B, and the employee him or herself, can all commit to a tripartite agreement to determine how the new employment relationship would work. Note, a tripartite agreement may not be the most appropriate legal option for all intra-group transfers; There can be major benefits to outsourcing a particular service or function, such as payroll: especially when outsourcing a function globally. In these cases, a tripartite agreement can be useful for setting out the rights and obligations of each party.

### **What are the risks of not having a tripartite agreement?**

It is possible to carry out an intra-group transfer, or to outsource, without a tripartite agreement. There can be some risks involved in this option, however. Two examples of how this could go wrong include:

Confusion over employer role. In most countries, employers have an extensive range of obligations, such as providing annual leave, providing a safe and healthy workplace, and paying minimum wage. If there is no tripartite agreement in place, it can become unclear who has employer obligations. In a 2014 New Zealand Employment Court case, Judge Inglis faced a situation where “difficulties are compounded having regard to the tripartite relationship at issue here”. In that case, the employee was employed as a prison literacy tutor by the company ‘WDL’. The employee had an agreement with WDL. And WDL, in turn, had an agreement with the Department of Corrections (the agency that actually runs the prisons). But there was no agreement between the three distinct parties. The employee was terminated as a result of a Department of Corrections investigation. This raised the question, was this a fair dismissal given that the employer didn’t themselves investigate? A tri-partite agreement would have clarified the obligations of each party.

Severance obligations. In some countries, outsourcing a function from one company to another (from a ‘customer’, to a ‘service provider’), can mean incurring severance obligations for employees in the customer’s company. This can sometimes be avoided by a tripartite agreement that transfers the employee to the service provider (with that employee’s consent’). For an in-depth analysis of how this operates in different countries, see the 2018 Global Outsourcing Employment Handbook.

### **What should you include in a workforce tripartite agreement?**

Usually, in a workforce tripartite agreement, all parties agree that the original employment relationship (with company x) will be switched to a new employer (company y). At the same time, the original employment contract is terminated, without severance or other benefits that usually accrue on termination.

- When framing a tripartite agreement, important matters to consider include:
- The continuation of ‘length of service’, where this is relevant for employee benefits;
- A continuation of other key terms in the original contract, with the new employer;
- Any terms in the original contract which specify how consent to transferring rights, or obligations under the contract, is to be obtained;
- A formal release from liability for both parties with respect to the original agreement that has now been terminated;
- An indemnification clause to ensure that each party will pay damages to the other, if any arise due to an alleged breach of the original contract.

When operating across international borders, a tripartite agreement should also identify which laws are to govern the contract. An English case, Chunilal v Merrill Lynch [2010]

EWHC 1467 (Comm), concerned the intra-group transfer of a Merrill Lynch employee. The employee alleged that, under English law, an implied term of his contract had been breached through a 'perverse' reduction of his bonus payment. As the tripartite agreement did not specify which country's laws applied (not to mention the fact that the employee agreed to the contract in New York, and actually worked and lived in Hong Kong), his case failed.

### Conclusion

Tripartite - If you are thinking about expanding your global workforce, you must ensure that you pick the right legal and compliance structures to suit your business. In some cases, it may make sense to incorporate a company in a foreign country. In other cases, it makes sense to hire a Professional Employer Organization (PEO). When outsourcing, seconding or, transferring employees overseas, it is worth considering whether a tripartite agreement needs to be part of your business solution.

Globalization – on the other hand, globalization is also needed for transitioning to a more sustainable world, since only a global synergy would really be able to allow a real ecological transition. Globalization means the speedup of movements and exchanges (of human beings, goods, and services, capital, technologies or cultural practices) all over the planet. One of the effects of globalization is that it promotes and increases interactions between different regions and populations around the globe.

### **ACTIVITY 7: POWER POINT PRESENTATION**

1. Make your power point presentation on the following topics. Choose only 1 question for the presentation.
  - 1.1 Industry-based social dialogue and tripartism for better policy making
  - 1.2 World Health and safety statistics are important? Why?
  - 1.3 Accident at work employer responsibility Is an employer responsible for an employee's injury?

## CHAPTER 8: CHEMICAL and FIRE SAFETY HAZARDS

### LEARNING OBJECTIVES

- To know how to control Chemicals in the workplace
- To know the different procedures on how to control chemicals
- To know how to transfer and handle chemical materials
- To why workers use protective equipment while working
- To know the fire safety in buildings
- To know what is MEANS of EGRESS
- To know the different types of fires

### CONTROLS

- There are three classes for protecting people from exposure to hazardous materials in the workplace:

1. engineering controls
2. work practice and administrative controls
3. personal protective equipment

#### 1. ENGINEERING CONTROLS

- Engineering controls include process changes and substituting of nonhazardous substances, enclosing a source, isolation of worker, and the use of ventilation.

##### ❖ SUBSTITUTION

- By replacing a hazardous material with a nonhazardous one, the danger of exposure to a hazardous material can be eliminated.

##### ❖ ISOLATION

- Isolation uses a barrier between a source of contaminants and workers.

▪

##### ❖ VENTILATION

- Ventilation is useful for airborne contaminants.
- There are two types of ventilation for controlling hazardous substances: one is general ventilation or dilution ventilation, and the second is local exhaust ventilation.



- In **general ventilation**, one moves fresh outside air into the general work space to dilute or displace contaminants.
- The goal is to keep concentration at or below allowable levels.
- **Local exhaust** systems capture contaminants at or near their source, before hazardous substances reach the breathing zone of people, and moves the air to locations where people will not be present.

## MATERIALS HANDLING OR TRANSFER PROCEDURE

- Loading and unloading of materials can cause materials to become airborne, thereby exposing workers to hazardous levels of the materials.
- Example, transferring liquid into an empty tank truck or car will displace residual or evolving vapors from the container.
- Pouring or dumping dusts or dusty materials into open containers or on piles may generate a great amount of airborne dust.
- These transfer operations may require closed transfer systems or exhaust systems to prevent exposures of workers or others.



## PERSONAL PROTECTIVE EQUIPMENT

- Use of personal protective equipment may be necessary when adequate engineering controls, work practices, or administrative reforms cannot be achieved.
- Maintenance workers and those involved in spill cleanup activities usually need personal protective equipment.



## **FIRE SAFETY IN BUILDINGS**

### **❖ FUNDAMENTALS**

- The main objectives for fire safety in buildings are:
  1. Getting occupants out safely
  2. Minimizing property loss for structures and contents
  3. Minimizing interruption of operations.
- Often the goal is to confine a fire to the site of origin, then to the building of origin.
- Through proper design of facilities, one can confine most fires to the floor and even the room of origin.

