

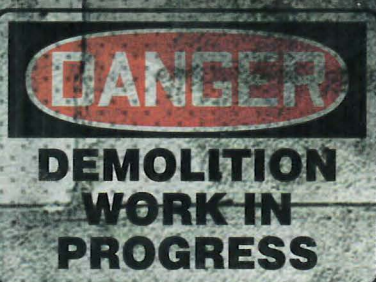


KEMENTERIAN  
PENDIDIKAN  
MALAYSIA

**POLITEKNIK**  
MALAYSIA  
PORT DICKSON

# OCCUPATIONAL SAFETY & HEALTH

DUW1012 – POLITEKNIK MALAYSIA



**NO**   
**SMOKING**



**NOTICE**  
**ALL VISITORS**  
**REPORT TO**  
**SITE OFFICE**



**HAZCHEM**

KQB  
14  
.K46  
2014



KHOR SEOW LOON  
MOHD SALLEHUDDIN BIN YAZID  
SALINA BINTI SUMALI



KQB14 .K46 2014



0000027849

Khor, Seow Loon

Occupational safety & health / Khor Seow Loon, Mohd

Sallehuddin bin Yazid, Salina binti Sumali.

# OCCUPATIONAL SAFETY AND HEALTH

**KHOR SEOW LOON**  
**MOHD SALLEHUDDIN BIN YAZID**  
**SALINA BINTI SUMALI**

**PUBLISHER**

JABATAN KEJURUTERAAN MEKANIKAL  
POLITEKNIK PORT DICKSON  
NEGERI SEMBILAN DARUL KHUSUS

| PERPUSTAKAAN<br>POLITEKNIK PORT DICKSON |              |
|-----------------------------------------|--------------|
| PESANAN KERAJAAN                        |              |
| NO. INVOIS                              |              |
| PEMBEKAL                                | SUMBERKITA   |
| NO. PANGGILAN                           | 1046<br>2014 |

Published by:  
Ministry of Education  
Jabatan Kejuruteraan Mekanikal

Politeknik Port Dickson  
<http://www.polipd.edu.my>

© Politeknik Port Dickson 2014  
First Edition, Jun 2014

ALL RIGHTS RESERVED. This book contains material protected under International and Federal Copyright Laws and Treaties. Any unauthorized reprint or use of this material is prohibited. No part of this book may be reproduced or transmitted in any form or by any information storage and retrieval system without express permission from the author / publisher.

Perpustakaan Negara Malaysia

Cataloguing-in-Publication Data

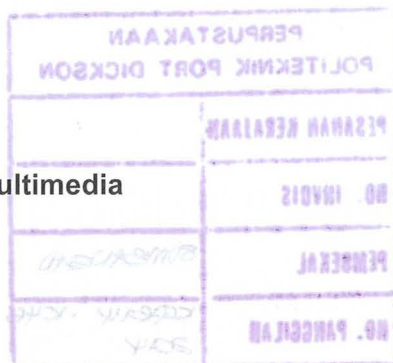
Occupational safety and health;

ISBN 978-967-5677-39-7

Graphic Designer:

Azrin Mohammad

**Unit Pembangunan Instruksional & Multimedia**





## PREFACE

DUW 1012 Occupational safety and Health is one of the courses offered by the Polytechnic Department, Ministry of Education. The course is worth 2 credit hours and should cover over 15 weeks. This book is written for Polytechnic students based on the latest syllabus prepared by the Polytechnic Department, Ministry of Education. The contents are comprehensive and concise to help students in learning the course effectively to achieve excellent results. Upon the completion of the course, students should be able to:

1. Identify the OSH legislation and its compliance in Malaysia.
2. Explain briefly incident hazards, risks and safe work practices in order to maintain health and safe work environment.
3. Discuss cooperatively in responding to an accident action at workplace.
4. Adhere to the safety procedures in respective fields.

This book is divided into 6 chapters which covers most of the sub-skills in the syllabus. To consolidate students learning and to test their understanding, we also provide several features such as *Examples*, *Safety Fact*, *Discussion Case* and *Self check*. You are encouraged to go into <http://portal.cidos.edu.my> to check out the course outline, assessment, assignment and etc.

We are happy to receive any comments and suggestions to improve the quality of this book. We hope that this book can be beneficial to the OSH practitioner besides educationist and students. We wish you a pleasant study experience.

Khor Seow Loon

- *Incident Prevention*
- *Hazard Identification, Risk assessment and Risk Control*

Mohd Sallehuddin bin Yazid

- *Occupational Safety and health Management System*
- *Emergency Preparedness, Response And Fire Safety*

Salina binti Sumali

- *Intoduction to Occupational Safety and Health Legislation*
- *Occupational First Aid*

June 2014

# CONTENTS

|                  |                                                                    |           |
|------------------|--------------------------------------------------------------------|-----------|
| <b>CHAPTER 1</b> | <b>INTRODUCTION TO OCCUPATIONAL SAFETY AND HEALTH LEGISLATIONS</b> | <b>1</b>  |
|                  | Intoduction                                                        | 1         |
|                  | Concept of Occupational Safety and Health (OSH)                    | 2         |
|                  | Importance of Safety in Workplace                                  | 3         |
|                  | History of OSH Legislation in Malaysia                             | 3         |
|                  | OSH Legislation in Malaysia                                        | 6         |
|                  | Occupational Safety And Health Act (OSHA) 1994                     | 7         |
|                  | Factories And Machinery Act (FMA) 1967                             | 12        |
|                  | Safety and Health Organization in Malaysia                         | 13        |
| <b>CHAPTER 2</b> | <b>OCCUPATIONAL SAFETY AND HEALTH MANAGEMENT SYSTEM</b>            | <b>16</b> |
|                  | Introduction                                                       | 16        |
|                  | Safety & Health Committee (SHC)                                    | 17        |
|                  | Roles of The Management                                            | 17        |
|                  | Summary of PDCA in Safety                                          | 21        |
| <b>CHAPTER 3</b> | <b>INCIDENTS PREVENTION</b>                                        | <b>22</b> |
|                  | Introduction                                                       | 22        |
|                  | Incident and Accident Defined                                      | 22        |
|                  | Principle of Incidents Prevention                                  | 23        |
|                  | Accident Causation Theories                                        | 23        |
|                  | Incidents Prevention Costs                                         | 29        |
|                  | Accident Prevention Programme                                      | 30        |



|                  |                                                                |           |
|------------------|----------------------------------------------------------------|-----------|
| <b>CHAPTER 4</b> | <b>EMERGENCY PREPAREDNESS, RESPONSES AND FIRE SAFETY</b>       | <b>32</b> |
|                  | Introduction                                                   | 32        |
|                  | Emergency Management                                           | 32        |
|                  | The Basic of Fire                                              | 33        |
|                  | Emergency and Fire Safety Planning                             | 34        |
| <b>CHAPTER 5</b> | <b>OCCUPATIONAL FIRST AID</b>                                  | <b>36</b> |
|                  | Introduction                                                   | 36        |
|                  | First Aid Definition                                           | 37        |
|                  | First Aid Principles                                           | 37        |
|                  | First Aid Requirement by DOSH                                  | 38        |
|                  | Basic First Aid and Treatment                                  | 42        |
|                  | First Aid Training                                             | 46        |
| <b>CHAPTER 6</b> | <b>HAZARD IDENTIFICATION, RISK ASSESSMENT AND RISK CONTROL</b> | <b>48</b> |
|                  | Introduction                                                   | 48        |
|                  | Hazard, Risk and Danger Definitions                            | 48        |
|                  | Classification of Hazard                                       | 49        |
|                  | Hazard Identification                                          | 52        |
|                  | Risk Assessment                                                | 54        |
|                  | Risk Control                                                   | 56        |
|                  | <b>REFERENCE</b>                                               | <b>61</b> |





## **CHAPTER 1.0 : INTRODUCTION TO OCCUPATIONAL SAFETY AND HEALTH LEGISLATIONS**

By the end of this topic, you should be able to:

1. Understand the concept of Occupational Safety and Health (OSH).
2. Understand the importance of safety in workplace.
3. Understand statutory requirements.
4. Understand the role of safety and health organization in Malaysia.

### **1.0 INTRODUCTION**

This chapter provides students with the information they need about the OSH Act, OSHA and other pertinent federal legislation and agencies. Occupational safety and health management has a long history scientific management which is only about 70 years old after Heinrich proposed his domino theory of accident causation in the 1930s. The final form of occupational safety and health management thinking that exist today started only in the 1970s when Lord Robens recommended self-regulation to the United Kingdom government. This has resulted in legislation that has been adopted by many countries including Malaysia. Since the 1970s there were many serious industrial accidents that caused reactions from governments as well as industry. At the same time they were extensive development in quality management. People are beginning to see the relationship between quality management and what it stands for with safety management. These converging developments resulted in the management system approached that is now being widely promoted and practiced.

Safety and industrial legislation has been around since the time of Hammurabi 2000BC and the relationship between occupations, diseases and injuries had been known for a long time. Knowledge on occupational health was further increased during the middle ages through studies by such scholars. In 1473, Ellenborg publish the first known pamphlet on occupational diseases. In 1556, the German scholar, Agricola describe the diseases of miners and in 1713, Rammazini who is regarded as the father of occupational medicine suggested that in diagnosis doctors should ask patients about their occupations.

During in the middle ages deaths from natural diseases were more frequent than from industrial accidents as people generally working in agricultural sector. Industrial accidents arose out of the factory system during the Industrial Revolution in Britain in 18th Century (1700s) when people migrated from farms to work in the factories. Deaths and injuries through industrial accidents increased many fold. Women and children worked as heavy laborers under unsafe and unhealthy workplace in factories as well as in mines and the working hours are extremely long.

Legislation before the 19th Century tended to protect landlords. In 1883, English Factory Acts was the first effective industrial safety law. It provides compensation for accidents rather than to control their causes. At the same time insurance companies inspected workplaces and suggested prevention methods. The problems in situations like this is that the focus turns more on compensation and what is insurable rather than safety. Safety became an issue of injury and insurance.

Factories remained unhealthy and unsafe. Towards the end of the 19th Century other laws were enacted to make factories safer. Safety management never had any framework to base on safety management before Heinrich. Prior to Heinrich an accident was seen as an act of God which nothing could be done. In the 1930s, Heinrich studied accident records and discovered that more than 88% of all accidents were caused by unsafe acts of workers. This led him to the formulation of the 'Domino Theory of Accident Causation'. The theory promoted control of workers behavior. Unfortunately it focused on worker behavior and not management. It caused people to think that safety is about policing workers.



Frank Bird (1970) developed Loss Control Theory. He suggested that underlying causes of accidents are lack of management controls and poor management decisions. This is widely accepted theory and many activities in safety management for example accident investigation and audit are based on this theory.

In 1980s, Behavioral Based Safety (BBS) was introduced. The system meets resistance from trade unions especially because some organizations implement the system exclusively. Part of the resistance is because the system now turned full circle and identifies workers as the focus of attention just like Heinrich did in the 1930s. The system appears to concentrate on workers at the expense of hazards in the workplace or management's contribution to it. Also incentives and reward system did not always work as desired and appear to manipulate human beings. BBS should be used only as an addition to existing established management system for which it could be good.

Lord Roben, Chairman of a Royal Safety Commission Report 1972 noted that there were several characteristics of legislation at the time which were:

- a) Too many OSH legislation
- b) Fragmented
- c) Limited in coverage (specific hazards & workplace)
- d) Out of date and difficult to update
- e) Inflexible (prescriptive)
- f) People thought that safety was what government inspectors enforcing the law

From the report findings, he recommended that legislation in United Kingdom should be based on 'Self-Regulation'. The outcome of the report resulted in the Health and Safety of Workers at Work Act in the UK in 1974. The legislation was successfully implemented in UK and similar legislation was enacted in Australia in 1984. Malaysia enacted a similar type of legislation in 1994 after the 1992 Bright Sparkler accident in Sungai Buloh.

Currently development of Occupational Safety and Health management system was driven by self-regulatory legislation in UK and quality management movement. Features of 'Roben Style' legislation are:

- a) General duties of care by :
  - employers, self-employed persons, designers, manufacturers & suppliers and employees
  - duties of employers to make the workplace safe
- b) Consultation with employees through Safety and Health Committees
- c) Safety and health officer as advisor and coordinator
- d) Improvement and prohibition notices

## **1.1 CONCEPT OF OCCUPATIONAL SAFETY AND HEALTH (OSH)**

Basically, safety is defined as the condition of being safe or freedom from harm/injury whereas health is a state of complete physical, mental and social well-being and is not simply the absence of illness or disease.

Occupational safety and health (OSH) is generally defined as the science of the anticipation, recognition, evaluation and control of hazards arising in or from the workplace that could impair the health and well-being of workers, taking into account the possible impact on the surrounding communities and the general environment.

As according to World Health Organization, WHO and the International Labor Organization, ILO (1995), occupational safety and health can be defined as a multidisciplinary activity aiming at:

- a) The promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations
- b) The prevention among workers of adverse effects on health caused by their working conditions



- c) The protection of workers in their employment from risks resulting from factors adverse to health
- d) The placing and maintenance of the worker in an occupational environment adapted to his physiological and psychological capabilities and
- e) The adaptation of work to man and of each man to his job. In other words, occupational safety and health encompasses the social, mental and physical well-being of workers which fulfill the state of condition being safe and free from health risk

## 1.2 **IMPORTANCE OF SAFETY IN WORKPLACE**

Workplace safety is a concept that involves creating a safe working atmosphere, securing and safe guarding the lives of the employees or workers. Workplace safety is of prime importance since there are professions, which involve risks that could turn out to be fatal.

The importance of safety at the workplace including:

- a) Works plays a central role in people's lives
- b) Most workers spend at least 8 hours a day in workplace (plantation, office, factory etc.) Therefore, work environments should be safe and healthy
- c) Every day workers all over the world are faced with multitude of health hazards, such as dust, gases, noise, vibration, extreme temperatures, sharp objects, huge electricity flows, deep waters, huge machines and etc
- d) Some employers assume little responsibility for the protection of worker's health and safety
- e) As a result of the hazards and a lack of attention given to health and safety, work-related accidents and diseases are common in all parts of the world.

## 1.3 **HISTORY OF OSH LEGISLATION IN MALAYSIA**

The role of occupational safety and health has been in existence since 120 years ago, in the late 19th century. It started with steam boiler safety and then followed by machinery safety. After that, it was continued with industrial safety, industrial safety and health and lastly occupational safety and health that covers every work sector. The history, role and development of this department can be explained in five eras.

### 1.3.1 **Steam Boiler Safety Era - before 1914**

Job relating to occupational safety was first established in Malaysia in the year 1878, when Mr. William Givan was appointed as Machinery Inspector. His job was to inspect the safety aspect of steam boilers, which was usually used in tin mines. Circa 1890s, the Perak state government created a system of inspection by individual surveyors. Individual with steam boiler related qualifications are given license to survey boilers. In 1892, there were 83 steam boilers in the state of Perak. All of it was used in tin mines except for 6 units, which were used in sugar factory. This boiler surveyor system was terminated in 1900 with the appointment of Mr. C. Finchman as an inspector of boiler.

Steam boiler enactments at that time were state oriented as each of the four Allied Malay States or *Negeri-Negeri Melayu Bersekutu* (Perak, Selangor, Pahang and Negeri Sembilan) uses its own steam boiler law. The first steam boiler law of Malaysia was believed to be legislated in Selangor, which is the Selangor Boiler Enactment 1892. Meanwhile in Perak, their first steam boiler law was enforced in the year 1903. Only by 1908, did the Allied Malay States have a uniform steam boiler legislation that was enforced by inspectors of boiler.