### **SITE PLANNING AND ACCESSIBILITY**

- Fire departments and equipment should have access to all sides of a building.
- Access roads should be adequate even during peak traffic loads.
- Landscaping, external structures, and vehicle parking should not create barriers to access.
- Water supplies, hydrants, and valves should be located conveniently to support fire-fighting strategies.
- Adequate pressure and quantities of water must be available.

### **❖ SEPARATION OF STRUCTURES**

- Buildings should have sufficient separation to minimize fire traveling from one building to another.
- Distance between buildings is one way to provide separation.
- Shielding by fire walls is another way.

### **❖ CONFINEMENT**

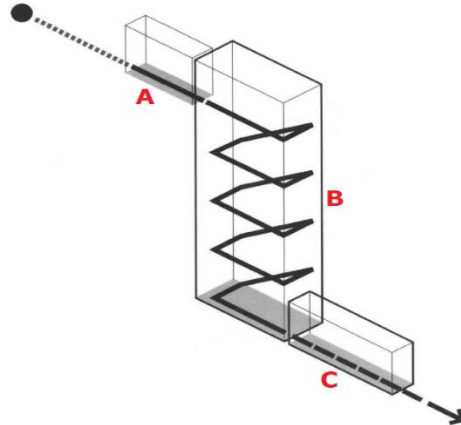
- A major objective in building design is limiting a fire to the area of origin.
- Confining a fire to a small area is best.
- Some call this strategy compartmentation.
- A building and each portion of it are designed to restrict horizontal and vertical movement of fire, smoke, and heat.

## **MEANS OF EGRESS**

- Many factors affect the ability to egress and the time required to do so.
- A means of egress is a continuous and unobstructed way of travel from any point in a building or structure to a public way (street, alley, or other similar parcel of land open to the outside air).
-

- There are three parts to the means of egress:

- 
- 
- Exit access (A)
- Exit (B)
- Exit discharge (C)



- **Exit access** is a path leading to an exit.
- An **exit** is bounded by one or more entrances to it and one or more doors to leave it at ground level.
- An **exit discharge** is the last segment of a means of egress between the protected exit and the land outside.

## TYPES OF FIRES

### ❖ CLASSES OF FIRES

#### ➤ Class A:

1. Ordinary combustibles such as:
2. Paper
3. Wood
4. Cloth
5. Rubber and
6. Many plastic

#### ➤ Class B

Flammable liquids such as:

1. Oils
2. Gasoline
3. Grease
4. Solvents
5. Lacquers
6. And some paints

#### ➤ Class C

- Energized electrical equipment
  - Electrical sources which are still supplied with power

#### ➤ Class K

Cooking oils such as:

1. Vegetable oil
2. Animal oils
3. Fats

## **FIRE EXTINGUISHERS**

### ❖ **MULTIPURPOSE FIRE EXTINGUISHER**

- Multipurpose (ABC) dry chemical extinguishers contain an ammonium phosphate base which can be used on all types of fires and is the least expensive of the extinguisher agents.



### ❖ **WET CHEMICAL (K)**

- The class K extinguisher is the ideal choice for use on cooking appliances including deep fat fryers and solid fuel cooking appliances.
- They contain low PH potassium acetate base.
- The extinguishing agent discharges as a fine mist which helps prevent grease splash and fire reflash while cooling the appliance.

### ❖ **CLEAN AGENTS**

- Clean agents fire extinguishers do not leave a residue and are rated ABC or BC depending on size.
- Halon 1211 is a clean agent that is commonly found around computer systems and electronic equipment.

### ❖ **CARBON DIOXIDE (CO<sub>2</sub>)**

- CO<sub>2</sub> extinguishers may be used on most mechanical and electrical fires.
- Because they are less effective on ordinary combustible (class A) fires, CO<sub>2</sub> fire extinguishers are usually only rated BC depending on the size of the extinguisher.

### ❖ **PRESSURIZED WATER**

- Pressurized water extinguishers are designed for use on ordinary combustible (class A) fires only.

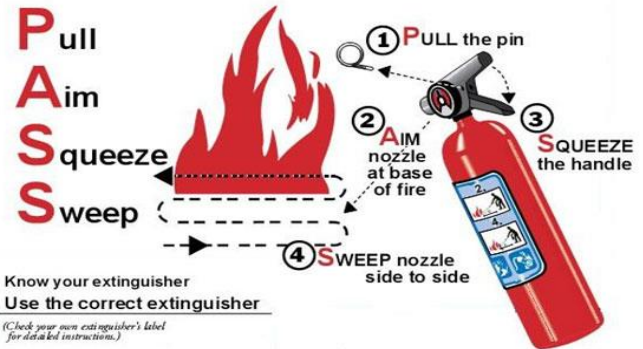
- Use of water on fires involving flammable liquids and energized electrical equipment can be very dangerous.

## FIRE EXTINGUISHER OPERATION

### ❖ P.A.S.S.

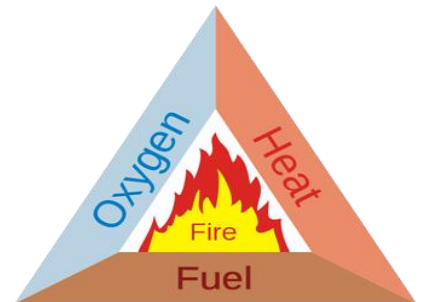
- Pull the pin
- Aim the extinguisher
- Squeeze the handle
- Sweep from side to side

To operate an extinguisher:



## THE FIRE TRIANGLE

- In order to understand how fire extinguishers work, you first need to know a little bit about fire.
- Four things must be present at the same time in order to produce fire:
  1. Oxygen, enough oxygen to sustain combustion.
  2. Heat, enough heat to raise the material to its ignition temperature.
  3. 3. fuel, some sort of fuel or combustible material and
  4. 4. The chemical, exothermic reaction that is fire.
- 5. Take a look at the following diagram
- 6. m, called the “fire triangle”
- The important thing to remember is: take any of these four things away, and you will not have a fire or the fire will be extinguished.
- Essentially, fire extinguishers put out fire by taking away one or more elements of the fire triangle/tetrahedron.
- Fire safety, at its most basic, is based upon principle of keeping fuel sources and ignition sources separate.



## Activity 8.

Directions: Answer the following questions with True or False before the number.

\_\_\_\_\_ 1. Smoke can hurt you but it can't kill you.

\_\_\_\_\_ 2. Exposure to mixed substances always has combined effects.