### 1.3.2 Machinery Safety Era - 1914 till 1952

On the 1st of January 1914, the steam boiler enactments of the Allied Malay States were abolished and were replaced with Machinery Enactment of 1913. Effective with this legislation, inspectors were not only to inspect steam boilers but also had to inspect machineries, including self-combustion engines, water turbines and other related auxiliary machineries. At the same time, the job title of Inspector of Boiler was also abolished and was replaced with Inspector of Machinery and Assistant Inspector of Machinery.

In the year 1932, the Machinery Enactment of 1913 was abolished and replaced with Machinery Enactment of 1932. Registration and inspection of installation were enforced.

At that time, the inspectors of machinery was under the administration of the Mineral Department, under the machinery branch. This was because most machineries were being used in the mining sector and furthermore, mining was also the main industry.

### 1.3.3 Industrial Safety Era - 1953 till 1967

The Machinery Branch was under the Mineral Department until 1952, when the branch was split off from the department and renamed Machinery Department. The split was a must because most inspections had progressed to other industries besides mining.

In 1953, all of the machinery enactments of the Allied Malay States (*Negeri-Negeri Melayu Bersekutu*), Non-Allied Malays States (*Negeri-Negeri Melayu Tidak Bersekutu*) and Strait States (*Negeri-Negeri Selat*) were abolished and replaced with the Machinery Ordinance 1953. With the enforcement of this ordinance, the roles of inspectors were not only limited to steam boiler or machinery safety but also covered all aspect of factory workers safety where those machineries were being used. Ordinance 1953 lack a lot in workers' health aspects even though there were regulations on safety, health and welfare of workers under the ordinance, as it was not fully enforced. The main provisions of the ordinance were as follows:

- a) There must be established a Board of Inspectors with powers to conduct inspections and to approve certificates of fitness
- b) Hence regulations can be made
- c) Only machinery with approval certificates can be use
- d) Only approved persons can operate machineries
- e) Approval from Inspections must be given before a machine can be licensed or be modified
- f) All accidents to person or property relating to machinery must be notified and investigated
- g) No person should be acting in a manner that could cause injury to others or to use safety tools
- h) No person should be acting in a manner that could cause injury to others or to use safety tools
- i) All non-complying machinery should not be sold, borrowed or rented
- j) Inspectors are given powers to enter premises and to stop unsafe machineries

### 1.3.4 Industrial Safety and Health Era – 1970 till 1994

In the year 1967, the Factory and Machinery Act was approved by the Parliament. Besides that, reorganization of the department was undertaken near the end of 1960's, in which the function and responsibilities of inspectors, administrative method and filing system are reorganized beside the closing down of small branch offices in Rawang, Taiping, Tapah and Muar. In 1970, the Factory and Machinery Act and eight regulations under the act were enforced. With the commissioning of this act, Machinery Ordinance 1953 was abolished and the name of the department was changed to Factory and Machinery Department. The inspectors who enforce the act are renamed as Factory and Machinery Inspector. This act was legislated to overcome the weaknesses in the Machinery Ordinance 1953, in the scope of worker's coverage, as they were not protected if they are working in a workplace that doesn't use machinery. Provisions relating to industrial health are further added.



Generally, the Act was drafted to provide minimum standard of safety, health and welfare of workers at workplace consisting of 5 employees or more and at premises which machinery were being used, including factories, building construction sites and works of engineering construction. The Act was only enforced in Peninsula Malaysia until 1980 when it was further enforced in Sabah and Sarawak. Until the year 1968, Chief Inspectors were made up of British citizens. By 1968, the posts of inspectors in the Machinery Department were fully filled by locals. The year 1968 was also the year when the post of Medical Officer and Surveillance Unit was created in the department. The unit did not stay that long under the Labour Ministry as it was placed under the administration of the Health Ministry in the year 1971.

This era also witnessed the existence of a few important activities and sections like the formation of the Anti-Pollution Section in the year 1971; formation of Industrial Hygiene Unit in the year 1971 and upgrade of its status to Industrial Hygiene Section in the year 1980.; start of petroleum safety activities with the formation of Petroleum Safety Section in the year 1985; start of special inspection activities to prevent major industrial accident, industrial safety and health activity exercises with expert help from International Labour Organisation in the year 1987; formation of C.I.S in 1988; and formation of Major Hazards Section in the year 1991. Petroleum Act (Safety Measures) was enforced in the year 1984 and its enforcement is carried out by a few government agencies including the Factory and Machinery Department. The department enforced provisions in the act relating to transportation of petroleum using pipeline, petroleum distribution, storage and also related equipment and instrument. Regulations (Safety Measures) (Transportation of Petroleum by Pipelines) 1985 have been fully enforced by the department. With these new responsibilities, the Factory and Machinery inspectors were also gazetted as Petroleum Inspector.

### 1.3.5 Occupational Safety and Health Era - after 1994

The new legislation on occupational safety and health was made in the year 1994. The purpose of Occupational Safety and Health Act 1994 is to promote and encourage occupational safety and health awareness among workers and to create organization along with effective safety and health measures. This would be carried out by self-regulation schemes that match the industry or related organization. This Act is a measure that supersedes any conflict in existing occupational safety and health laws such as the Factory and Machinery Act 1967. The Occupational Safety and Health Act 1994 complements any existing legislative provision and if there are any conflicts, the Occupational Safety and Health Act 1994 will overcome it.

This Act also defines the responsibilities of employers, manufacturer, employees, self-employed workers, designers, importers and vendors. Even though those responsibilities are general, it would still need serious attention and would carry all kind of liabilities. There are three main principles that had been taken as the foundation in the drafting of this Act which are:

- a) Self-regulation. To handle issues relating to occupational safety and health, employers must develop a good and orderly management system. Starting with formation of a safety and health policy and consequently employers have to make the proper arrangements to be carried out
- b) Consultation, where employers, employees and the government must negotiate to settle issues and problems relating to occupational safety and health at the workplace
- c) Co-operation, where employers and employees must co-operate to take care, nurture and to increase the quality of occupational safety and health at the workplace. Without co-operation between employers and employees, none of the occupational safety and health programmes carried out would succeed

This Act also provide for the appointments of enforcement officers, establishment of National Council for Occupational Safety and Health, formation of policy and arrangement of measures to protect safety, health and welfare of people at work and others who might be endangered by the activities of people at work. The powers to enforce, to inspect and the liabilities for breaking the law are also clearly defined.

With the approval of this Act, starting from April 1994 the Department of Factory and Machinery has been renamed as the Department of Occupational Safety and Health (DOSH) and the Inspectors are called Occupational Safety and Health Officers.



Under this act, industrial sectors that are covered by it are as follows:

- a) Manufacturing
- b) Mining and quarrying
- c) Construction
- d) Agriculture, forestry and fishing
- e) Utilities - gas, electric, water and sanitary services
- f) Transport, storage and communication
- g) Wholesale and retail traders
- h) Hotels and restaurants
- i) Finance, insurance, real estate, business service
- j) Public services and statutory authorities
- k) Higher education institutions (IPTA/IPTS)

#### **1.4 OSH LEGISLATION IN MALAYSIA**

Legislative framework plays a significant role in ensuring the progress of safety practices in any country. Without the government's initiatives, occupational safety and health (OSH) will not become a national agenda. Laws and regulations are not made for the sake of copying other countries. They are made by the government to protect the people. In this case, the protection in place is for the well-being of the workforce.

Act defines the scope and boundary, and the basic provisions which approved by Parliament.

Regulation is the detailed specific requirements of the Acts approved by the Minister.

Code of Practice/Guidelines is written by an official body or a professional association to its members to help them comply with its ethical standards or act. It should be endorsed by Department of Occupational Safety and Health (DOSH) and yet it is not the law (no legal binding). However, because they are developed based on industrial experience, they are persuasive in practice to the lower courts and in civil cases to establish reasonable safety standards (Holt, 2006).

##### **1.4.1 Statute Law and Common Law**

Generally, occupational safety and health legislation comprises of both Statutory Law and Common Law. These acts prescribe that the employers have a duty care upon the employees.

Statutory Law consist the act and regulation of:

- a) Enacted by Parliament
- b) Violation of statutory law is a crime
- c) Punishment in term of detention in prison and charge
- d) Prosecution by Government Officer in Criminal Court

These Acts usually set out a framework of principles in the areas or issues involved. In order to achieve the objectives, Acts are supported by regulations and orders. Regulations and orders are not necessarily written at the time the Acts were introduced. They are sometimes added in after the Acts are established to accommodate new requirements.

Common Law consist the act and regulation of:

- a) Judgments by Judges and Civil Courts
- b) Application for trial is made by lawyer appointed by the injured person
- c) Any compensation is in currency



The sector of common law related to OSH issues is known as tort of negligence. Some literature refers to it as Law of Tort. A tort is defined as a type of civil offence. This is where the common principles fill the gap if and when a statute law does not supply any specific requirements. For instance, the relationship between an employer and the employees is a special application of common law principles. Employers are responsible for the well-being of their workers in their working environment. Employers are also liable for the actions of their employees that cause injury, death or damage to others. This form of liability of the employer is known as vicarious liability.

#### **1.4.2 Legal Obligation of Duty of Care under Common Law is:**

'Employers are not exempted from the responsibility under duty of care even though he has assigned a competent person to execute the task'

Wilson and Clyde Coal Co vs English

#### **1.4.3 Employer Liability under the Duty of Care is injury on:**

- a) Each individual worker
- b) Injuries caused by one worker to another worker or negligence of workers or agents appointed to do the job. (Vicarious Liability)

'The employer are however not responsible for any actions by the worker which do not fall within the scope of his job such as horseplay while at work'

(Example: Two apprentices injecting compressed air to a third party as a joke)

Smith vs Crossley bros Ltd

#### **1.4.4 Legislation Categories**

The occupational safety and health legislation can be classified into two categories which are;

- a) Control of industrial activities or use of specific materials/chemicals such as;
  - i. Mineral Enactment
  - ii. Atomic Licensing Act 1984
  - iii. Pesticides Act 1974
  - iv. Petroleum (safety measure) Act 1984
  - v. Electricity Supply Act 1990
- b) Basic and general statutory requirements which are :
  - i. Act 139 - Factory and Machinery Act, FMA 1967
  - ii. Act 514 - Occupational Safety and Health Act, OSHA 1994

### **1.5 OCCUPATIONAL SAFETY AND HEALTH ACT 1994 - Act 514 (OSHA 1994)**

Occupational Safety and Health Act 1994 (Act 514) was approved by the Parliament in 1993 and was gazette on February 1994. This legislation was made considering the fact that the Factory and Machinery Act 1967 only covers occupational safety and health in the manufacturing, mining, quarrying and construction industries, whereas the other industries are not covered. The Occupational Safety and Health Act (OSHA) 1994 - Act 415 provides the legislative framework to promote, stimulate and encourage high standards of safety and health at work. OSHA is enforced by the Department of Occupational Safety and Health (DOSH) previously known as Factory and Machinery Department, under the Ministry of Human Resources.

The act is referred as a reflexive-type act which was less prescriptive and covers 90% of the nation's total man power and would exempt those who work aboard merchant ship and in the armed forces. As compared to the FMA 1967, it has the following disadvantages:

- a) Scope is limited to only the manufacturing sector
- b) Prescriptive, detailed regulations
- c) Too dependent on the government

OSHA 1994 emphasize on self-regulation and duties of employer, employee and designer/manufacturer. In short, the responsibility on OSH is made to rest on the philosophy and guiding principles which includes responsibilities to ensure safety and health at the workplace lies with those who create the risk and with those who work with the risk.

The objectives of the act are:

- a) To secure the safety, health & welfare of person at work
- b) To protect person (other than persons at work) at places of work against hazard
- c) To promote occupational environment adaptable to the persons physiological and psychological needs
- d) To provide the means toward a legislative system based on regulations and industry codes of practice in combination with the provisions of the Act

OSHA 1994 is arranged in the following sequence:

- a) PART I - Preliminary
- b) PART II - Appointment of Officers
- c) PART III - National Council for Occupational Safety and Health
- d) PART IV - General Duties of Employers and Self Employed Persons
- e) PART V - General Duties of Designers, manufacturers and Suppliers
- f) PART VI - General Duties of Employees
- g) PART VII - Safety and Health Organizations
- h) PART VIII - Notification of Accidents, Dangerous Occurrence, Occupational Poisoning and Occupational Diseases and Inquiry
- i) PART IX - Prohibition Against Use of Plant or Substance
- j) PART X - Industry Codes of Practice
- k) PART XI - Enforcement and Investigation
- l) PART XII - Liability for Offences
- m) PART XIII - Appeals
- n) PART XIV - Regulations
- o) PART XV - Miscellaneous

#### **1.5.1 Part IV - General Duties of Employers And Self Employed Persons**

This part outlines the provision of the general duties of employers and self-employed persons in order to ensure, as far as is practicable, the safety, health and welfare at work of all his employees.

Under the Act, employer means the immediate employer or the principal employer or both.

Principal employer means the owner of an industry or the person with whom an employee has entered into a contract of service whereas immediate employer means a person who has undertaken the execution at the place of work where the principal employer is carrying on his activities.

Listed below are sections involved in Part IV :

- a) Section 15 : General duties of employers and self- employed persons to their employees
- b) Section 16 : Duty to formulate safety and health policy
- c) Section 17 : General duties of employers and self-employed persons to persons other than their employees



- d) Section 18 : Duties of an occupier of a place of work to persons other than his employees
- e) Section 19 : Penalty for an offence under section 15, 16, 17 or 18

### Section 15

- (1) It shall be the duty of every employer and every self-employed person to ensure, so far as is practicable, the safety, health and welfare at work of all his employees.
  - (a) Provide and maintain safe plant and safe system of work
  - (b) Make arrangements for safe use, operation, handling, storage and transportation of substances and plant
  - (c) Provide information, instruction, training and supervision
  - (d) Provide and maintain safe place of work and safe access and egress
  - (e) Provide and maintain working environment that is safe and without health risk and with adequate welfare facilities

### Section 16

It shall be the duty of every employer and every self-employed person to prepare and as often as may be appropriate revise a written statement of his general policy with respect to the safety and health at work of his employees and the organization and arrangements for the time being in force for carrying out that policy, and to bring the statement and any revision of it to the notice of all of his employees."

### Section 17

- (1) The duty of every employer and every self-employed person to conduct his undertaking in such a manner as to ensure, so far as is practicable, that :
  - a) A person other than his employees who might be affected is not exposed to any health and safety risk
  - b) Provide information about work activities carried out

### Section 18

- (1) An occupier of non-domestic premises, which has been made available to persons, not being his employees, as a place of work, or as a place where they may use a plant or substance provided for their use there, shall take such measures as are practicable to ensure that the premises, all means of access thereto and egress there from available for use by persons using the premises, and any plant or substance in the premises or provided for use there, is or are safe and without risks to health.
- (2) A person who has, by virtue of a contract or lease or otherwise, an obligation of any extent in relation to :
  - (a) The maintenance or repair of a place of work or any means of access thereto or egress herefrom ; or
  - (b) The prevention of risks to safety and health that may arise from the use of any plant or substance in the place of work

### Section 19

- a) Liable to a fine not exceeding RM50,000
- b) Imprisonment for a term not exceeding 2 years
- c) or both

#### **Safety Fact 1.1**

Employers are not allowed to employ persons less than 16 years old. For more information on young person you can refer to Section 28, PART III FMA1967 and Section 28(c), PART VII OSHA 1994.

### **1.5.2 Part VI- General Duties Of Employees**

This Part outlines the provision of the general duties of employees.

Under the Act, an employee is defined as a person who has been employed by an employer under a contract of service or apprenticeship.