- \_\_\_\_\_3. It can take only 3 minutes to go from a tiny flame to a raging fire.
- \_\_\_\_\_4. Fire develops from a mix of three components, heat, smoke and oxygen.
- \_\_\_\_\_5. An invention must pass three tests before being patented.
- \_\_\_\_\_6. Combustible gases or liquids are class A fuels.
- \_\_\_\_\_7. When using a fire extinguisher, you should aim the spray at the shooting flame.
- \_\_\_\_\_8. You should always check closed doors for heat before opening them.
- \_\_\_\_\_9. Switching off the computers and printer at the end of every workday can prevent any overheating of equipment which then causes fire hazards
- \_\_\_\_\_10. In general if a fire gets out of control, we should try to put it out with fire extinguishers before calling in the firemen.

## **CHAPTER 9: OCCUPATIONAL SAFETY AND HEALTH AND THE ENVIRONMENT**

### **LEARNING OBJECTIVES**

- **To identify occupational safety and health partnership and critique the effectiveness.**
- **To know the global environmental issues and solutions.**
- **To know the e-waste environmental concerns**

Environmental health is concerned with all aspects of the natural and built environments that affect the health of individuals and the population in general. Occupational health specifically deals with workplace health and safety. It has a strong focus on the primary prevention of hazards that can cause injuries and disease at the workplace.

Occupational health and safety are the field of public health that studies trends in illnesses and injuries in the worker population and proposes and implements strategies and regulations to prevent them. Its scope is broad, encompassing a wide variety of disciplines—from toxicology and epidemiology to ergonomics and violence prevention.

Dedicated to studying and preventing workplace injuries and illnesses, the field of occupational health and safety is responsible for the overwhelmingly positive outcomes achieved for American workers over the past 200 years.

## PURPOSE OF HEALTH SAFETY AND ENVIRONMENT

- **Environment:** This refers to the world around you and concerns preventing things like chemical spills and air pollution.
- **Health:** This usually refers to things that can make people ill, like pathogens, radiation, and exposure to noise or bad smells.
- **Safety:** The safety aspect of EHS is focused on preventing workplace accidents and injuries.

## THE ENVIRONMENTAL FACTORS THAT AFFECT HEALTH

### • CHEMICAL SAFETY

1. *Flame retardants:* There are hundreds of chemicals used in consumer products from electronics to furniture that help prevent the spread of fires.
2. *Lead:* Old paint, contaminated soil and water, pottery and even house dust are a few ways people are exposed to this metal.
3. *Per fluorinated chemicals:* These compounds help reduce friction and also are used to make products resistant to stains, water and grease.
4. *Pesticides:* These chemicals kill, repel or control pests from weeds and fungus to insects.

### • AIR POLLUTION

1. *Air pollution:* From car exhaust to wildfire and e-cigarette smoke to ozone, pollution is a mix of natural and manmade substances found both indoors and outdoors.
2. *Smoke:* A single cigarette is chock full of hundreds of chemicals including arsenic, formaldehyde and lead.

### • CLIMATE CHANGE AND NATURAL DISASTERS

Climate change increases the frequency of natural disasters, often having a ravenous effect on homes and communities and sometimes resulting in loss of life. Wildfires, hurricanes, cyclones, and droughts are just a few examples.

### • DISEASES CAUSED BY MICROBES

Nanomaterials: Engineered nanomaterials are a concern because particles are tiny and used in many consumer materials, structures and devices.

### • LACK OF ACCESS TO HEALTH CARE

Individuals who don't have access to health care services (including pharmaceuticals as well as dental care) are at a higher risk for chronic conditions, which may include asthma, cancer, diabetes, or heart disease.

- **INFRASTRUCTURE ISSUES**

Infrastructure issues can also have a major impact on community health. Examples include the following:

1. Poorly maintained roads (increasing risk of car accidents)
2. Lack of access to clean drinking water
3. Lack of local health care infrastructure, such as clinics capable of giving vaccinations

- **POOR WATER QUALITY**

A number of factors can contribute to poor water quality, including industrial waste and pollution, lack of access to proper water treatment and sanitation services, and outdated plumbing infrastructure.

- **GLOBAL ENVIRONMENTAL ISSUES**

Along with the issues mentioned here, these can include soil pollution, ultraviolet radiation, and biodiversity loss

## **WHO MANAGES EHS?**

EHS manager is there to identify, reduce, and control risks and hazards. Some of the tasks they may be responsible for include:

- Performing job hazard analysis
- Leading the safety and health management program
- Assisting in running safety committees
- Performing incident investigations
- Tracking environmental, health, and safety training
- Enforcing EHS regulatory compliance
- Gathering and analyzing EHS lagging and leading indicators
- Improving operational and human performance
- Organizing safety committees

## **EHS MANAGEMENT SYSTEM BENEFITS**

- **Streamlined Data Collection:** Using a customizable platform allows for greater flexibility in data collection that matches your exact processes and business needs. Securely store all incident details and supporting documents you need in one central place to ensure you're in compliance and ready for any device.
- **Data-Logging on the Go:** Many people are using mobile applications to improve their EHS management process because collecting data while on the move is convenient and accurate, and this information can sync directly to the database whenever you're online. Increase safety and compliance by recording all incident information, including photos and documents, in one secure location, from anywhere and on any device.



- **More Consistency:** Centralized information leads to better data-collection consistency and better-quality data. This enables you to make smarter decisions by gaining full transparency across sites, incident types, root cause, and more.
- **Improved Reporting Efficiency:** Organize and streamline reporting by making it easier to track information in an integrated system. Using a flexible platform will help your company track and keep up with changing reporting standards and regulations.
- **Better Compliance with Regulations:** EHS software makes it easier to collect data to meet OSHA standards and regulations.

## 5 FACTORS THAT CAUSE HEALTH AND SAFETY HAZARDS

- **People** - People's actions, whether they display them or not, have a significant impact on workplace health and safety.
- **Equipment** - Equipment include tools and machines that people work with. Further, equipment includes those to which people are near. Equipment can include fixed machines, vehicles, material handling devices, hand tools, protective equipment, and personal gear.
- **Material** - Material include raw material, products, hazardous chemicals, and other substances that workers use, process, or handle. Therefore, it is important to be aware about the damage material can cause to the property. These damages could be owing to spills, corruptions, burns, or explosions.
- **Environment** - Environment refers to all parts of a workplace. Moreover, there are six aspects of a workplace that can be a potential hazard. The condition of all surfaces on which people walk or where company places its things is important.
- **Process** - Process considers how things are done at the workplace as a whole. Therefore, it connects the previous contributors – people, equipment, material, environment. Moreover, process covers the hazards that may be prevalent a
- process between these factors occurs.
- **Electronic system Waste product**
- Globally, e-waste constitutes more than 5 percent of all municipal solid waste and is increasing with the rise of sales of electronic products in developing countries. The majority of the world 's e-waste is recycled in developing countries, where informal and hazardous setups for the extraction and sale of metals are common. Recycling companies in developed countries face strict environmental regulatory regimes and an increasing cost of waste disposal and thus may find exportation to small traders in developing countries more profitable than recycling in their own countries. There is also significant illegal transboundary movement of e-waste in the form of donations and charity from rich industrialized nations to developing countries. E-waste profiteers can harvest substantial profits owing to lax environmental laws, corrupt officials, and poorly

paid workers, and there is an urgent need to develop policies and strategies to dispose of and recycle e-waste safely in order to achieve a sustainable future.

- **Impacts on Human Health**

- The complex composition and improper handling of e-waste adversely affect human health. A growing body of epidemiological and clinical evidence has led to increased concern about the potential threat of e-waste to human health, especially in developing countries such as India and China. The primitive methods used by unregulated backyard operators to reclaim, reprocess, and recycle e-waste materials expose the workers to a number of toxic substances. Processes such as dismantling components, wet chemical processing, and incineration are used and result in direct exposure and inhalation of harmful chemicals. Safety equipment such as gloves, face masks, and ventilation fans are virtually unknown, and workers often have little idea of what they are handling.
- For instance, in terms of health hazards, open burning of printed wiring boards increases the concentration of dioxins in the surrounding areas. These toxins cause an increased risk of cancer if inhaled by workers and residents. Toxic metals and poison can also enter the bloodstream during the manual extraction and collection of tiny quantities of precious metals, and workers are continuously exposed to poisonous chemicals and fumes of highly concentrated acids. Recovering resalable copper by burning insulated wires causes neurological disorders, and acute exposure to cadmium, found in semiconductors and chip resistors, can damage the kidneys and liver and cause bone loss. Long-term exposure to lead on printed circuit boards and computer and television screens can damage the central and peripheral nervous system and kidneys, and children are more susceptible to these harmful effects.

- **Environmental Impacts**

- Although electronics constitute an indispensable part of everyday life, their hazardous effects on the environment cannot be overlooked or underestimated. The interface between electrical and electronic equipment and the environment takes place during the manufacturing, reprocessing, and disposal of these products. The emission of fumes, gases, and particulate matter into the air, the discharge of liquid waste into water and drainage systems, and the disposal of hazardous wastes contribute to environmental degradation. In addition to tighter regulation of e-waste recycling and disposal, there is a need for policies that extend the responsibility of all stakeholders, particularly the producer.

## EXPLANATION

Affecting our safety, health and environment would create a huge impact to our society, development and economy. As these are essentials to the development, there are factors that can affect the occupational safety, health, and environment, we should always look for. Every possible hazard can become disastrous— and this is solely the purpose of safety precautions for the health and the environment. Comprehending and planning the safety is needed is a smart move to identify and prevent any hazards and mitigate any disasters.

### ACTIVITY 9: RESEARCH WORK

Provide 1 comparative OSH study maximum of 5 pages reaction paper only.  
Select 1 topic.

1. Indoor Air and Outdoor Air Quality.
2. Protective Apparel and PPE
3. Airborne Diseases and Direct Contact Diseases.
4. N95 respirators and surgical mask effectiveness

## CHAPTER 10: JOB SAFETY AND COMPLIANCE

### LEARNING OBJECTIVE

**This chapter tells us how to become safe when we are off the job and socializing with new people in any way.**

### FACTS ABOUT OFF-THE-JOB SAFETY

- The off-the-job safety statistics are staggering.
- Employees are safer at their jobs than when they leave work.
- Nine out of 10 deaths and two-thirds of disabling injuries suffered by workers in 2004 occurred off the job.
- So why should employers care about off-the-job safety?
- **It's the right thing to do:** while companies have a legal responsibility to prevent occupational injuries and deaths, they have amoral responsibility to try to prevent injuries away from the job.
- **It creates good will and good publicity:** a company that cares for its employees after they leave work is showing a commitment to the community – which reflects well on the company
- **It offers a recruiting edge:** off-the-job safety is an additional benefit that can be used to attract and retain employees.

- **It saves money:** operating costs and production schedules are affected as much when employees are injured away from work as when they are injured on the job.

## **SAFETY TIPS**

### **❖ RESIDENCE HALL SAFETY TIPS**

- Never leave a door propped open.
- Always lock your door when you leave your room or go to sleep.
- Identify visitors through the use of the door viewer (peephole) before you let them in.
- Demand that uninvited/unwelcome guests leave your room. If they do not leave, then you must leave quickly and notify the authorities.
- If you do receive a telephone call from someone you do not know, never give out any pertinent information (room number, telephone number, last name, etc.) about yourself or someone you know.
- Report to the authorities any suspicious activity by calling.
- Report to the authorities any emergency by calling.

### **❖ VEHICLE SAFETY TIP**

- Always lock your vehicle.
- Do not leave valuables in your vehicle.
- Park in well-lit areas.

### **❖ PERSONAL SAFETY TIPS**

- Travel on streets where there is pedestrian traffic.
- If possible, use the buddy system – do not walk alone – especially at night.
- Be aware and alert to your surroundings
- Do not leave valuables unattended in the library, cafeteria, classrooms, etc.

### **❖ SOCIAL SITUATIONS**

- Before going on a date, know your date's name, address, and friends.
- Meet new friends in public places.
- Do not rely on someone you just met for your ride home.
- If you begin to feel uncomfortable on a date, for any reason, remove yourself from the situation.
- Speak up! Communicate your wishes clearly. Do not let anyone assume your intentions.
- Assert yourself. Insist on being treated with respect.

- If you are assaulted, find a safe place and a friend – and call (anytime) the authorities.

### ❖ **SEXUAL ASSAULT AWARENESS**

- There is no perfect way to protect yourself, but there are simple things you can do to minimize your risk.
- Do not let alcohol or drugs fog your judgment.
- Be alert. Show that you are in control. Walk with confidence.
- Be aware of your surroundings.

### ❖ **NAVIGATING THE BAR SCENE**

- BEFORE YOU GO OUT TO A BAR OR CLUB, READ THIS!
- Know where you are going and what to expect when you get there.
- Know how to get there and more importantly, how you will get home safely at 2 or 3am.
- Go out with friends you can trust. If something goes wrong, they will be there to assist you.
- Let a friend or roommate who is not going with you know where you are going and when you expect to return. Call that someone if you are going to be late so that he/she will not worry about you.
- Know what you will do in case of emergency.
- Keep your valuables such as money, ID, and keys with you at all times. Do not leave them in a jacket unattended. A small purse will allow you to keep your stuff with you even on the dance floor. Another option is to keep money, keys, and ID in a front pants pocket.
- Make sure you have enough money for cab fare to get you home safely at the end of the evening.
- Do not accept drinks from strangers. If you do, realize that there may be consequences, such as that someone may expect something from you in return.
- Do not leave your drink unattended. If you do, do not drink it. Order a fresh one.
- When you drink alcoholic beverages, you increase your chances of becoming a victim of a crime because your communication skills and decision-making skills are impaired.
- If someone is bothering you or harassing you after you express no interest, tell a bouncer or a friend. Be forceful and assertive – do not get talked into doing something you do not want to do.
- Be careful when leaving the bar. If you are harassed or followed, call the authorities.