Listed below are sections involved in Part VI :

- a) Section 24 : General duties of employees at work
- b) Section 25 : Duty not to interfere with or misuse things provided pursuant to certain provisions
- c) Section 26 : Duty not to charge employees for things done or provided
- d) Section 27 : Discrimination against employee, etc

#### **Section 24**

- (1) It shall be the duty of every employee while at work
  - (a) To take reasonable care for the safety and health of himself and of other persons who may be affected by his acts or omissions at work
  - (b) To co-operate with his employer or any other person in the discharge of any duty or requirement imposed on the employer or that other person by this Act or any regulation made thereunder
  - (c) To wear or use at all times any protective equipment or clothing provided by the employer for the purpose of preventing risks to his safety and health
  - (d) To comply with any instruction or measure on occupational safety and health instituted by his employer or any other person by or under this Act or any regulation made thereunder
- (2) A person who contravenes the provisions of this section shall be guilty of an offence and shall, on conviction, be liable to a fine not exceeding one thousand ringgit or to imprisonment for a term not exceeding three months or to both.

#### **Section 25**

A person who intentionally, recklessly or negligently interferes with or misuses anything provided or done in the interests of safety, health and welfare in pursuance of this Act shall be guilty of an offence and shall, on conviction, be liable to a fine not exceeding RM20 000 or to imprisonment for a term not exceeding 2 years or to both.

#### **Section 26**

No employer shall levy or permit to be levied on any employee of his any charge in respect of anything done or provided in pursuance of this Act or any regulation made thereunder.

- a) The employer must not charge his employees for providing personal protective equipment or other requirements of the law.
- b) For example the employee cannot be required to pay for personal protective equipment (e.g. safety boots, goggles, face mask, gloves or safety helmet) and employees welfare facilities (e.g. first aid box)



## Section 27

- (1) No employer shall dismiss an employee, injure him in his employment, or alter his position to his detriment by reason only that the employee:
  - (a) Makes a complaint about a matter which he considers is not safe or is a risk to health
  - (b) Is a member of a safety and health committee established pursuant to this Act or
  - (c) Exercises any of his functions as a member of the safety and health committee
- (2) No trade union shall take any action on any of its members who, being an employee at a place of work
  - (a) Makes a complaint about a matter which he considers is not safe or is a risk to health
  - (b) Is a member of a safety and health committee established pursuant to this Act or
  - (c) Exercises any of his functions as a member of a safety and health committee
- (3) An employer who, or a trade union which, contravenes the provisions of this section shall be guilty of an offence and shall, on conviction, be liable to a fine not exceeding RM10 000 or to a term of imprisonment not exceeding 1 year or to both.
- (4) Notwithstanding any written law to the contrary, where a person is convicted of an offence under this section the Court may, in addition to imposing a penalty on the offender, make one or both of the following orders:
  - (a) An order that the offender pays within a specific period to the person against whom the offender has discriminated such damages as it thinks fit to compensate that person
  - (b) An order that the employee be reinstated or reemployed in his former position or, where that position is not available, in a similar position

### Safety Fact 1.2

**Table 1.1 : OSHA 1994 Requirement Based On Type Of Industry**

| Type of Industry                                                      | Employee Quantity                | OSHA 1994 Requirement                                                                                              |
|-----------------------------------------------------------------------|----------------------------------|--------------------------------------------------------------------------------------------------------------------|
| For all industries                                                    | a) if >5 employees               | a) formulate Safety & Health Policy                                                                                |
|                                                                       | b) if ≥40 employees (Section 30) | b) formulate Safety & Health Policy and establish Safety & Health Committee                                        |
| For high risk industries (i.e. construction, ship building, gas etc.) | if >100 employees (Order 1997)   | Formulate Safety & Health Policy, establish Safety & Health Committee and hire a Certified Safety & Health Officer |
| For low risk industries (other than the above mentioned industries)   | if >500 employees                | Formulate Safety & Health Policy, establish Safety & Health Committee and hire a Certified Safety & Health Officer |

00027849

### Discussion Case 1.1

Section 15 (2) of the Occupational Safety and Health Act 1994 requires an employer to provide and maintain plant and safe system of work.

1. What is meant by a safe system of work?
2. How can safe system of work be created at the workplace?
3. How would you formulate a safe system of work for the employees in your organization to work at height?

## 1.6 **FACTORIES AND MACHINERY ACT 1967 - Act 139 (FMA 1967)**

This is an Act to provide for the control of factories with the respect to matters relating to the safety, health and welfare of persons therein, the registration and inspection of machinery and for matters connected therewith.

It started in 1960, when government implemented a policy to move towards industrialization resulting in increased number of workers in the manufacturing sector such as electronics, chemical and mineral based industries and in later years textile and automobiles.

FMA 1967 was enacted in 1967 and the enforcement was carried out by the Factories and Machinery Department (previously known as Machinery Department). A number of regulation were introduced in 1970 to further strengthen the FMA 1967 (Table 1).

Although FMA was an improvement over earlier legislation it had some important limitations. Among them are it only encompassed 'factories' and also limited to manufacturing industry, mining and quarrying and construction activities, prescriptive in nature whereby overcoming hazards identified were stipulated and command and control approaches which rely heavily on the effectiveness of enforcement.

The objectives of FMA 1967 (Act 139) are: to provide for the control of factories with respect to:

- a) Matters relating to the safety, health and welfare of persons therein
- b) The registration and inspection of machinery and
- c) Matters connected therewith

FMA 1967 is arranged in the following sequence:

- a) Part I : Preliminary
- b) Part II : Safety, Health and Welfare
- c) Part III : Persons in Charge and Certificate of Competency
- d) Part IV : Notification of Accident, Dangerous Occurrence and Dangerous Disease
- e) Part V : Notice of Occupation of a Factory, and Registration and Use of Machinery
- f) Part VI : General



## **1.7 SAFETY AND HEALTH ORGANIZATION IN MALAYSIA**

### **1.7.1 Department of Occupational Safety and Health (DOSH)**

The Department of Occupational Safety and Health (DOSH) is a department under the Ministry of Human Resources. This department is responsible for ensuring the safety, health and welfare of people at work as well as protecting other people from the safety and health hazards arising from the working activities

As a government agency, the department is responsible for the administration and enforcement of legislations related to occupational safety and health of the country, with a vision of becoming an organization which leads the nation in creating a safe and healthy work culture that contributes towards enhancing the quality of working life.

The roles of DOSH are:

- a) To study and review the policies and legislations of occupational safety and health.
- b) To enforce the following legislations :
  - i. Occupational Safety and Health Act 1994 and its regulations
  - ii. Factories and Machinery Act 1967 and its regulations
  - iii. Part of Petroleum Act 1984 (Safety Measures) and its regulations
- c) To conduct research and technical analysis on issues related to occupational safety and health at the workplace
- d) To carry out promotional and publicity programs to employers, workers and the general public to foster and increase the awareness of occupational safety and health
- e) To carry out promotional and publicity programs to employers, workers and the general public to foster and increase the awareness of occupational safety and health
- f) To become a secretariat for the National Council regarding occupational safety and health

### **1.7.2 National Institute of Occupational Safety and Health (NIOSH)**

NIOSH registered in June 1992 as a company limited by guarantee under the Malaysian Companies Act 1965. The Board of Directors is the administrative body that makes policies and decisions and its members are individuals from government, unions and the industrial sector.

NIOSH was established with an endowment fund from the SOCSO and from the Government. This fund was invested to become part of NIOSH's source of income. It started operations in March 1993.

Here are the roles of NIOSH:

- a) Entrusted to promote a Safe & Healthy Workplace and Workforce in Malaysia
- b) Committed to assist Employers and Employees to manage Occupational Safety and Health in their organization effectively
- c) Dedicated to provide Quality Solutions for OSH issues a professional manner, with a pragmatic approach which are reasonable and practicable
- d) Conducting core activity such as :
  - i. Provide training programs (OSH practitioners' / general OSH, certificated / competency, in-house, trainers, conference and seminar, Safety Passport System)
  - ii. Consultancy (legal compliance, medico-technical services, customized training, OSH solutions)
  - iii. Research and development (using external sources /research grants from government and private sector, supervision research projects for students in higher learning institutions, article writing for journal publication)
  - iv. Information dissemination (OSH exhibition, library, OSH shop, website and forum)



### 1.7.3 Social Security Organization (SOCSO)

The Social Security Organization was established in 1971 under the Ministry of Human Resources (formerly known as Ministry of Labour) in which to administer, enforce and implement the Employees' Social Security Act, 1969 and the Employees' Social Security (General) Regulations 1971.

Every company is required to contribute SOCSO for its employees, whether they are full/part time, permanent or temporary, employment or contract. A company must remit the contribution sum to Perkeso (Pertubuhan Keselamatan Sosial ) Office before the end of the following month.

Failing to submit the forms & remit the payment within the period will result in late interest (penalty) charged by Perkeso. The functions of SOCSO (PERKESO) are as follows:

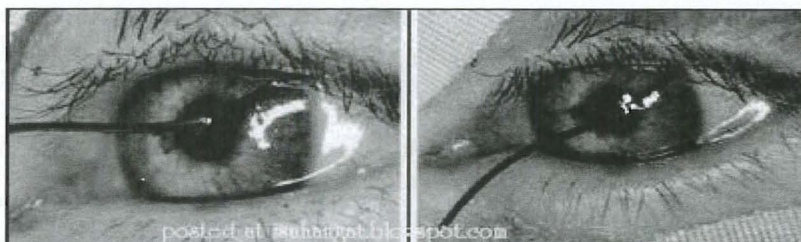
- Registration of employers and employees
- Collection of contribution from employers and employees
- Payment of benefits (social insurance including medical and cash benefits) to workers and/or their dependents when tragedy strikes
- Provision of physical and vocational rehabilitation benefits to reduce the sufferings
- Promotion of awareness of occupational safety and health

Those who are not eligible for SOCSO protections are stated below:

- Government servants
- Foreign employers
- Self-employed persons
- Sole proprietors & partnership
- Domestic servants or spouse

#### Discussion Case 1.2

A worker was using a grinder with a wire wheel and had safety glasses on. When he stop grinding, he took his safety glass off, he saw a spot he missed grinding, he picked up the wire wheel, turned it on but failed to put his safety glasses back on. A loose strand flew up and landed squarely in his eye. The wire strand punched his eyes to a depth of one half inch. Because of this incident he has vision impairment that will be corrected by glasses or contact lenses.



From the case, discuss:

Who should be responsible, either the employer or employee?

What are the acts that can be enforced in order to prevent the same case happen again?

Justify your answer.



### Self Check

1. List the chronology of local OSH legislation
2. Differentiate between Statutory Law and Common Law
3. Describe the 'Self -Regulation' concept in OSHA 1994
4. Explain the duties of employer in section 16, OSHA 1994
5. Explain the duties of employee in section 24, OSHA 1994
6. Determine the differences between OSHA 1994 and FMA 1967

## CHAPTER 2 OCCUPATIONAL SAFETY AND HEALTH MANAGEMENT SYSTEM

By the end of this topic, you should be able to:

1. Understand the concepts of safety management.
2. Understand the establishment of safety and health committee.
3. Understand the roles of the management.

### 2.0 INTRODUCTION

What is OSH-MS?

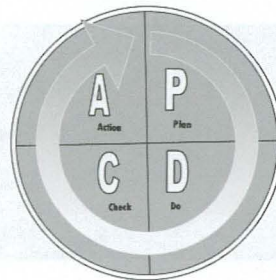


"The means by which an organisation controls risk through the management process." [Health & Safety Executive, UK]

Occupational safety and Health (OSH) management is a process of planning, organizing, leading and controlling and where relevant, staffing, to enable proactive accident prevention program to be planned and executed effectively with the aim to create and develop safe working environment.

Most of management system standard were established based on the PDCA cycle;

- **PLAN:** Design or revise business process components to improve results.
- **DO:** Implement the plan and measure its performance.
- **CHECK:** Assess the measurements and report the results to decision makers.
- **ACT:** Decide on changes needed to improve the process.



#### Safety Fact 2.1

*Frederick Taylor (1856-1915), lead developer of scientific management*





| Country                                 | Standard & Guidelines                                                                                                      |
|-----------------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| United Kingdom                          | British Standard (BS 8800:1996)                                                                                            |
| International Labour Organisation (ILO) | ILO – MS 2001                                                                                                              |
| Australia/New Zealand                   | AS/NZ 4801, 4804:1997                                                                                                      |
| United State of America                 | Occupationa Safety & Health Administration (OSHA)<br>Federal Register, 12/4/1988; Voluntary Protection<br>Programmes (VPP) |
| Malaysia                                | OSH – MS 1722                                                                                                              |

## 2.1 SAFETY AND HEALTH COMMITTEE (SHC)

Objectives of SHC:

1. To promote consultation and cooperation between management and workers in upgrading safety and health at work
2. To provide a two-way communication channel for dissemination of information on safety and health issues
3. To enhance interest and motivation of all groups of management and workers at workplace of work in safety and health

Importance if SHC:

1. Involves the individual in the various level and processes of accident and disease prevention
2. To make analysis of industrial experiences and formulate policies on OSH
3. To generate awareness on OSH

Employer to established a Safety and Health Committee if:

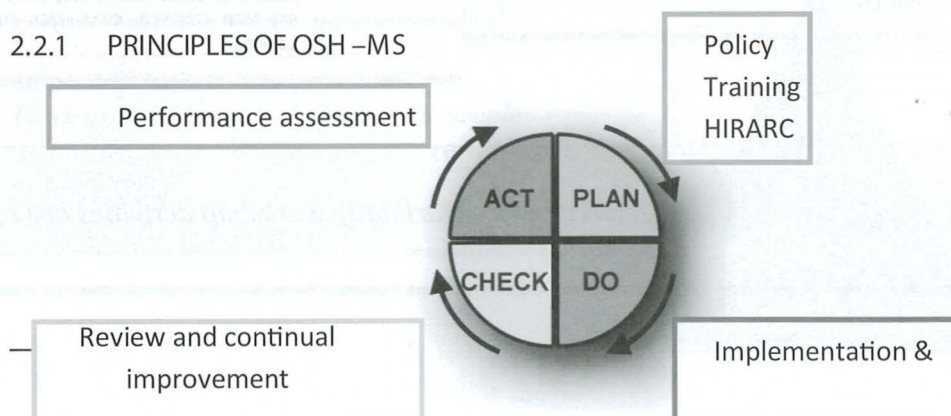
1. Employer more than 40 employees or
2. When directed by the Director-general (OSH General Director)

Function of Committee (according to OSHA 1994)

1. To keep under review measure taken to ensure safety and health at work
2. To investigate any safety and health matter brought to attention of employer

## 2.2 ROLES OF THE MANAGEMENT

### 2.2.1 PRINCIPLES OF OSH –MS





#### ■ OSH Policy

- The employer, in consultation with employees and their representatives, should write an OSH policy, that is:
  - specific to the organization and appropriate to its size and the nature of its activities.
  - concise, clearly written, dated and made effective and signed by the most senior accountable person.
  - communicated and readily accessible to all.
  - made available to relevant external parties.

#### Question 2.1;

*If there are two persons who have the same grade, who did we choose as person to signature the OSH Policy? – answer the senior on Job Position not the higher level grade.*

#### 2.2.2 ORGANIZING

##### a) RESPONSIBILITY & ACCOUNTABILITY

- THE EMPLOYER SHOULD HAVE OVERALL RESPONSIBILITY.
- PROVIDE LEADERSHIP FOR OSH ACTIVITIES IN THE ORGANIZATION.
- ALLOCATE RESPONSIBILITY accountability and authority to someone.
- APPOINT a SENIOR MANAGEMENT PERSONNEL WITH RESPONSIBILITY, accountability and authority FOR DEVELOPMENT, IMPLEMENTATION, PERIODIC REVIEW AND EVALUATION OF OSH MS.