### ❖ **INTERNET SAFETY**

- **DO NOT BELIEVE EVERYTHING YOU READ WHEN CHATTING ONLINE.** People may misrepresent themselves.
- **DO NOT GIVE OUT PERSONAL INFORMATION ONLINE TO STRANGERS.** Avoid giving out your home telephone number, address, or credit card numbers.
- **DO NOT RUSH.** Meeting someone online and then arranging a date right away can be dangerous. Give it time. If you are being rushed be suspicious.
- **TALK ON THE TELEPHONE BEFORE YOU MEET.** Play it safe. You make the telephone call.
- Do not go to the dark web! You're not missing anything.

## **SAFETY AS A VALUE**

### **❖ DIFFERENCE BETWEEN SAFETY AND COMPLIANCE**

1. **SAFETY** – the condition or state of being safe; freedom from danger or hazard; exemption from hurt, injury, or loss.
2. **COMPLIANCE** – acting according to certain accepted standards; to conform, submit, or adapt as required or requested; conformity in fulfilling official requirements.

## **POINTERS**

### **• QUESTION:**

1. Just because you are in compliance, does this mean you are being safe?
2. If you are being safe, will you be in compliance?

### **• ANSWERS:**

1. A compliant person follows the law without fail.
  2. A safe person understands the intent of the law and surpasses it when the law is failed.
- Can you think of any regulation where there is conflict with respect to safety versus compliance?

## **ACTIVITY 10: SELF EVALUATION (Use Short Bond Paper)**

1. As you walk into work in the morning, you hear a few co-workers chatting about how things seem more dangerous at work lately, and that as far as they're concerned it's the employer's fault. The internal responsibility system is a part of health and safety law. Does it

say that everyone at your workplace shares responsibility for keeping each other healthy and safe? If your answer is yes supporting your answer and if No support your answer too.

2. Develop a questionnaire at least five questions (answerable only by yes or no) pertaining to healthy and safe of the employee especially in times of pandemic. Then discuss the importance of the five questions

## **CHAPTER 11: WORK TRANSFORMATION AND THE PSYCHOSOCIAL OSH**

### **LEARNING OBJECTIVE**

- **To know about the occupational safety and health**
- **To know the different Types of Emergencies**
- **To know what to prioritize in case of emergencies**
- **To know how to prevent losses in emergencies**

**WORK TRANSFORMATION** or workplace transformation is the rethinking of flexible workspaces to accommodate different kinds of work, workers, and technology.

The trick to having a work transformation strategy that really makes a difference is to ensure it is one that can be executed successfully. Too often, great efforts are put into creating a strategy only to have it to be a communication piece that circulates, stirs up a bit of discussion, and then gets lost in the demands of the day. A strategy that is executable needs to use a holistic approach that goes beyond just getting the strategy documented; the approaches, tools and resources must also be aligned to execute on each factor of the strategy. A holistic, executable transformation strategy entails five critical elements:

- **BUSINESS ALIGNMENT**
  - Vision and performance philosophy, strategic value, and structure for success.
- **PEOPLE AND TEAMS**
  - Performance experience, capabilities matrix, and enablement journey
- **TECHNOLOGY AND SYSTEMS**
  - Technology ecosystems, integrated user experienced, and systems integration.
- **POLICIES AND PROCEDURES**

- Constraints and enablers, systems structure, and measurement and analytics
- **CULTURE AND ENVIRONMENT**
  - Leadership and change management, stakeholder support and enablement, and governance and sustainability

### **Evolving Workplace Strategies:**

- **Today's work is more complex**
  - The work we need to accomplish today is characteristically unstructured, complex, and highly collaborative. Because of this, we need flexible workspaces that support us in both focusing without distraction and collaborating in creative teams. We also need to hire a different kind of worker – individuals who are creative problem solvers.
- **Generations of Workers are Shifting**
  - A significant chunk of our most experienced and skilled workers is heading to retirement, creating a potential talent shortage. Organization must appeal to younger generations seeking work/life balance, seamless technology, and inspiring workspaces.
- **Technology Continues to Shape How We Work**
  - Today's powerful mobile devices, ubiquitous internet access, and cloud-based applications make working anywhere, anytime possible. Millennials expect to bring their devices to work and have them function with company infrastructure. Evolving workplace strategies include BYOD (Bring Your Own Device) to offer employees choice and control.
  - In order to be competitive in a global economy, attract and retain the best talent, and continue to innovate, the workplace must adapt. The level of workplace transformation can be dramatic or subtle, depending on your existing workplace culture. Any steps a company makes towards creating flexible workspaces will create real bottom-line results.

### **PSYCHOSOCIAL ISSUES**

Psychosocial disorder is a mental illness caused or affected by life-experience, as well as ill-adjusted cognitive and behavioral processes.

#### **Current Issues**

Major psychosocial issues included family issues, depression, anxiety, substance abuse, sexual abuse and violence. Women were more likely to have suffered violence, while many of the men had issues with their own aggression against others.



- **Excessive workloads**
  - All common workload issues include anxiety, depression and mental stress. Heart disease, hypertension, joint pain, weight loss and tiredness are more likely to develop in employees who work long hours. Their mood and behavior are also affected by a heavy workload, causing poor mental focus, reduced motivation and difficulty concentrating on the tasks at hand.
- **Conflicting demands and lack of role clarity**
  - When opposing groups each make claims that are not in agreement with each other.
- **Lack of involvement in making decisions that affect the worker and lack of influence over the way the job is done**
- **Poorly managed organizational change, job insecurity**
- **Ineffective communication, lack of support from management or colleagues**
- **Psychological and sexual harassment, third party violence**

- **FACTORS**

- The psychological and social factors in the job he/she does may have a positive or negative effect on any employee. Employment satisfaction relies on the desires of the employee and on the chances to satisfy them in the job environment. These requirements can be linked to salary, career growth opportunities, leadership, working partnerships with others and the degree of the right of the employee to control the labor union.
- Factors that positively influence it are: the employee's opportunities to influence the work process, the professional development opportunities, the sense of safety related to keeping the job and the safety artwork in general, as well as the good relationships with colleagues and with the company's management. Examples of factors that negatively influence the employee are: fear and threats regarding a possible dismissal, salary cuts, very limited room for maneuver, fewer opportunities for employees to influence their own work environment, poor relationships with colleagues and with the company's management, a less stimulating or boring labor content and insufficient social support
- **Positive Factors**
  - The opportunities of the employee to influence the work process

- The opportunities for professional development
- the sense of safety related to keeping the job and safety at work in general
- Good relationships with colleagues and with the management of the company

- **Negative Factors**

- Fear and threats of possible dismissal
- Wage cuts
- Very limited room for maneuvering
- Less opportunities for employees to influence their own work environment
- Poor relationships with colleagues and with the management of the company
- Less stimulating or boring work content and inadequate social support

Work transformation is an important factor to be taken into consideration in providing a safe workplace. Changes in work can be accounted to different reasons such as technological advancement, company growth, unexpected disasters etc. This can never be more relevant today as most places shift to work from home set up due to the ongoing pandemic. We need to be able to adapt to these unexpected changes with the use of a reliable back up plan. Having an adaptable mindset can assure the safety of the work to be done.

Workplace safety not only includes physical and chemical hazards but also the well-being of the workers thus the importance of psychosocial issues. Stress is the common word that used to describe the feeling that is often used but this could mean different things. These include factors such as excessive workloads, poorly managed workplace, lack of support from colleagues, harassment, discrimination etc. These things might not be an illness but this are things that lead to mental and physical sickness. Having a hazard and regulation in place would keep this event to a minimum.

## **ACTIVITY 11: Assignment**

Table presentation or Matrix Form/SWOT ANALYSIS

Provide 1 table output that answer the needs of the information. Support your own data.

Work Transformation in terms of (Strength, Weaknesses, Opportunities and Threats).

## **CHAPTER 12: PLANNING FOR EMERGENCY RESPONSE**

### **LEARNING OBJECTIVES**

- To know how to plan for emergencies
- To know the step by step plan for emergencies
- To know how to execute plan for emergencies
- To know how to respond to emergencies
- To know the plan to respond to emergencies
- To know how to maintain the plan to respond to emergencies

### **PLANNING**

- A key to emergency preparedness is planning.
- Planning should include actions, participants, authority and agreements, communication, data and information resources, supplies and equipment, locations for actions teams, and training procedures.

### **ACTIONS**

- The first component of an emergency plan is what actions should be taken.
- The actions can be general or very specific.
- For example, an evacuation of a plant can begin with an automatic or manual alert.

### **PARTICIPANTS**

- For each action, there should be people to perform them.
- The person or group responsible for an action must be assigned to the action.
- Examples are plant fire brigade, first aid team, an emergency response committee, or all department heads.

### **AUTHORITY**

- Participants must have authority when an emergency occurs.
- If they have authority for assigned actions during normal conditions, there is no need for additional authority.

## **COMMUNICATION**

- Communication is one of the most critical components in an emergency because information flow is essential.
- The status of conditions must be current because decisions must be made quickly and accurately.
- The more information available and the more accurate it is, the better the decisions are likely to be made.

## **DATA AND INFORMATION RESOURCES**

- During an emergency, there is a need for key information.
- Not only is the status of the current situation essential, but so is data about the site, utilities, evacuation routes, road conditions, materials and equipment involved, people injured, location of resources, and other elements.

## **SUPPLIES AND EQUIPMENT**

- Emergency supplies and equipment must be available when an emergency occurs.
- Is it usually too late to obtain the correct items after an emergency exists?
- Emergency plans need to identify what supplies and equipment are needed, in what quantities, and at what locations.
- Supplies could include medical and first aid supplies, neutralizing agents for spills, and sand for sandbags.
- Equipment could include rescue equipment, fire extinguishing equipment, traffic control devices, and barricades.
- Supplies and equipment may also include food, drink, and cooking equipment, tables and chairs, and cots for workers to rest or to temporarily house stranded people.

## **LOCATIONS AND FACILITIES**

- There should be locations for emergency teams to prepare for work or from which communications teams operate.
- Designed locations in existing areas may serve nicely and easily may be converted to alternate uses.
- In some cases, there should be mobile facilities.

## **MEDICAL SERVICES**

- Any emergency planning must consider the potential for injuries to people.
- Medical staff, first aid staff and evacuation teams, rescue equipment, and vehicles should be part of any emergency plan.
- Hospital emergency rooms, operating rooms, or decontamination facilities may be necessary.

## **TRAINING**

- Emergency plans need to include training requirements for participants.
- Planners should identify clearly the knowledge, skills, and abilities for each “player”.

## **TRAINING AND EXECUTION**

- A key to making any emergency plan work is training.
- To attempt execution of a plan without training will probably result in failure, at least in part.
- Each plan may be different, and individuals and teams need training for their role in each plan.

## **EMERGENCY RESPONSE PLAN**

- This section summarizes many of the components of an emergency response procedure.
- It is based on the guidance of the Federal Management Agency (**FEMA**).

## **STEP 1: TYPE OF PLAN**

- A plan may extend from a simple procedure about who to call and when to a very detailed activities for various kinds of emergencies and the responsibilities required of many different organizations and companies.

## **STEP 2: ORGANIZING THE PARTICIPANTS**

- Participants may involve fire and police departments.
- Medical organizations, companies transporting or using hazardous materials, emergency organizations, and local and state government bodies, as well as companies or organizations with special equipment and materials or specialization in cleanup and disposal services.

## **STEP 3: CONDUCTING A HAZARD ANALYSIS**

- The key step in the process is defining the problems for which emergency responses may be needed.
- For emergency response plans, the problem definition results from a hazard analysis, identifying hazardous materials that could affect the community.

## **STEP 4: WRITING THE PLAN**

- The plan should include procedures and assign responsibilities for responding to each type of emergency.
- Completing the plan is not an easy job.
- Writers should refer to other plans, and the interfaces to other plans in the community or in the surrounding area should be clearly identified.

## **STEP 5: MAINTAINING THE PLAN**

- The plan should be tested through training and evaluation of incidents.
- There should be a periodic review process to ensure that data and procedures are up to date.
- Even simple things must be checked periodically such as phone numbers if they are still active.