##### b) COMPETENCE & TRAINING

- DEFINED, ESTABLISHED AND MAINTAINED ARRANGEMENTS FOR ENSURING ALL PERSONS ARE COMPETENT TO CARRY OUT THEIR DUTIES AND RESPONSIBILITIES.
- THE EMPLOYER SHOULD HAVE SUFFICIENT OSH COMPETENCE TO IDENTIFY AND ELIMINATE OR CONTROL WORK-RELATED HAZARDS AND RISKS, AND TO IMPLEMENT THE OSH MANAGEMENT SYSTEM.
- TRAINING SHOULD BE PROVIDED TO EMPLOYEE.

##### c) OSH Management Documentation

- ACCORDING TO THE SIZE AND NATURE OF ACTIVITY OF THE ORGANISATION, OSH – MS DOCUMENTATION SHOULD BE ESTABLISHED AND MAINTAINED,
- OSH RECORDS SHOULD BE IDENTIFIABLE AND TRACEABLE, AND THEIR RETENTION TIMES SHOULD BE SPECIFIED.
- WORKERS SHOULD HAVE THE RIGHT TO ACCESS RELEVANT RECORDS, WHILE RESPECTING THE NEED FOR CONFIDENTIALITY.

##### d) COMMUNICATION

- ARRANGEMENTS AND PROCEDURES SHOULD BE ESTABLISHED AND MAINTAINED FOR:
  - RECEIVING, DOCUMENTING AND RESPONDING TO INTERNAL AND EXTERNAL COMMUNICATION ABOUT SAFETY.
  - ENSURING THE EFFECTIVE INTERNAL COMMUNICATION OF INFORMATION.
  - ENSURING THAT THE EMPLOYEES' AND REPRESENTATIVES' CONCERNS, IDEAS AND INPUTS AND ARE BEEN RECEIVED, CONSIDERED AND RESPONDED TO ACTION.

#### Safety Fact 2.2;

*Morning Briefing, or briefings given by lecturer before start daily workshop activities are consider training.*



### 2.2.3 Planning & Implementation

#### a) Initial Review

- ▣ Existing **OSH** management system and relevant arrangements should be evaluated by an initial review.
- ▣ Where no **OSH** management system exists, initial review should serve as a basis for establishing an **OSH** management system.
- ▣ Should be carried out by competent persons, in consultation with employees and/or their representatives (SHC).

#### b) System Planning, Development & Implementation

- ▣ Based on the results initial review, subsequent reviews or other available data.
- ▣ Should contribute to the protection of safety and health at work.
- ▣ Planning arrangements should cover the development and implementation of all the **OSH** management system elements and in compliance with relevant laws and regulations.

#### c) OSH Objectives

- ▣ Consistent with the **OSH** policy & based on the initial or subsequent reviews,
- ▣ Measurable **OSH** objectives; specific to the organisation, consistent with the relevant and applicable laws and regulations, focused towards continuous improvement, realistic and achievable;
- ▣ The **OSH** objectives should be documented and communicated.
- ▣ Periodically evaluated and if necessary updated.

#### d) Prevention & Control Measures

- ▣ Hazards and risks should be identified.
- ▣ Preventive and protective measures should be implemented in the following order of priority based on Hierarchy of Control.
- ▣ Hazard prevention and control procedures or arrangements should be established.
- ▣ HIRARC processes to be recorded.

#### e) Management of Change

- ▣ The impact on **OSH** of internal changes and of external changes should be evaluated and appropriate preventive steps taken.
- ▣ HIRARC should be carried out before any modification or introduction any changes.
- ▣ HIRARC should be done in consultation with employees.
- ▣ Affected personnel are properly informed and trained on any changes.

#### f) Emergency Prevention, Preparedness & Response

- ▣ Emergency prevention, preparedness and response arrangements should be established and maintained.
- ▣ Arrangements should identify the potential for accidents and emergency situations, and address the prevention of **OSH** risks associated with them.
- ▣ The arrangements should be made according to the size and nature of activity of the organisation.
- ▣ Arrangements should be established in cooperation with external emergency services and other bodies where applicable.

#### g) Procurement

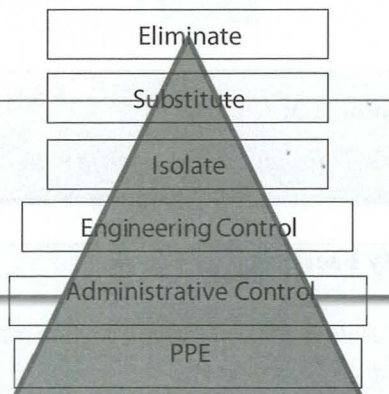
- ▣ Procedures should be established and maintained to ensure that:
  - Compliance with safety and health requirements are identified, evaluated and incorporated into purchasing and leasing specifications.
  - Laws and regulations and the organisation's own **OSH** requirements are identified prior to the procurement of goods and services.
  - Arrangements are made to achieve conformance to the requirements prior to their use.

#### h) Contracting

- ▣ Arrangements should be established and maintained for ensuring that the organisation's safety and health requirements, or at least the equivalent, are applied to contractors and their employees.

#### Safety Fact 2.3;

There are **SIX** basic Risk Control, as people said as Hierarchy of Control or can remember as **ESIEAP**





### Question 2.2;

*Can we use the risk control more than one? – YES, we can. And usually PPE used with Administrative Control*

## 2.2.4 EVALUATION

### a) PERFORMANCE MONITORING & MEASUREMENT

- ▣ RECORD **OSH** PERFORMANCE ON A REGULAR BASIS SHOULD BE DEVELOPED, ESTABLISHED AND PERIODICALLY REVIEWED.
- ▣ RESPONSIBILITY, ACCOUNTABILITY AND AUTHORITY FOR MONITORING AT DIFFERENT LEVELS IN THE MANAGEMENT STRUCTURE SHOULD BE ALLOCATED.
- ▣ THE SELECTION OF PERFORMANCE INDICATORS SHOULD BE ACCORDING TO THE SIZE AND NATURE OF ACTIVITY OF THE ORGANISATION AND THE **OSH** OBJECTIVES.

### b) INVESTIGATION OF WORK-RELATED INJURIES, ILL HEALTH, DISEASES, ETC.

- ▣ THE INVESTIGATION OF THE ROOT CAUSES OF WORK-RELATED INJURIES, ILL HEALTH, DISEASES AND INCIDENTS SHOULD IDENTIFY ANY FAILURES IN THE **OSH** MANAGEMENT SYSTEM AND SHOULD BE DOCUMENTED.
- ▣ INVESTIGATIONS SHOULD BE CARRIED OUT BY COMPETENT PERSONS WITH PARTICIPATION OF EMPLOYEES AND THEIR REPRESENTATIVES.
- ▣ RESULTS OF INVESTIGATION & RECOMMENDATIONS SHOULD BE COMMUNICATED TO THOSE RESPONSIBLE FOR CORRECTIVE ACTION.

### c) AUDIT

- ▣ TO DETERMINE WHETHER THE **OSH** MANAGEMENT SYSTEM AND ITS ELEMENTS ARE IN PLACE, ADEQUATE, AND EFFECTIVE.
- ▣ CONDUCTED BY INDEPENDENT COMPETENT PERSONS (INTERNAL & EXTERNAL).
- ▣ AUDIT RESULTS AND AUDIT CONCLUSIONS SHOULD BE COMMUNICATED TO THOSE RESPONSIBLE FOR CORRECTIVE ACTION.

### d) MANAGEMENT REVIEW

- ▣ ARRANGEMENTS SHOULD BE ESTABLISHED AND MAINTAINED FOR MANAGEMENT TO EVALUATE THE OVERALL STRATEGY OF THE **OSH** MANAGEMENT SYSTEM TO DETERMINE WHETHER IT MEETS PLANNED PERFORMANCE OBJECTIVES.

## 2.2.5 ACTION FOR IMPROVEMENT

### a) PREVENTIVE & CORRECTIVE ACTION

- ▣ ARRANGEMENTS SHOULD BE ESTABLISHED AND MAINTAINED FOR PREVENTIVE AND CORRECTIVE ACTION RESULTING FROM **OSH** MANAGEMENT SYSTEM PERFORMANCE MONITORING AND MEASUREMENT, AUDITS AND MANAGEMENT REVIEWS.

### b) CONTINUAL IMPROVEMENT

- ▣ ARRANGEMENTS SHOULD BE ESTABLISHED AND MAINTAINED FOR THE CONTINUAL IMPROVEMENT OF THE RELEVANT ELEMENTS OF THE **OSH** MANAGEMENT SYSTEM AND THE SYSTEM AS A WHOLE.
- ▣ THE SAFETY AND HEALTH PROCESSES AND PERFORMANCE OF THE ORGANISATION SHOULD BE COMPARED WITH OTHERS IN ORDER TO IMPROVE HEALTH AND SAFETY PERFORMANCE.

### Question 2.3;

*Can OSH Policy can be rewrite with new policy? – YES, it can.*

### Safety Fact 2.4;

*OSH Policy in any Organization/Institution/Company is compulsory because its already state is OSHA 1994 (Section 16)*



## 2.4 SUMMARY OF PDCA IN SAFETY

| Stag   |   | Activities                           |                                                                                      |
|--------|---|--------------------------------------|--------------------------------------------------------------------------------------|
| PLAN   | 1 | Panning, Commitment & Initial Review | Discussion<br>Conduct Initial Review<br>Formulate Action Plan                        |
|        | 2 | Policy                               | Formulate<br>Define Objectives & Goals                                               |
| DO     | 3 | Procedures                           | How to perform activities<br>Implement document control system                       |
|        | 4 | Training                             | In-house training & outside course                                                   |
|        | 5 | Implementing                         | Policies & Procedures                                                                |
| Check  | 6 | Monitoring, Audit & Review           | Check Policies and procedure are it been follow?                                     |
| Action | 7 | Corrective Action                    | Audit result – develop new action plan if the old one fail to comply the system      |
|        | 8 | Continues Improvement                | All part of the system need to reviewed regularly to make sure every follow as plan. |

### Self Check

1. What is OSH MS?
2. Explain P-D-C-A concept?
3. What the 7 tools that been used in Risk Control?
4. What is OSH Policy?

## CHAPTER 3.0 INCIDENTS PREVENTION

By the end of this topic, you should be able to:

1. Understand the concepts of incident.
2. Understand principle of incidents prevention.
3. Understand accident causation theories.
4. Understand incidents prevention costs.
5. Know accident prevention programme.

### 3.0 INTRODUCTION

The International Labour Organization (ILO) marks the World Day for Safety and Health at Work on the 28th of April to promote the prevention of occupational accidents and diseases globally. It is an awareness-raising campaign intended to focus international attention on emerging trends in the field of occupational safety and health and on the magnitude of work-related injuries, diseases and fatalities worldwide.

This chapter provides students with the information they need about the principle of incident prevention, incident prevention costs. It also provides specific information about accident causation theories as well as accident prevention programme.

#### Safety Fact 3.1

##### Outcome

- 1) Government promotes a high level of workplace health and safety performance, and has excellent health and safety practices in its own workplaces.
- 2) Work-related fatality rate down by 20%, and work-related injury rate down by 30%.
- 3) Industries lead improvements in workplace health & safety practices, and there is strong support for workplace health & safety in the wider community.
- 4) Internally strong correlation between OSH practitioner & Government. Externally, more bilateral agreements on OSH implemented.

(Source: National OSH Agenda – OSH MP15)

### 3.1 INCIDENT AND ACCIDENT DEFINED

- The term "accident" can be defined as an unplanned, unexpected event that results in physical injury or ill health to people, or damage to property, plant, materials or the environment or a loss of business opportunity.

OR

- An unplanned, uncontrolled event which has led to or could have led to injury to people, damage to plant, machinery or the environment and/or some other loss.

Example: A window cleaner dropping a bucket from a height, which caused injury to a person underneath, would be classed as an accident.



- An "incident" can be defined as any event, which under slightly different circumstances, may have resulted in injury or ill health of people, or damage or loss to property, plant, materials or the environment or a loss of business opportunity.

OR

- An incident can refer to any event that happens. The term "incident" includes "near -miss." Near misses describe incidents where no property was damaged and no personal injuries sustained, but where, given a slight shift in time or position, damage and/or injury easily could have occurred. Therefore, the term incident is used in some situations and jurisdictions to cover both an "accident" and "incident".

Example: A window cleaner dropping a bucket from a height, which just missed a person standing underneath, would be classed as a "near-miss" incident. This incident did not cause an injury to a person but, under slightly different circumstances (the person standing nearer to the contact point) the person may have been injured.

### 3.2 **PRINCIPLE OF INCIDENTS PREVENTION**

The Ministry of Labour and National Service (UK) postulated the following six principles of Principles of incidents prevention in 1956 that are still valid today. These principles are included in Occupational Safety and Health Act 1994 (OSHA 1994).

- a) Accident prevention is an essential part of good management and of good workmanship.
- b) Management and workers must fully cooperate wholeheartedly in securing freedom from accidents.
- c) Top management must take the lead in organising safety.
- d) There must be definite and known safety policy in workplace.
- e) The organisation and resources necessary to carry out the policy must exist.
- f) The best available knowledge and method must be applied.

### 3.3 **ACCIDENT CAUSATION THEORIES**

The primary goals of an accident causation theory are to help predict and prevent accidents and to identify the root cause of the accident. There are many theories on accidents as researchers from different fields of science and engineering have been trying to develop it. The three main ones of accident causation theories are:

- a) Heinrich's Domino Theory
- b) Bird's Loss Causation Model
- c) Multi-causality Accident Model

### 3.3.1 Heinrich's Domino Theory

Heinrich's Domino Theory (1931) was a theory of accident causation developed by William Heinrich. Heinrich concluded that 88% of all accidents are caused by unsafe acts of people, 10% by unsafe conditions and 2% are unavoidable. According to Heinrich, there are five factors in the sequence of events leading up to an accident. The sequence of accident factors is as follows:

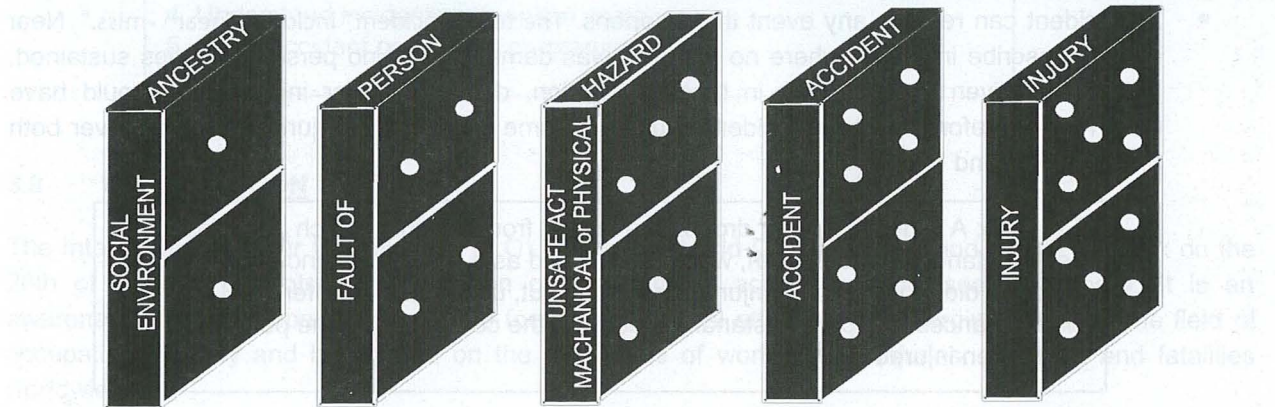


Fig.3.1 Heinrich's Domino Theory

The sequence of accident are as follow:

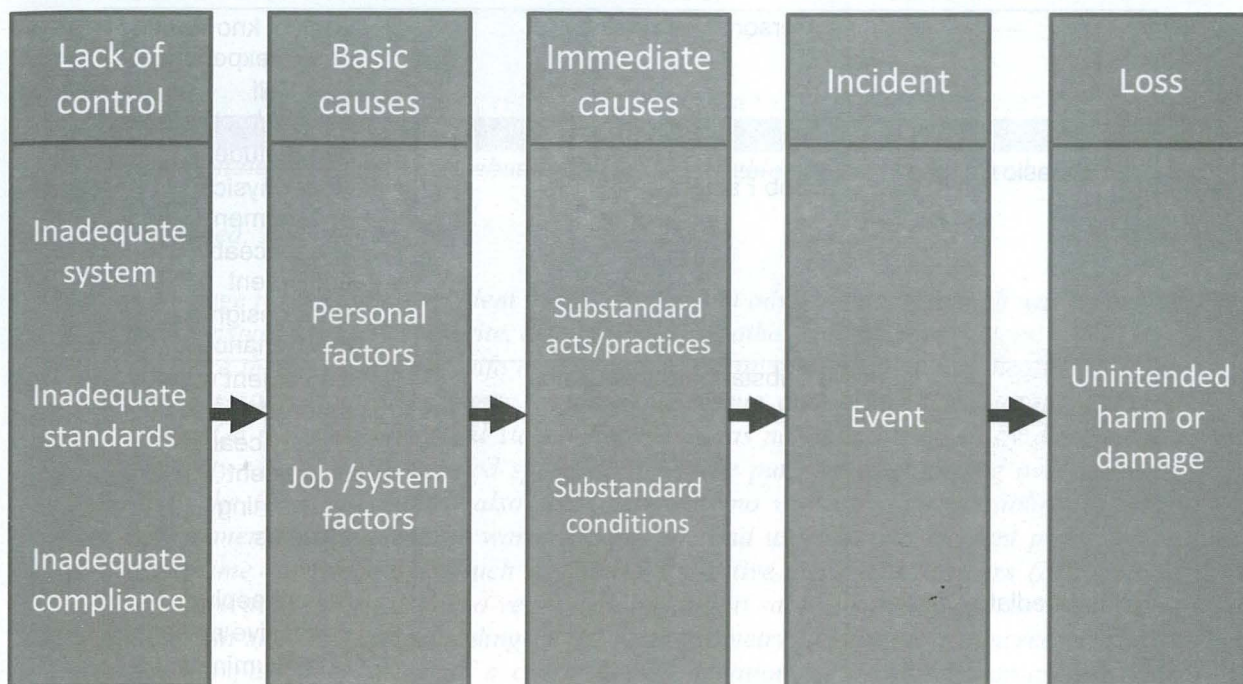
1. Ancestry and social environment of the injured worker
2. Worker fault is caused by a personal flaw such as negligence, carelessness or nervousness.
3. Unsafe act or unsafe condition is caused by the worker fault.
4. Accident is caused by unsafe act and unsafe condition.
5. Injury or damage is caused by accident.

The accident is avoided, according to Heinrich, by removing one of the dominoes, normally the middle one or unsafe act. This theory provided the foundation for accident prevention measures aimed at preventing unsafe acts or unsafe conditions.

### 3.3.2 Bird's Loss Causation Model

In early 1970s, Frank E. Bird revised Heinrich's Domino theory and introduced Loss Causation Model. Bird's revision was important because it introduced the thought of managerial error into the accident causation sequence. He showed the way by making the accident sequence a manageable and controllable matter.





**Fig 3.2: Loss Causation Model**

1. Lack of control by management
2. This permits the existence of basic causes (i.e personal and job factors)
3. In turn, this leads to immediate causes (i.e substandard conditions and substandard practices)
4. These are subsequently the direct causes (the accident)
5. Finally this results in loss

The model above is a simplified reflection of the real life situation but powerful for communication purpose, it relates the management system to the event and the results thereof, either good or bad, depending on the quality of the system.

### 3.3.2.1 Loss Causation Model Details

| Accident Sequence  | Factor of Accident               | Example                                                                                                                                                        |
|--------------------|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Lack of control | i. Supervisory Performance       | <ul style="list-style-type: none"> <li>• Improper supervision</li> <li>• Failure of SOP</li> <li>• Poor inspection</li> <li>• Hazards not corrected</li> </ul> |
|                    | ii. Management Policy & Decision | <ul style="list-style-type: none"> <li>• Poor company safety policies</li> <li>• Consider safety as unimportant element</li> <li>• No Commitment</li> </ul>    |

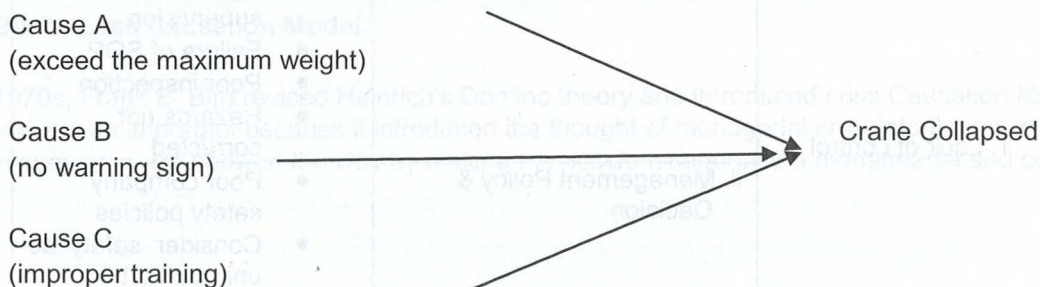
|                     |                           |                                                                                                                                                                                                                                                                                                                     |
|---------------------|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2. Basic Causes     | i. Personal Factors       | <input type="checkbox"/> Lack of knowledge or skill/experience,<br><input type="checkbox"/> Low Self esteem/motivation<br><input type="checkbox"/> bad attitude                                                                                                                                                     |
|                     | ii. Job Factors           | <input type="checkbox"/> Poor physical environment<br><input type="checkbox"/> unserviceable equipment<br><input type="checkbox"/> Poor design & maintenance                                                                                                                                                        |
| 3. Immediate Causes | i. Substandard Conditions | <input type="checkbox"/> Equipment without safety devices<br><input type="checkbox"/> Unserviceable equipment<br><input type="checkbox"/> No warning systems<br><input type="checkbox"/> Poor housekeeping,<br><input type="checkbox"/> Excessive noise<br><input type="checkbox"/> Poor illumination & ventilation |
|                     | ii. Substandard Practices | <input type="checkbox"/> Use unserviceable equipment<br><input type="checkbox"/> Operating without authority<br><input type="checkbox"/> Horseplay                                                                                                                                                                  |

**Fig.3.3 Loss Causation Model**

### 3.3.3 Multi-causality Accident Model

Multicausality Accident Model refers to the facts that there may be more than one cause to any accident. This theory is compatible with Bird's Loss Control Model. According to this theory, there may be more than one cause of an accident, not only in sequence, but occurring at the same time. Taking an example of a tower crane operator died after his crane collapsed on a high rise building site in Ara Damansara.

"----The man, XXX, 26, had started operating the crane during the site's morning briefing at Tower One, an 11 storey building currently being built by contractor SD. He had only started the job two weeks earlier, he was declared dead a the scene. It appears as if the top of the crane broke free from the tower, as the slew ring bolts or other component failed-----"



**Fig. 3.4 Multi-causality Accident Model**



### Safety Fact 3.2

*Report states six factors contributing to Genting Highlands bus crash tragedy – Bernama*

*Published: 21 February 2014*

*A 44-page report on the accident by an independent advisory panel, which was posted on the Transport Ministry's website, also outlined five other contributory factors.*

*They are the road, vehicle, safe operation and occupational safety and health (OSH) in transportation sector, emergency response and rescue, and lackadaisical attitude on road safety. On the road factors, it stated that there was no initiative taken by any relevant authority to gazette the posted speed limit for the purpose of enforcing over-speeding along the Genting Road. It also said there was no warning sign pertaining to foggy environment and inadequate warning signs to road users about accident prone areas. Night time safety features, such as Raised Reflective Pavement Markers (RRPM) and reflective delineators, are also very much lacking, it said. It said the barrier installed at the crash site was not according to the road geometry, leading to an increased risk of direct impact in an event of a crash. On the location of the emergency escape ramp (EER), it said, it was not easily accessible by road users in an emergency situation as the EER entry was obstructed by the horizontal curvature of the roadway. On the vehicle factors, the report cited there was inefficiency in the brake system, where the front brake linings were badly worn-out and had exposed the rivets which caused metal contacts between the drums and rivets. Given the steep condition of the road at the crash site, the secondary retarder installed on the bus might not have functioned as effectively as it should, it added. The panel also found that Genting Highlands Transport Sdn Bhd demonstrated poor commitment on managing its operations and its compliance with the Occupational Safety and Health Administration and the Industry Code of Practice for Land Public Transport Commission 2010. There was also ineffective communication system in hilly and remote areas and the Computer Aided Dispatch (CAD) 999 system was not utilised efficiently during the incident. Following the findings, the panel had proposed 51 recommendations to address the problems.*

*The recommendations are sub-divided into road, vehicle, safe operation and OSH practice, emergency response and rescue, and strengthening and empowering the public for road safety. The Genting Highlands bus crash is the worst road accident ever recorded in the country.*

*(Source: <http://www.themalaysianinsider.com/malaysia/article/report-states-six-factors-contributing-to-genting-highlands-bus-crash-trage#sthash.i9YeoJBp.dpuf>)*

### Example of Questions on Bus Accident

The example of questions that will assist us in finding the cause based on accident causation theories are as follows:

#### Heinrich approach

Some may ask:

- Was the driver experienced in the work being done?
- What was the status of his health?
- Was he tired?
- Was he under stress (work or personal)?
- Was the bus driver didn't take enough rest?
- Were unsafe conditions of bus corrected?

#### Bird's Loss Causation and Multi-causality Accident approach

Some may ask:

- Were regular safety inspections carried out?
- Were safety rules communicated to and understood by all employees?
- Was driver trained to do the work?
- Was regular maintenance of bus carried out?
- Were regular safety inspections carried out?
- Were written procedures and orientation available?
- Were they being enforced?
- Was there adequate supervision?
- Had hazards been previously identified?
- Had procedures been developed to overcome them?
- Was regular maintenance of equipment carried out?
- Was the bus driver trained to do the work?
- Why the management of bus company assigned two drivers instead of one
- Why the management didn't have record on maintenance



Fig. 3.4 Multi-causality Accident Model



### Discussion Case 3.1

Read the article below. You as a Safety and Health Officer, are required to choose the most appropriate accident causation theory to identify the root cause behind the fatal accident in order to avoid the reoccurrence of such accident. Discuss the strategies that can be used to prevent such accidents.

#### 300-tonne concrete span at MRT construction site falls, three workers feared dead

*PETALING JAYA: Three workers are feared dead after a 300-tonne concrete span collapsed at a MRT construction site in Kota Damansara Monday night. In a statement, Mass Rapid Transit Corporation (MRT Corp) said the incident occurred at the MRT worksite within the former Rubber Research Institute site near Kota Damansara. "The incident occurred at around 8.30pm while construction of the parapet was being carried out on the MRT elevated guideway.*

*"A span of the guideway had dislodged from its piers and fallen on the ground below. The span, which was made up of 14 units of segmented box girders, was 38m in length and weighed 300 tonnes. "MRT Corp confirms that three workers are unaccounted for and are believed to be trapped underneath. Rescue efforts are currently on-going and an emergency response team is on standby at the site," it said.*

*It later revealed the names of the three workers unaccounted for, namely Bangladesh nationals Mohamad Faruk Khan, Mohammad Elahi Hossain and Mohammad Alauddin Mollik" .*

(Source: <http://www.thestar.com.my/News/Nation/2014/08/18/MRT-beam-collapse-3-feared-dead> )

### 3.4 INCIDENTS PREVENTION COSTS

The incident prevention costs refer to the cost of all the activities undertaken by employer in order to plan and apply a safety program that will decrease accidents. The costs of workplace incidents prevention costs include design costs, operational costs and safe guarding of the future costs.

#### 3.4.1 **Design Costs**

Design costs include installing machine guard to protect worker. Machine guarding is a precautionary safety feature on manufacturing or other engineering equipment. Specifically, it is a shield or device covering hazardous areas of a machine to prevent contact with body parts or to control hazards like chips and noise from exiting the machine.

Machine guarding provides a means to protect humans from injury while working nearby or while operating equipment. Machine guarding is often the first line of defense to protect operators from injury while working on or around industrial machinery during normal operations.

#### 3.4.2 **Operational Costs**

Operational costs include such things as running a safety department training, maintenance and replacement of Personal Protective Equipment, routine maintenance and service.



### 3.4.3 Safe Guarding of the Future Costs

Cost for environmental sampling, safety audit and inspection and audit of the working conditions.

## 3.5 ACCIDENT PREVENTION PROGRAMME

Most successful accident prevention programs are based on a common set of key elements. These include management leadership, worker participation, hazard identification and assessment, hazard prevention and control, education and training, and program evaluation and improvement.

### 3.5.1 Management Commitment in Accident Prevention

The top management must provide and maintain a safe and healthy work environment as indicated by acceptable industry practices and compliance with legislative requirements. The top management needs to ensure safety trainings are held as well as enforcing the safety rules, all necessary safety equipment are readily available and ensure that everyone in the workplace understand their responsibilities and duties to work safely.

### 3.5.2 Develop the Accident Prevention Planning

Studies show that most workplace accidents can be due to employees' errors, equipment insufficiencies and bad procedures and etc. These factors can all be addressed with better training and by developing an accident prevention plan. There are four major considerations in developing and running a accident prevention program. They are:

- Planning (eg: *involve staff members in the planning and implementation of training programs*)
- Methods (eg: *what methods to use in a staff training program*)
- Logistics (eg: *location, setup and training materials matters*)
- Evaluation (eg: *to determine the effectiveness of your training program*)

Over the months and years ahead, the accident prevention plan must be revised, changed, added to, deleted from, as things change. This is a working guide, so make sure you have everything in it and that it's changed as necessary. It's a guide that should be used regularly as a reference, by employees, supervisors and managers.

### 3.5.3 Determine the Accident Prevention Training

Training is directly related to the skills, knowledge, and strategies necessary to do a particular job. Providing safety & health training is to ensure you or your employees are not injured or made ill by the work they do. Besides, it is to meet legal duty to protect the health & safety of your employees.

The accident prevention training program such as:

- Injury and illness prevention program
- Safe handling of hazardous materials
- Site-specific training
- Formal orientation sessions for new employees
- Specific equipment safety training
- To perform jobs in accordance with legislative requirements and Standard Operating Procedures.



- Fire emergency program
- PPE training

#### Self Check

1. What is the difference between incident and accident?
2. Explain the domino theory of accident causation, including its origin and its impact on more modern theories.
3. A methane explosion requires: (i). Methane in the explosive range of 5% to 15% (ii) oxygen or air (iii) ignition source. The ignition will only happen if these three events occur together. What would be the most relevant accident causation theory to describe this incident?
4. You are employed by a factory as a Safety and Health Officer. The factory has recorded high accident rate. Discuss how you could minimize this rate.
5. A worker fell off the fifth floor of the building where he was working. He had complained of headache before the incident. He died in the hospital. Base on this case, discuss:
  - Possible causes of accidents, and
  - Strategies to avoid the recurrence of such accidents

## **CHAPTER 4.0 EMERGENCY PREPAREDNESS, RESPONSES AND FIRE SAFETY**

By the end of this topic, you should be able to:

1. Understand emergency
2. Understand emergency management
3. Understand the basic of fire
4. Understand emergency and fire safety training

### **4.1 INTRODUCTION**



Emergency – “A sudden occurrences or unstoppable developing event or an imminent threat to the organization due to widespread or service damage injury, loss of life”.



There are three stages to an emergency  
BEFORE EMERGENCY  
WHEN EMERGENCY HAPPEN  
EMERGENCY UNDER CONTROL / IS OVER

#### **LEVEL OF EMERGENCY**

Level 1 – where the organization can handle the situation with its own

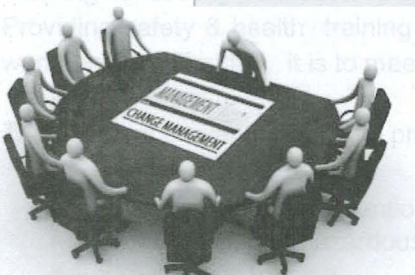
Level 2 – where external local assistance is required. Example – Majlis Keselamatan Negara Arahan 20

Level 3 - where the incident is of such a proportion that it becomes a national disaster

### **4.2 EMERGENCY MANAGEMENT**

The basic program elements of an emergency preparedness and response are:

1. Organize an Emergency Management Team
2. Identify Accident Scenarios and emergency consequences
3. Find our resources, equipment and facilities
4. Develop plans and procedures for emergency and for response
5. Training (drills)
6. Review system

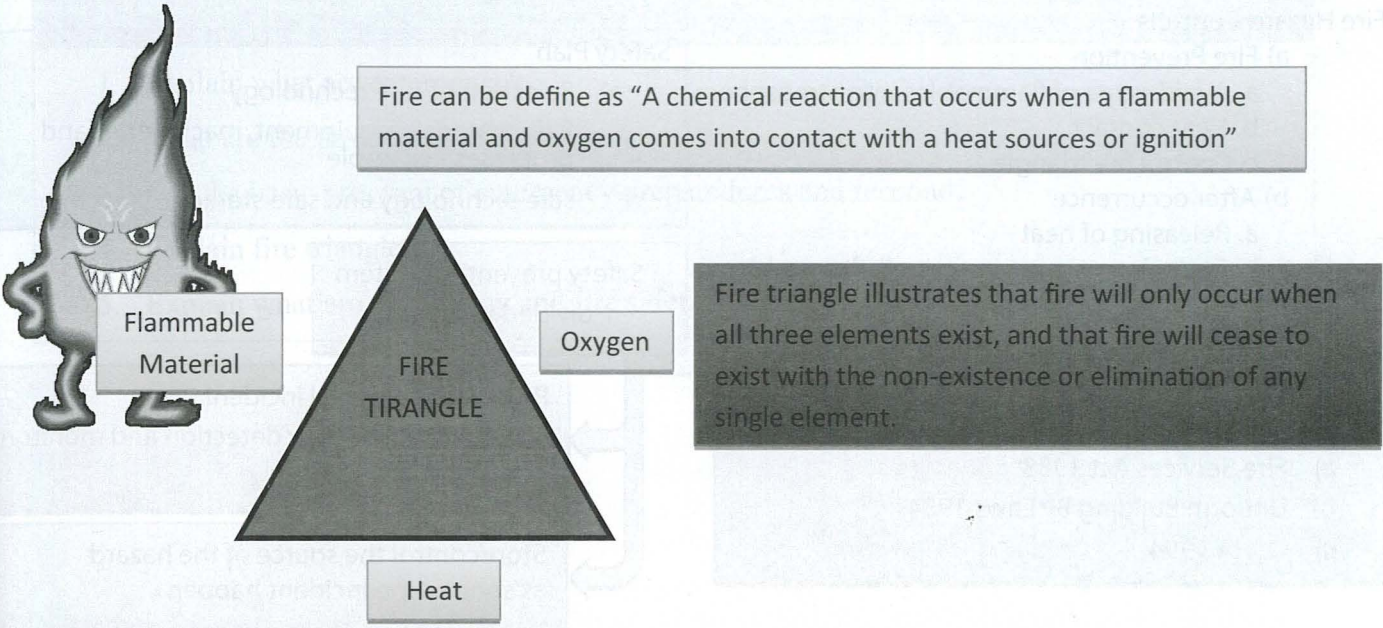


#### **Safety fact 4.1:**

Did you know what ERT is in safety? ~ ERT is emergency response team; it's one of the ERP communications of Emergency Management.



4.3 BASIC FIRE



NFPA 10: 1984 CODE

| CLASS | TYPE OF FIRE                                           |
|-------|--------------------------------------------------------|
| A     | WOOD, MATERIAL, PAPER, RUBBER AND PLASTIC              |
| B     | FLAMMABLE LIQUID, OIL, GREASE, TAR, PAINT & GAS        |
| C     | ELECTRICAL EQUIPMENTS WITH CONNECTED ELECTRICAL SUPPLY |
| D     | METAL                                                  |

CODE BS EN2: 1992

| CLASS | TYPE OF FIRE                        |
|-------|-------------------------------------|
| A     | SOLIDS THAT CAUSE FIRE              |
| B     | LIQUID OR SOLID THAT BECOMES LIQUID |
| C     | GAS / VAPOUR                        |
| D     | METAL                               |

Safety fact 4.2:  
Fire Extinguisher Chart

| Fire Extinguisher Chart |                      |                                  |                   |                  |                      |                     |
|-------------------------|----------------------|----------------------------------|-------------------|------------------|----------------------|---------------------|
| Extinguisher            |                      | Type of Fire                     |                   |                  |                      |                     |
| Colour                  | Type                 | Solids (wood, paper, cloth, etc) | Flammable Liquids | Flammable Gasses | Electrical Equipment | Cooking Oils & Fats |
|                         | Water                | ✓<br>Yes                         | ✗<br>No           | ✗<br>No          | ✗<br>No              | ✗<br>No             |
|                         | Foam                 | ✓<br>Yes                         | ✓<br>Yes          | ✗<br>No          | ✗<br>No              | ✓<br>Yes            |
|                         | Dry Powder           | ✓<br>Yes                         | ✓<br>Yes          | ✓<br>Yes         | ✓<br>Yes             | ✗<br>No             |
|                         | Carbon Dioxide (CO2) | ✗<br>No                          | ✓<br>Yes          | ✗<br>No          | ✓<br>Yes             | ✓<br>Yes            |



#### 4.4 EMERGENCY AND FIRE SAFETY PLANNING

##### Fire Hazard Controls

- a) Fire Prevention
  - a. Avoid surge of flammables into atmosphere
  - b. Heat contact
  - c. Control fire triangle
- b) After occurrence
  - a. Releasing of heat
  - b. Enclosing or stopping supply flammables
  - c. Enclosing or stopping supply of oxygen

##### Safety Plan

- a) Selection of safe technology  
Safe materials, equipment, machineries and processes - example  
safe technology and safe storage

##### Safety prevention system divided into two

##### Prevention of initial incident

- By having an early detection and monitoring system

Stop/control the source of the hazard as soon as the incident happen

##### Statutory Provisions Related To Fire Safety

- a) Fire Services Act 1988
- b) Uniform Building By Laws 1984
- c) OSHA 1994

##### Safety fact 4.3:

Did you know source stated that there 20 explosion during Bright Sparkle Factory Tragedy at Kepong



##### User-Friendly Plant

| Characteristic                   | User-friendly                                       |
|----------------------------------|-----------------------------------------------------|
| Substitution of chemicals        | Avoid fire                                          |
| Weakening of Hazardous chemicals | De-ridge rate atmosphere temperature                |
| Design of equipment              | Reaction may be handled and controlled              |
| Plant Layout                     | Breaks spread of fire and isolate between equipment |

##### Administrative & Engineering Controls

| Administrative Control | Engineering Control                             |
|------------------------|-------------------------------------------------|
| Training – Fire Drill  | Regular Check Equipment                         |
| SOP                    | Improved layout – Emergency Response Team (ERT) |
| Signage                | Design of equipment – improvise to better usage |
| Testing                |                                                 |
| Inspection             |                                                 |
| Review                 |                                                 |



Table 5.1 : Number Of First Aider Required (OSH Act, 1994)

### Self Check

1. Explain what are emergency?
2. What are the three level of emergency
3. List the basic program of emergency preparedness and respond?
4. Explain fire triangle?
5. Explain what are emergency and fire safety planning?

## **CHAPTER 5.0 : OCCUPATIONAL FIRST AID**

By the end of this chapter, you should be able to:

1. Understand first aid
2. Understand the purpose of first aid
3. Understand principles of first aid
4. Understand the requirement under the first aid guideline by DOSH
5. Understand basic first aid and treatment
6. Explain three level of first aid training

### **5.0 INTRODUCTION**

This chapter gives prospective and practicing safety and health professionals the information they need to conduct through effective first aid arrangements to meet the requirements of the OSHA1994 and FMA 1967. Each year companies and organizations are suffering from incidents resulting from disasters / emergencies at workplace. Accidents and emergencies can happen anywhere, at any place and at any time. Medical records show 95% of accidents and emergencies occur away from a medical facility. Prompt action by a bystander can save a life. Doing the right thing with the right techniques makes the difference between life and death. The ability to carry out first aid before paramedics arrive can really minimise a casualty's damage, help aid their recovery and even ensure their survival.

Employer has a legal obligation/duty to provide information, instruction, training and supervision about first-aid services for its staff in the premises.

#### **The Factories and Machinery Act 1967**

Section 25 of the FMA 1967 (Act 139) and Regulations 38 of the Factories and Machinery (Safety, Health and Welfare) Regulations 1970 state the scope of responsibility of an occupier with regards to first-aid provision. The scope includes:

- a) Providing and maintaining a first-aid box/kit of such standard as may be prescribed and ensuring the box/kit is readily available/accessible at all times
- b) Assigning the responsibility to upkeep a first-aid box/kit to a responsible person, specifying that the responsible person should be proficient in first-aid treatment
- c) Providing and maintaining a first-aid room in a factory where more than 150 person are employed

#### **The Occupational Safety and Health Act 1994**

Section 15(1) of the OSHA 1994 (Act 514) provides that every employer must ensure, so far as is practical, the safety, health and welfare at work of all his employees. The provision of first-aid facilities and first-aiders is in compliance with the welfare component of this general duty of employers. This means that the employer must provide, as a minimum, an appointed person at all times to take care of the emergency requirements at work.



### Safety Fact 5.1

**Table 5.1 : Number Of First Aider Required (OSHA 1994)**

| Description                                                                              | Number Of Workers | Number Of First Aider                                                                                                      |
|------------------------------------------------------------------------------------------|-------------------|----------------------------------------------------------------------------------------------------------------------------|
| Workplace with low risk hazards (eg : office)                                            | less than 20      | (1)                                                                                                                        |
|                                                                                          | 21-150            | (2)                                                                                                                        |
|                                                                                          | more than 150     | (2) for every 150 workers or part thereof                                                                                  |
| Workplace with high risk hazards (eg : chemical plant, shipyards and construction sites) | less than 20      | (1) per shift                                                                                                              |
|                                                                                          | 20 or more        | (2) for every 150 workers or part thereof                                                                                  |
| Workplace with more than 400 workers                                                     |                   | (2) for every 150 workers or part thereof and in addition a registered nurse or medical assistant must be employed on site |
| Logging                                                                                  |                   | one for every "tree felling gang"***                                                                                       |

\*\* a tree-felling gang is a group of workers involved in tree felling operation which normally consists of a tree-feller, a tractor driver, a wireman and the supervisor.

### 5.1 FIRST AID DEFINITION

Regarding to DOSH, first aid in the workplace includes the provision of first-aid facilities, services and personnel required for the initial treatment of persons suffering from injury or illness at a workplace. It is the immediate treatment or care given to a victim of an accident or sudden illness before qualified health personnel attend to provide treatment.

The aims of first aid are to:

- Preserve life
- Prevent illness or injury from becoming worse
- Provide pain relief
- Promote recovery
- Care of unconscious

It is important to understand that first aid has its limitations and does not take the place of professional medical treatment.

### 5.2 FIRST AID PRINCIPLE

The process of providing first aid service is similar to that of risk management.

- Identification :
  - Identify the nature of existing work, processes and hazard
  - brief examination of casualty - by observing sign and symptom  
Signs: details of a casualty's condition we may assess using our senses : look, listen, smell or feel  
Symptoms: a sensation that the casualty experiences: is there a pain? what type of pain? nausea dizziness, coldness



- b) Assessment :
  - i. Assess the consequences from the identified situation
  - ii. Ask details of the injury or illness, any care that may have already been given, and pre-existing conditions such as diabetes or heart trouble. One method for evaluating a victim's condition is known by the acronym ABC
    - A = Airway - ensure airway to lungs is open
    - B = Breathing – check of sign of breathing
    - C = Circulation – is there any pulse/ is the person bleeding externally
  - iii. Take into account
  - iv. Availability of the immediate help from external outsourcers including the distance from the nearest hospital
- c) Control :
  - i. Provision of appropriate first aid facilities, trained first aiders and services accordingly

### **5.3 FIRST AID REQUIREMENT BY DOSH**

When the assessment of first aid requirements has been completed, the employer should provide the materials, equipment and facilities needed to ensure that the level of cover identified as necessary will be available to employees at all relevant times. This will include ensuring that first aid equipment is suitably marked and easily accessible, i.e. available in all places where working conditions require it.

#### **5.3.1 First Aid Box**

##### **a) Design**

First aid box should be made of sturdy material and designed to protect the contents from damp, dust and contamination. Boxes should be clearly identified as first aid containers, the marking used should be a white cross on a green background.

The boxes can be of any size, but they must be large enough to fit the contents, and be of a sufficient size to cope with the number of people needing to use it. The size of the box will depend on whether or not it is designed to operate as a mobile, lone worker, vehicle or commercial premises box.

##### **b) Number and Location**

Each first-aid box should be placed in a clearly identifiable, well-illuminated and accessible location. The box should be kept locked and the key thereto kept by responsible person available during all working hours [section 38(iii) FMA (Safety, Health and Welfare) Regulations]. The employees should be informed of the location of all first aid boxes.

Each employer shall provide at least one full basic first aid box in each place of work. Where a workplace covers a large area, an adequate number of first-aid boxes should be provided. Additional supplies may be mobile first aid boxes as appropriate to the situation. A first aid box should be provided and located so as to ensure that:

- i. It is close to a wash basin with hot and cold running water, soap, and clean towels. If, because of location, running water is not available, then saline solution can be provided instead
- ii. It is easily seen and readily accessible to all employees
- iii. There is immediate access to areas of particular or special hazard
- iv. There is at least one first aid box on each floor of a multi-level place of work
- v. Where employees work in, or travel to, scattered locations away from the main place of work, each work vehicle shall be provided with a suitable first aid box



### c) Content

The content of your first aid box must take account of the circumstances and hazards of your workplace. So the contents should be decided based on the outcome of your Needs Assessment. Where particular hazards exist, the boxes should be provided with additional contents. Therefore first aid boxes should contain a sufficient quantity of suitable first-aid materials.

It is essential that first-aid boxes be checked frequently so as to make sure they are fully equipped and all items are usable. Ensure they are replenished as soon as possible after use, so there's always an adequate supply of equipment available. Items should be replaced before the expiry date shown on the packaging, where applicable. Nothing other than first aid equipment or related equipment, such as pens, accident report forms and oral medication of any kind other than those required for first-aid treatment should be in the boxes.