## **ACTIVITY 12: DISASTER PLANNED (COMMUNITY -BASED)**

Make a plan table for disaster management stages;

- Prevention
- Preparedness
- Response
- Recovery
- Lesson modified

Determine the stakeholders

- Civil society
- Private sector
- Government sector
- Scientist/Experts

## **CHAPTER 13: ACCIDENT ESCALATION, INCIDENT INVESTIGATION REPORTING AND CAUSAL ANALYSIS; RECOGNITION OF ROOT CAUSE**

### **LEARNING OBJECTIVES**

- To know the plan for incident investigation
- To know the plan for incident reporting
- To know the phases of incident investigation
- To know the composition of the investigation committee
- To know how to Analyze the Cause of Accident
- To know the different techniques on cause analysis
- 

### **INCIDENT INVESTIGATION AND REPORTING**

- This plan should address how a facility will investigate and report all incident ranging from near-misses to catastrophic events.
- One way of doing this is to list and define the types of incident that could occur.
- A typical listing of the types of incidents that could occur at a facility are as follows:
  1. Near-miss

2. Process deviation
3. Non-recordable accident
4. Lost-time accident
5. Fatality or multiple hospitalization accident
6. Chemical release above reportable quantity
7. Chemical release below reportable quantity

## **INITIAL INVESTIGATION (PHASE 1)**

- Investigation should begin almost immediately with the occurrence of an incident.
- Phase 1 is that portion of the investigation that begins within a few minutes after the incident begins to approximately one hour later or until the end of the incident.
- The main goal of initial investigation (Phase 1) is to assist emergency response efforts by quickly determining key facts about the incident and reporting to the appropriate agencies.
- The initial information collected in Phase 1 should focus on gathering the following information:
  - Date and time the incident started
  - If chemical released, approximate amount released and to which medium the release occurred (water, air, or ground)
  - The extent of personnel injuries – particularly of hospitalizations (if any)
  - Determine if there are any confirmed fatalities

## **INITIAL INVESTIGATION (PHASE 2)**

- As soon as the scene of an incident is safe to approach and all emergency operations completed, phase 2 of the initial investigation should be done.
- The purpose of this phase of the investigation is to obtain “evaporative” information that may not be available later.
- The clues to the causes of many incidents can “disappear”.
- The phase 2 initial investigation team should consist of multiple onsite personnel and be pre-specified in the plan.
- The scene should be isolated to prevent unnecessary persons from entering the area.
- This could be done with yellow ribbon.
- If it can be done safely, photographs of the incident scene should be made.



- Focus on those items that are likely to be gone or changed when the process is restarted.
- Make notes of any other pertinent observation.
- It may be a good idea to collect sample for immediate or later testing.
- During this phase on the investigation, the first interviews of witnesses should be done.
- Focus on collecting facts and observations concerning the incident.

## **MAIN INVESTIGATION AND CAUSE ANALYSIS**

- Starting typically the next working day after an incident, the main investigation should begin.
- The goal of the main investigation is to establish the information needed to make the first written report within the next five to ten days.

## **COMPOSITION OF MAIN INVESTIGATION COMMITTEE**

- The main investigation committee is generally composed of local personnel.
- Whereas the post-incident investigation was composed of the personnel onsite when the incident occurred, the main investigation committee should be composed of different members (if possible) to avoid bias.
- Avoid selecting those persons that may not be able to investigate the incident objectively.
- Exclude the designers of the process, those involved in marketing or selling the products from the process, and all supervision, including management, of the operators of the process.
- The scribe will be responsible for documenting the committee's work which will be used later for the basis of the written investigation report.

## **TIMELINE**

- The timeline is basically a list of the events making up the incident listed in chronological order.
- The precise times and dates of these events should be indicated if known.
- Information gathered from the post-incident investigation will be used to establish the timeline.

## **CAUSE ANALYSIS TECHNIQUES**

- The purpose of this phase is to identify the causes of the incident.

- Some of the more popular cause analysis methods are:

1. Change analysis
2. Job hazards analysis
3. Process hazards analysis
4. Cause diagrams

#### ❖ **CHANGE ANALYSIS**

- This method is based on the theory that causes can be directly correlated to “changes” or “deviations”.
- A search of all possible changes that may be related to the incident is done.
- Afterwards, these changes are further analyzed to determine which ones are relevant to the incident.

#### ❖ **JOB HAZARD ANALYSIS**

- This technique is more associated with worker’s tasks in the preparation of operating procedures.
- The basic technique is to break the job down into its separate task and analyze each task for hazards.
- Because of its emphasis on the operator, this technique works best when the operator is directly involved in the incident.
- It may not be suitable for automated complex processes or where the operator is remotely involved.

#### ❖ **PROCESS HAZARDS ANALYSIS**

- This technique is similar to the JHA but is more appropriate for process incidents.
- Also, like the JHA, it is prevention technique that can be applied to incident investigation.
- Using a PHA method as a tool for incident investigation will work best if a PHA has already been done for the process involved in the incident.

### **PROCESS HAZARDS ANALYSIS WHAT-IF/CHECKLIST**

- This method involves asking a series of “what-if” questions concerning the process.
- The questions are meant to focus the committee/team on analyzing a particular aspect of the process.
- If the question leads to a possible hazard, then a search is done for existing “controls” that eliminate or minimize the hazard.

- After listing the control, a decision is made to determine if the existing controls are adequate.

### **PROCESS HAZARDS ANALYSIS HAZARD AND OPERABILITY STUDY**

- This method is similar to “what-if/checklist” but instead of using what-if questions, certain “key words” are used to focus the team’s attention.

### **PROCESS HAZARDS ANALYSIS FAILURE MODE AND EFFECTS ANALYSIS**

- This method analyzes the failure states of individual components in the process from bottom-up.
- If the failure of a component causes a hazard in the system or process, then it is noted.
- The analysis of controls and recommendations is then similar to the above PHA methods.

### **PROCESS HAZARDS ANALYSIS FAULT TREE ANALYSIS**

- Fault tree analysis (from top-down) is basically the opposite of FMEA (from bottom-up).
- A hazard event is chosen and then a logic diagram (or tree) is constructed indicating how the event can occur.
- The “branches” on the tree represent events or conditions to produce the hazard event

### **ACTIVITY 13: INVESTIGATION ANALYSIS**

1. Create an investigation report pertaining to any problem in the computer laboratory or computer work place follow the content of report investigation with causal analysis mentioned in the module. (use short bond paper).

## **CHAPTER 14: CRISIS AND DISASTERS; OSH ISSUES OF RESPONDERS**

### **LEARNING OBJECTIVES**

- To know how to response in time of disaster
- To know the critique response efforts
- To know the OSH implications

It is the Health Safety Issues being encountered by the Responders in times of Crisis and Disaster. Natural disasters can create a multitude of safety, wellness, and health concerns for workers in the affected areas. Emergency preparedness plays an essential role in ensuring employees and employers are safe when natural disasters strike. Occupational health and safety professionals are not only responsible for regulatory policy compliance and enforcement, but they also ensure people are safe while at work during crises. As part of the job, they prepare for natural disasters—tornadoes, hurricanes, earthquakes, wildfires, and floods—long before they happen. They make plans, make sure employees are prepared, and ensure the proper equipment is in place. Because natural disasters can be unpredictable, advance preparation is essential, experts such as the U.S. Occupational Safety and Health Administration (OSHA) said.