A basic first aid box should include :

|                                               |                                                       |
|-----------------------------------------------|-------------------------------------------------------|
| 1. 5 Triangular bandages 130cm x 90cm x 90cm  | 14. Adhesive tape                                     |
| 2. Sterile eye pads                           | 15. Sterile multi-trauma dressing/gauze               |
| 3. Non-sterile 4x4" gauze pads                | 16. Alcohol prep pads                                 |
| 4. Sterile 4x4" gauze pads                    | 17. Cetavlon                                          |
| 5. Sterile 10x10" gauze pads                  | 18. Cotton buds                                       |
| 6. Elastic bandage                            | 19. Barrier device for CPR (pocket mask, face shield) |
| 7. 4 Roller bandages 7.5 cm                   | 20. Elastoplast /sterile adhesive dressing            |
| 8. 4 Roller bandages 3 cm.                    | 21. Safety pin for triangular bandages                |
| 9. 4 Roller bandages 2.5 cm                   | 22. Thermometer                                       |
| 10. Cold pack compress gel                    | 23. First aid manual                                  |
| 11. Burn sheet/dressing                       | 24. Waterproof waste bag                              |
| 12. Pairs of gloves (disposable/ non sterile) | 25. Inventory of box contents (checklist)             |
| 13. Stainless steel bandage scissors          |                                                       |

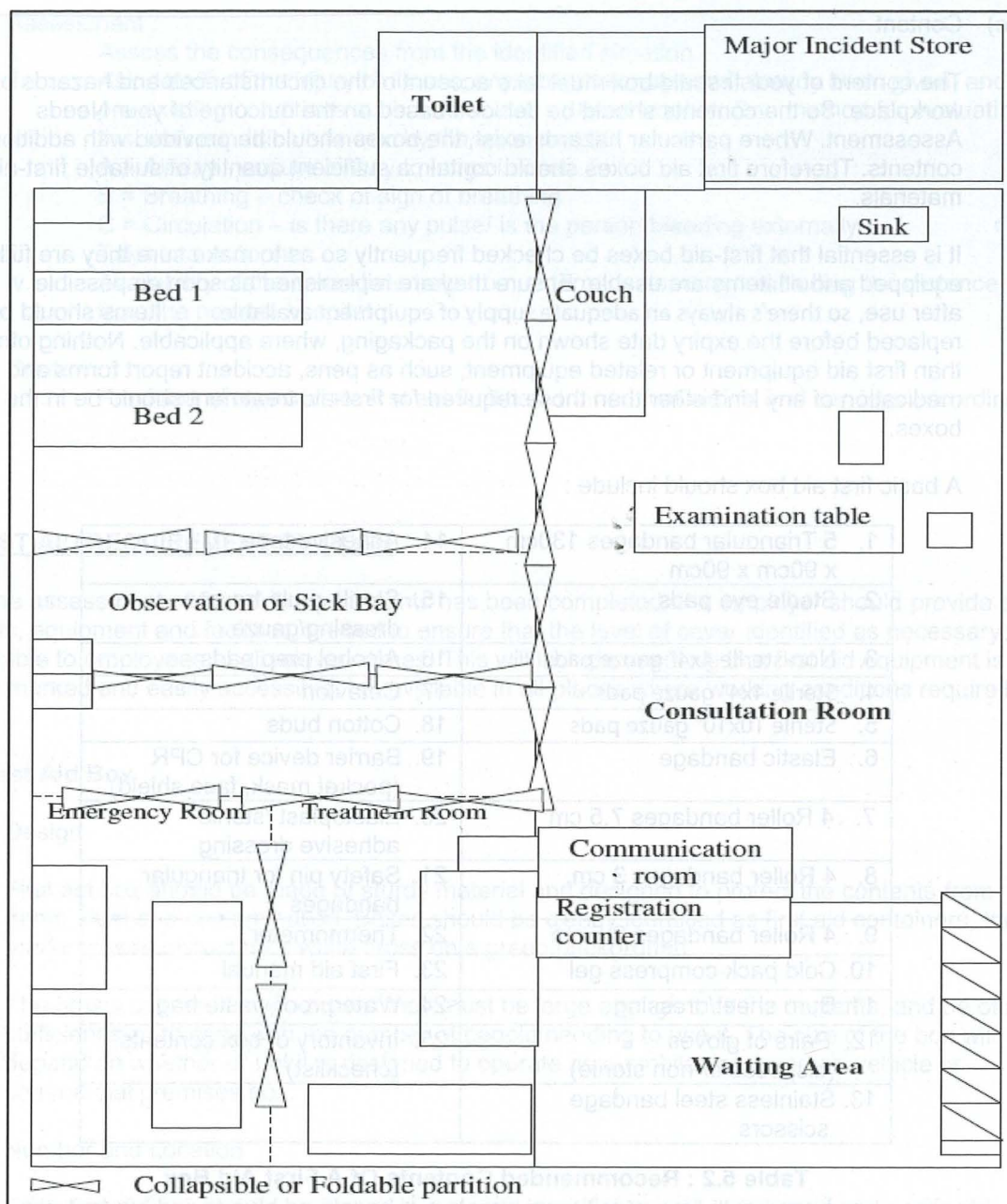
**Table 5.2 : Recommended Contents Of A First Aid Box**

### 5.3.2 First Aid Room

Regarding to DOSH, a first-aid room should be provided where there are more than 150 employees in the workplace. This is to be used exclusively for giving first aid treatment

#### a) Design

The room should be large enough to hold a couch and still have space for people to move about. There should be emergency lighting in the room. The walls made of foldable or removable type to enable the room to be expand to the requirement size, floor and ceiling should be of material which does not collect dust and is easily cleaned. Floors should be of non-slip material. Privacy must be ensured, by obscuring windows if necessary. Temperature and humidity should be maintained at a comfortable level. It should also be clearly identified as a first-aid room by means of a sign. A typical layout of a first-aid room is shown in Figure 5.1.



**Figure 5.1 : Typical Layout Of A Treatment Room At The Workplace**

**b) Location**

When choosing a site for a first-aid room, bear in mind the following factors:

- i) Proximity to shower for cleaning or decontamination purposes
- ii) Proximity to lifts and main passageways which are wide enough to allow a stretcher or wheelchair through
- iii) Accessibility to work areas
- iv) Accessibility to car park, so as to facilitate transfer of the injured person to an ambulance



### c) Items In First Aid Room

The items that should be provided in a first-aid room are as listed in Table 5.3.

|                                                         |                                                                                            |
|---------------------------------------------------------|--------------------------------------------------------------------------------------------|
| 1. First aid box                                        | 8. Disposable plastic apron                                                                |
| 2. Sink with tap water                                  | 9. Separate disposable waterproof waste bag/basket for hazardous & non-hazardous materials |
| 3. Antiseptic hand wash soap                            | 10. Spinal immobilization equipment (cervical collar, spinal board)                        |
| 4. Paper towels                                         | 11. Torch light                                                                            |
| 5. An examination/treatment couch with pillow & blanket | 12. Chairs for waiting room                                                                |
| 6. Portable stretchers                                  | 13. Cupboard for storing first aid equipment (as in the first aid box) for top up purposes |
| 7. Splints (upper & lower limbs)                        |                                                                                            |

**Table 5.3 : Recommended Facilities For A First Aid Room**

### 5.3.3 Special First Aid Requirements

#### a) Provision for Mass Casualties

In a workplace where there is a potential risk of mass casualties, provisions should be made for a safe place for evacuation and for the availability of adequate equipment e.g. stretchers, wheelchairs, sheets, bandages, blankets, etc.

#### b) Special Instructions

In any place of work where a chemical hazardous to health is used, the current Chemical Safety Data Sheet (CSDS) for that chemical or a copy thereof shall be kept in a conspicuous place close to each location where that chemical is use and shall be easily accessible to the employees (Chemicals hazardous to health are as in USECHH Regulations 2000). First-aiders working for companies dealing in chemicals should receive special training on how to provide early management in cases of chemical poisoning (i.e decontamination).

#### c) Protective Clothing and Equipment

Protective clothing and equipment should be provided where there is a possibility that the first-aiders may need protection to avoid becoming a casualty himself while administering first aid. Protective clothing and equipment should always be properly stored and checked regularly to ensure that they remain in good condition. The principle of Universal Precautions is encouraged when dealing with a casualty. Extra precaution should be taken when there is possibility of coming in contact with blood or body fluids. It is recommended that a first-aiders be immunized for Hepatitis B.

#### c) Cleaning Up

First-aiders should wash their hands or any other surfaces of their body splashed with blood or other body fluids as soon as possible with soap and water. Contaminated surfaces should be cleansed and disinfected.



## 5.4 BASIC FIRST AID AND TREATMENT

First aid is the provision of initial care to an injury or an illness. But bear in mind that first aid is not medical treatment and should not be replaced with what a trained healthcare personnel can do.

In all emergencies, if you are not sure what the extent of injury or illness is, the first thing to do is to call for help. In our local setting, our emergency contact number is the default 999. Do note that calling the nearest hospital for an ambulance will not work because ambulance services have their own catchment area. Therefore, the nearest hospital to you may not be the nearest ambulance to you.

Second thing to note in basic first aid is to assess danger. In no situation you should put yourself in danger before performing first aid care. Once the area is clear of any present danger, only then first aid care should be given.

### 5.4.1 CPR (Cardio Pulmonary Resuscitation)

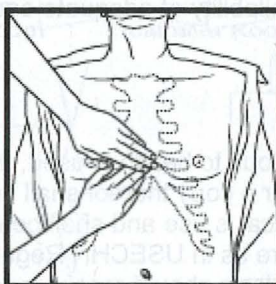
Once you are with the victim or patient, you need to assess the breathing:

- If the person is unconscious and breathing, place the person on a 'recovery position', which is on the left lateral position (turn the patient unto his left side).
- If the person is unconscious and not breathing, CPR (cardio-pulmonary resuscitation) can be commenced.

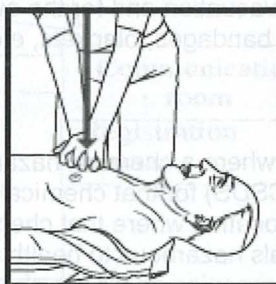
CPR is an emergency procedure for a person whose heart has stopped or is no longer breathing. CPR can maintain circulation and breathing until emergency medical help arrives.



**CALL**



**PUMP**



**BLOW**

For adults:

- Place both hands on the center of the person's chest in between the nipples and with the heel of your hand, press down by 2 inches (5cm) at a steady rate, up to two compressions a second. The rule of chest compressions is 'push hard, push fast'.
- After every 30 chest compressions, give two rescue breaths. (If you are not comfortable with rescue breaths, you can skip it)
- Tilt the person's head backwards gently and lift the chin up with two fingers. This is to open up the airway.
- Completely pinch the person's nose to close the nasal cavity. Seal your mouth over their mouth and blow steadily and firmly into their mouth.
- Give two rescue breaths. Check that the chest moves with each breath.
- Continue with cycles of 30 chest compressions and 2 rescue breaths until they begin to breathe by themselves or help arrives.



Children over 1 year old:

1. Tilt child's head backwards gently and lift the chin. If there is obstruction(s) in the oral or nasal cavity, remove them.
2. Completely pinch the child's nose to close the nasal cavity. Seal your mouth over their mouth and blow steadily and firmly into their mouth.
3. Give five initial rescue breaths. Check that the chest moves with each breath.
4. Place your hands on the center of their chest between the nipples and with the heel of your hand, press down by one-third of the depth of the chest using one or two hands.
5. After every 30 chest compressions (slightly faster than one compression a second), give two rescue breaths.
6. Continue with cycles of 30 chest compressions and two rescue breaths until they begin to breathe or help arrives.

Babies under 1 year old:

1. Tilt baby's head backwards gently and lift the chin. If there is obstruction(s) in the oral or nasal cavity, remove them.
2. Place your mouth over both the mouth and nose of the baby and blow steadily and firmly into their mouth.
3. Give five initial rescue breaths. Check that the chest moves with each breath.
4. Place two fingers perpendicularly in the middle of the chest between the nipples and press down by one-third of the depth of the chest.
5. After 30 chest compressions (slightly faster than one compression a second), give two breaths.
6. Continue with cycles of 30 chest compressions and two rescue breaths until they begin to breathe or help arrives.

Again, you skip the rescue breaths and continuously do chest compressions if you are not comfortable with it.

## 5.4.2 Burns and Scalds

Burns and scalds are damage to the skin caused by heat. Both are treated in the same way. A burn is caused by dry heat. This can be caused by an iron or fire, for example. A scald is caused by something wet, such as hot water or steam. Burns can be very painful and can cause blisters and charred, black or red skin.

Burns and scalds:

1. First, dial 999 and ask for an ambulance.
2. Place affected area under cool (not ice cold) running water for 10 minutes or until pain relieved.
3. Slowly remove any clothing or jewellery, unless attached to skin.
4. In large burnt area, keep the person warm by using a blanket (avoid burned area) to prevent hypothermia.
5. Do not apply any cream or lotion.
6. If possible, elevate limb to prevent swelling.

Special note on chemical burns:

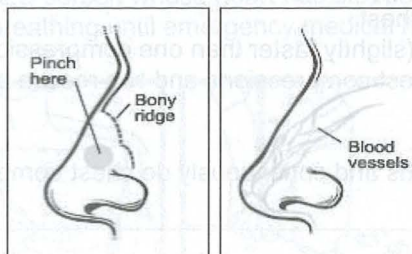
1. Protect yourself first by wearing protective gloves.
2. Place affected area under cool (not ice cold) running water for 20 minutes.

### 5.4.3 Bleedings

Bleeding is the name commonly used to describe blood loss. It can refer to blood loss inside the body (internal bleeding) or blood loss outside of the body (external bleeding).

Bleeding from wound:

1. First, dial 999 and ask for an ambulance.
2. Main aim is to prevent further blood loss.
3. Check if anything is embedded in the wound, if there isn't; apply a steady and constant pressure to the wound to stop bleeding.
4. If there isn't any obvious fracture over the wound area, raise the limb to decrease blood flow.



Special note on nosebleeds:

1. Sit down and firmly pinch the soft part of your nasal cavity, just above your nostrils, for 10 minutes.
2. Lean forward and breathe through your mouth; this will drain blood down your nose instead of down the back of your throat.
3. Stay upright, rather than lying down as this reduces the blood pressure in the veins of your nose and will stop further bleeding.
4. Maintain the pressure on your nose for up to 30 minutes (time this on the clock) so that your blood clots.
5. Place a covered ice pack on the bridge of your nose.
6. Avoid blowing your nose, bending down and strenuous activity for at least 12 hours after a nosebleed. Try to keep your head above the level of your heart during this time

### 5.4.4 Shock

Shock is a life-threatening condition that occurs when the body is not getting enough blood flow. Lack of blood flow means that the cells and organs do not get enough oxygen and nutrients to function properly. Multiple organs can suffer damage as a result. Shock requires immediate medical treatment and can get worse very rapidly.



#### Shock :

1. First, dial 999 and ask for an ambulance.
2. Check the person's airway, breathing, and circulation. If necessary, begin rescue breathing and CPR.
3. Even if the person is able to breathe on his or her own, continue to check rate of breathing at least every 5 minutes until help arrives.
4. If the person is conscious and does NOT have an injury to the head, leg, neck, or spine, place the person in the shock position. Lay the person on the back and elevate the legs about 12 inches. Do NOT elevate the head. If raising the legs will cause pain or potential harm, leave the person lying flat.
5. Give appropriate first aid for any wounds, injuries, or illnesses.
6. Keep the person warm and comfortable. Loosen tight clothing.

#### If The Person Vomits Or Drools :

1. Turn the head to one side to prevent choking. Do this as long as you do not suspect an injury to the spine.
2. If a spinal injury is suspected, "log roll" the person instead. To do this, keep the person's head, neck, and back in line, and roll the body and head as a unit.