### **Factors:**

- People

People's actions, whether they display them or not, have a significant impact on workplace health and safety. Therefore, actions become one of the major factors that cause health and safety hazards.

- Equipment

Equipment include tools and machines that people work with. Further, equipment includes those to which people are near. Equipment can include fixed machines, vehicles, material handling devices, hand tools, protective equipment, and personal gear. Moreover, some equipment can potentially emit harmful chemicals. Furthermore, certain equipment can produce physical agents such as heat, noise, vibration, or radiation during operation.

- Material

Material include raw material, products, hazardous chemicals, and other substances that workers use, process, or handle. Therefore, it is important to be aware about the damage material can cause to the property. These damages could be owing to spills, corrosions, burns, or explosions.

- Environment

Environment refers to all parts of a workplace. Moreover, there are six aspects of a workplace that can be a potential hazard. The condition of all surfaces on which people walk or where company places its things is important. Further, unsafe or

poor conditions such as overcrowding and poor ventilation become important. Furthermore, hazards caused by physical agents such as light, temperature, and noise are vital to analyze. It is important to consider housekeeping hazards such as spilled cleaning fluids, since they can be inhaled. Maintenance hazards such as blocked stairs, debris on stairs, and blocked floors and exits are critical for hazard analysis.

- **Process**

Process considers how things are done at the workplace as a whole. Therefore, it connects the previous contributors – people, equipment, material, environment. Moreover, process covers the hazards that may be prevalent a process between these factors occurs.

## **Information:**

The Occupational Safety and Health (OSH) Act was passed to "assure safe and healthful working conditions for working men and women." Accordingly, the Occupational Safety and Health Administration (OSHA) was created to perform the following primary functions:

- Assure the safety and health of workers at the workplace, wherever that may be.
- Consult with and advise employers, employees, and representative organizations of the effective means of preventing occupational injuries and illnesses.
- Conduct workplace inspections and investigations to determine whether employers are complying with standards.

OSHA has a key role in domestic preparedness and response activities. OSHA's mission to assure safe and healthful working conditions for our working men and women is a vital component in our nation's emergency response and recovery system. This document outlines the general parameters under which OSHA can assist, and the resources OSHA can provide during the various response phases associated with a catastrophic incident.

## **Elements:**

- **Pre-Planning**
  - Proactive reviews of safety and health programs developed by various response agencies.
  - Identification and resolution of pertinent safety and health issues before an incident occurs.
  - Increase coordination and understanding between various response agencies.
- **Response**
  - Operate in a cooperative mode with other agencies in the established command system;
  - Support the lead federal agency by providing technical safety and health expertise;
  - Identify and resolve safety and health issues associated with the response effort;

- Evaluate activities to ensure that employers (including responders) follow appropriate safety and health procedures; and
- Respond directly to requests from employers or workers.
- **Recovery**
  - Continue to operate within the established command system to support the lead agency by providing technical safety and health expertise;
  - Continue to monitor activities by employers, including government agencies and contractors, to ensure that appropriate safety and health procedures are being followed, and providing assistance, direction or enforcement as necessary;
  - Ensure that the various employers and contractors develop and implement relevant Health and Safety Plans;
  - Continue to respond directly to requests for assistance from employers and workers; and
  - Initiate enforcement actions as necessary and appropriate
- **Re-Occupancy**
  - The ultimate responsibility in determining when it is "safe" to return to work lies solely with the employer.
  - The employer may rely upon information, guidance, and direction provided by various federal and local governmental agencies.
  - While employees may never be exposed to conditions that threaten their health or well-being, it may not always be possible or feasible to decontaminate the worksite to pre-event levels.
  - When determining appropriate cleanup levels, the employer may find it necessary to implement additional controls such as personal protective equipment and certain work practices as a supplement to decontamination efforts.

### **Brief Explication:**

Crisis and Disaster Occupational Safety Professionals are also responsible for constructing a clear chain of command, creating signals and alerts that indicate impending dangers, and assessing dangers for severity, but as they do their duty, they also have risk of getting in danger and health issues. People, Equipment, Materials, Environment and Process are some of its Factor contributing to the Health Issues of the Responders. Pre- planning, Response, Recovery and Re-occupy are some elements of procedure to ensure the safety and success of the responders. We are talking about the lives of people here; our people are our top priority whenever a disaster comes. We must be always prepared in facing a disaster, we must always expect the worst-case scenarios, in order to have no regrets in the future. After All, preparedness is our only good defense against the attack of our nature.

### **ACTIVITY 14: CRISIS MANAGEMENT PLAN**

1. Create management plan pertaining to the recent problem of covid19 vaccine in the following information
  1. Pre-Crisis Action
  2. Due Date

3. Person involved
4. Comments
5. Completeness

## **CHAPTER 15: IDENTIFICATION OF CORRECTIVE OR PREVENTIVE ACTIONS**

### **LEARNING OBJECTIVES**

- **To know when the investigation reached its conclusion**
- **To know how to carry out the correct actions after the investigation concluded**

### **INVESTIGATION CONCLUSION**

- At this point the committee should have agreed upon the cause(s) of the incident or at least a set of possible cause scenarios.
- These cause scenario(s) should lead the committee to the conclusions.
- The conclusions are concise statements of the cause(s) or possible cause(s) of the incident and their effects.
- The committee may decide to favor one or more conclusions in the final report.
- The alternative conclusions should not be deleted from the final report and should be addressed by the recommendations.

### **INVESTIGATION RECOMMENDATION**

- Recommendations are suggested corrective actions to prevent a future occurrence of a similar incident.
- They should directly correspond to the cause(s) of the incident.
- Specifically, the recommendations should attempt to remedy and/or mitigate the causes or effects of the incident as listed in the conclusions.

### **INCIDENT INVESTIGATION WRITTEN REPORT DISTRIBUTION**

- Someone on the committee should be appointed to write the draft investigation report.
- For small reports (about 1-2 pages), the outline of the report can be as follows:

1. Incident description
  2. Causes/conclusion
  3. recommendation
- For longer and/or more complex reports, an outline as follows may be more suitable:
    1. Summary
    2. Incident description
    3. Analysis
    4. Causes/conclusions
    5. Recommendations
  - The “summary” is brief description of the incident including the key causes and recommendations.
  - “Analysis” is a description of the method used to determine the causes and effects pertaining to the particular incident.
  - Other sections are self-explanatory.
  - Final reports should be distributed according to the facility plan.

## **SUMMARY**

- Incident investigation and reporting is important to prevent future incidents.
- A well-documented incident investigation and reporting program is essential to be effective.
- All participants in the program should be trained
- A system should be in place to resolve recommendations from incident investigations.

PLS READY TO TAKE THE FINAL EXAMINATION GOODLUCK