#### Do NOT :

1. **Do NOT** give the person anything by mouth, including anything to eat or drink.
2. **Do NOT** move the person with a known or suspected spinal injury.
3. **Do NOT** wait for milder shock symptoms to worsen before calling for emergency medical help

### 5.4.5 Bone Fracture

A broken bone is called a fracture. Symptoms of a bone fracture are pain, inability to move or put weight on the injured body part, swelling, bruising, bleeding (if there is an open wound), or deformity.

#### Fractures:

1. First, dial 999 and ask for an ambulance.
2. In suspected fractures, if the victim is bleeding or not breathing, attend to these emergencies first.
3. Support the limb by using rolled blankets or clothes. If unsure, do not move the person from the original position.
4. In major fractures and if the victim can walk (fractures on upper limbs, nose, etc.), drive the victim to nearest hospital.

### 5.4.6 Poisoning

Poison is anything that kills or injures through its chemical actions. Most poisons are swallowed (ingested). But poisons can also enter the body in other ways such as by breathing, through the skin, by IV injection, from exposure to radiation, venom from a snake bite or insect bite.

#### Poisoning:

1. First, dial 999 and ask for an ambulance.
2. If the person is stable, try to ask what caused the poisoning (snake bite, ingestion of chemicals, etc.).
3. Do not try to induce vomiting or give the victim any food or drink in the case of an oral poisoning.

#### In cases of snakebites:

1. Try to remember the appearance of the snake if possible.
2. Remove any surrounding jewellery like chains, rings or bracelets.
3. Immobilize the affected area, stay calm and do not move around to prevent spread of venom.
4. Try to position the victim slowly so that affected area is below the heart.
5. **DO NOT APPLY TOURNIQUET.**
6. **DO NOT CUT THE WOUND OR TRY TO REMOVE VENOM.**
7. **DO NOT CAPTURE THE SNAKE.**

### 5.5 FIRST AID TRAINING

Training is absolutely essential for first aid. In times of emergencies no time must be lost as this could decide between life and death. Emergencies are times of chaos and everyone has to be trained to know exactly what to do in such time. Use approved training providers such as the Red Cross of St. John's Ambulance.

#### 5.5.1 Training Level

- a) Level 1 : Basic First Aid (emergency first aid and procedure)
- b) Level 2 : Workplace First Aid  
(Level 1 plus treatment of injuries and illness eg : heart attack, fainting)
- c) Level 3 : Occupational First Aid  
(Level 2 plus broad understanding of hazards, emergency care and assessment)

#### Discussion Case 5.1 [Allergic Reaction Emergency]

Today in the cafeteria they are serving a totally gross meal. You talk to your friend into sharing her sack lunch with you. Both of you split the sandwiches, share the chips, and there is even one cookie for each of you. Afterward, as both of you are laughing and talking about a girl who wore an ugly pink dress to class, you feels your arms are itching. Your face starts to turn red.

1. What is your assessment steps?
2. What type of emergency is this?
3. Determine the first aid action.



### Discussion Case 5.2 [Seizure Problem]

A 16-year old male walks into a metal pole at the edge of the sidewalk. You see he grab his head and scream with pain. He falls to the ground, and his arms and legs start to jerk.

1. What is your assessment steps/ What are you looking for?  
What do you ask?
2. What type of emergency is this?
3. Determine the first aid action.

### Discussion Case 5.3 [Low Blood Sugar/ Diabetic Emergency]

A 22-year-old woman was found unconscious in her apartment by her mother. The mother informs you that her daughter is an insulin-dependent diabetic who has been ill for two days and vomiting.

1. What is your assessment steps/ What are you looking for?  
What do you ask?
2. What type of emergency is this?
3. Determine the first aid action.

### Self Check

1. Define first aid.
2. List the purpose of first aid.
3. Explain the principle of first aid
4. Describe first aid and treatment for heart attack, seizure and stroke.
5. Differentiate between level 1, level 2 and level 3 for first aid training.

## **CHAPTER 6.0: HAZARD IDENTIFICATION, RISK ASSESSMENT AND RISK CONTROL (HIRARC)**

By the end of this topic, you should be able to:

1. Understand hazard, risk and danger.
2. Know types of hazard.
3. Understand risk assessment.
4. Understand risk control.

### **6.0 INTRODUCTION**

Every workplace has hazards and it must be prevented, corrected or controlled after detection. According to Section 15 (2)(a) of OSHA 1994, "the provision and maintenance of plants and systems of work that are, so far as is practicable, safe and without risks to health", therefore, the employers have to identify the hazards in the workplace so that the risks from the hazards can be made as low as a reasonably practicable. The safety and health committee, supervisors or workers and their representatives are recommended to carry out this task.

Hazard Identification, Risk Assessment, Risk Control (HIRARC) is a principle used in workplace to manage safety and health. Following is the brief explanations for each element.

- hazard identification ensures the recognition of specific hazards through regular monitoring of the workplace.
- risk assessment involves the assessment of the seriousness of the identified hazards.
- risk control takes a variety of forms depending on the nature of the hazard, and should be based on a hierarchy of control options emphasizing the elimination of the hazard at its source.

This topic discusses in detail how we can manage different types of hazards through conducting risk assessment. In addition, this chapter is also informative to students as they need to conduct a case study for HIRARC.

### **6.1 HAZARD, RISK AND DANGER DEFINITIONS**

#### **6.1.1 Hazard**

The definition given for hazard by BS OHSAS 18001 is : "*source, situation or act with a potential for harm in terms of human injury or ill health, or a combination of these.*"

Below are some of the examples for hazards.

- cords posing a tripping risk
- water on the floor posing a slipping risk
- children running out from between parked cars or playing at the side of the road



6.1.2 Danger

The danger is defined as relative exposure to hazard.

6.1.3 Risk

The definition of risk given by BS OHSAS 18001 is : "*Combination of the likelihood of an occurrence of a hazardous event or exposure(s) and the severity of injury or ill health that can be caused by the event or exposure(s).*"

Risk combines three elements: it starts with a *potential event* (hazard), and then combines its *probability* with its *potential severity*. The concept of risk asks two future oriented questions.

- i. What is the *probability* that a particular hazardous event or exposure will actually occur in the future?
- ii. How *severe* would the impact on safety and health be if the hazardous event or exposure actually occurred?

A high risk hazardous event or exposure would have both a high probability of occurring and a severe impact on OSH if it actually occurred. A high risk event or exposure is one that is likely to cause severe injury or ill health.

Self Check 6.1

What would be the correct word to describe the situation below. Is it a hazard, danger or risk to that person who is holding the red cloth?



6.2 CLASSIFICATION OF HAZARDS

The actual hazards that can cause harm can be classified in five ways as discussed below. They include unsafe act and unsafe conditions that can cause injury, illness and death.

## a) Physical hazard

Physical hazards are the most common and will be present in most workplaces at one time or another.

i. Mechanical: Examples of physical hazards include:

- unguarded machinery and moving machinery parts: guards removed or moving parts that a worker can accidentally touch
- working from heights, including ladders, scaffolds, roofs, or any raised work area
- working with mobile equipment such as fork lifts (operation of fork lifts and similar mobile equipment in the workplace requires significant additional training and experience)
- spills on floors or tripping hazards, such as blocked aisle or cords running across the floor

ii. Electrical: Examples of electrical hazards include:

- frayed cords, missing ground pins, improper wiring
- using improper socket, exposed wire(s)

iii. In occupational hygiene, a physical hazard is defined as "A factor within the environment that can harm the body without necessarily touching it. Vibration and noise are examples of physical hazards". Followings are the examples for physical hazard.

- noise (including Infrasound, Ultrasound)
- vibration (Hand-Arm, Whole-body)
- constant loud noise high exposure to sunlight/ultraviolet rays, heat or cold
- ionising Radiation (alpha, beta, gamma, Bremsstrahlung, X-ray)
- non-ionising radiation (electric fields, Infrared, Microwave, magnetic fields, Radio Frequency, static electric)
- ultraviolet, Visible (including lasers at all operating frequencies)

## b) Biological hazard

Biological hazards come from working with animals, people or infectious plant materials. Work in day care, hospitals, hotel laundry and room cleaning, laboratories, veterinary offices and nursing homes may expose you to biological hazards. The types of things you may be exposed to include:

- blood or other body fluids
- fungi
- bacteria and viruses
- plants
- insect bites
- animal and bird droppings.



### **c) Chemical hazard**

Chemical hazards are present when a worker is exposed to any chemical preparation in the workplace in any form (solid, liquid or gas). Chemicals can be corrosive, toxic, flammable and explosives. Common effects of chemical can cause illness, skin irritation or breathing problems depending on the individuals. Below are the examples of chemical hazards:

- liquids like cleaning products, paints, acids, solvents especially chemicals in an unlabelled container
- vapours and fumes, for instance those that come from welding or exposure to solvents
- gases like acetylene, propane, carbon monoxide and helium
- flammable materials like gasoline, solvents and explosive chemicals

### **d) Psychological hazard**

Psychological hazards are aspects of the work environment and the way that work is organised that are associated with psychological and/or physical injury or illness. When psychological risk factors are not effectively managed, they can negatively impact on organisational measures including productivity, absenteeism and turnover. The examples are stress, sexual harassment and etc.

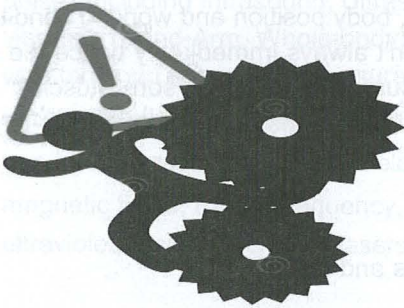
### **e) Ergonomic hazard**

Ergonomic hazards occur when the type of work, body position and working conditions put strain on your body. They are the hardest to spot since you don't always immediately notice the strain on your body or the harm these hazards pose. Short-term exposure may result in "sore muscles" the next day or in the days following exposure, but long term exposure can result in serious long-term injuries. Ergonomic hazards include:

- poor lighting
- improperly adjusted workstations and chairs
- frequent lifting
- poor posture
- awkward movements, especially if they are repetitive
- repeating the same movements over and over
- having to use too much force, especially if you have to do it frequently

6.3     **HAZARD IDENTIFICATION**

The source of hazards can be found through “5M” as below: Hazards can be identified by the following methods:

| No | Sources                                                                                                                                                                                      | Examples of methods                                                                                                                                                                                                                                                              |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1  | <div>Man</div> <div>- Human behavior, unsafe acts</div> <div></div>                                         | <div>- Inspection and observation at the workplace</div> <div>- <i>Regular OHS meetings</i></div>                                                                                                                                                                                |
| 2  | <div>Machinery</div> <div>- Installation, layout and design of equipment</div> <div></div>                | <div>- Inspection and observation at the workplace</div> <div>- Check manufacturer instructions</div> <div>- Review of documents and publications</div> <div>- <i>Consultation with industry peers who use the same equipment</i></div> <div>- <i>Regular OHS meetings</i></div> |
| 3  | <div>Materials</div> <div>- Substances such as chemicals and gases use in the workplace</div> <div></div> | <div>- Inspection and observation at the workplace</div> <div>- Measurement of the atmosphere, monitoring the environment</div>                                                                                                                                                  |



|   |                                                                                                                                                                                                                                        |                                                                                                                                                                                                                          |
|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4 | <p>Method</p> <ul style="list-style-type: none"> <li>- The way people carry out their work</li> </ul>                                                 | <ul style="list-style-type: none"> <li>- Inspection and observation at the workplace</li> <li>- Hazard Analysis</li> <li>- Injury and illness data</li> <li>- Workplace surveys</li> <li>- Workers interviews</li> </ul> |
| 5 | <p>Media</p> <ul style="list-style-type: none"> <li>- Workplace condition i.e. air quality, ventilation, lighting, noise, vibration etc.</li> </ul>  | <ul style="list-style-type: none"> <li>- Inspection and observation at the workplace</li> <li>- <i>Measurement of physical agents</i></li> <li>- <i>Regular OHS meetings</i></li> </ul>                                  |

**Table 6.1 Hazard Identification**

| Safety Fact                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Guidelines for Hazard Identification, Risk Assessment and Risk Control (HIRARC), 2008 is developed by DOSH and you can find it from Department of Safety and Health Official Website as link below.</p> <p><a href="http://www.dosh.gov.my/index.php?option=com_docman&amp;task=cat_view&amp;gid=15&amp;Itemid=179&amp;lang=en">http://www.dosh.gov.my/index.php?option=com_docman&amp;task=cat_view&amp;gid=15&amp;Itemid=179&amp;lang=en</a></p> |

## 6.4 RISK ASSESSMENT

A risk assessment is the process of assessing hazards that have potentials to harm people from their work routine and non routine activities, facilities at the workplace, production, major work areas and administrative office. This will enable an organization to understand the hazards in their workplace and proper control of it. It is also a requirement for management systems standards stated in MS1722:2011 and OHSAS 18001.

The aim of the risk assessment process is to remove a hazard or reduce the level of its risk by adding precautions or control measures, as necessary. Hence, you can create a safer and healthier workplace. There are two methods of Risk Assessment:

- a) Qualitative Risk Assessment
- b) Semi-Quantitative Assessment

### a) Qualitative Risk Assessment

Qualitative Assessment usually involves the use of a **Risk Matrix** as shown in the Table below. This table uses qualitative or descriptive scales for **likelihood** and **severity**, and allows the likelihood and severity of a hazard to be combined to determine the risk of the hazard.

|                          |                     | Likelihood      |          |        |             |
|--------------------------|---------------------|-----------------|----------|--------|-------------|
|                          |                     | Highly unlikely | Unlikely | Likely | Very likely |
| Severity/<br>Consequence | Negligible injuries | Low             | Low      | Medium | Medium      |
|                          | Minor injuries      | Low             | Medium   | Medium | High        |
|                          | Major injuries      | Medium          | Medium   | High   | High        |
|                          | Fatality            | Medium          | High     | High   | High        |

Table 6.2 Qualitative Risk Table

### Definitions of Likelihood

- how likely it is that a person will be harmed by that hazard
  - a) Very likely – could happen anytime
  - b) Likely – could happen sometime
  - c) Unlikely – could happen but very rarely
  - d) Highly unlikely – could happen but probably never will

### Definitions of Severity

- how severely a person can be harmed by that hazard
  - a) Fatality
  - b) Major injuries (normally irreversible injury or damage to health)
  - c) Minor injuries (normally reversible injury or damage to health requiring days off work)
  - d) Negligible injuries (first aid) and near misses



**b) Semi-Quantitative Assessment**

The Risk Matrix above may be modified to incorporate quantitative scales for likelihood and consequence. This method is called "Semi-Quantitative Risk Assessment".

**Determine Likelihood**

- a) Daily (very likely) : 4
- b) Weekly (likely) : 3
- c) Monthly (Unlikely) : 2
- d) Yearly (highly unlikely) : 1

**Determine Severity**

- a) Fatality & Permanent Disability (kill/cause permanent disability/ill health) : 4
- b) More than 4 days MC (long term illness/serious injury) : 3
- c) Less than or 4 days MC (medical attention and several days off work) : 2
- d) First aid needed and near misses : 1

| SEVERITY                        | LIKELIHOOD |        |         |        |       |
|---------------------------------|------------|--------|---------|--------|-------|
|                                 |            | Yearly | Monthly | Weekly | Daily |
|                                 |            | 1      | 2       | 3      | 4     |
| First Aid and Near Misses       | 1          | 1      | 2       | 3      | 4     |
| Less than or 4 days MC          | 2          | 2      | 4       | 6      | 8     |
| More than 4 days MC             | 3          | 3      | 6       | 9      | 12    |
| Fatality & Permanent Disability | 4          | 4      | 8       | 12     | 16    |

Table 6.3: Semi-Quantitative Risk Table

**Simple Exercise for Accessing the Risk**

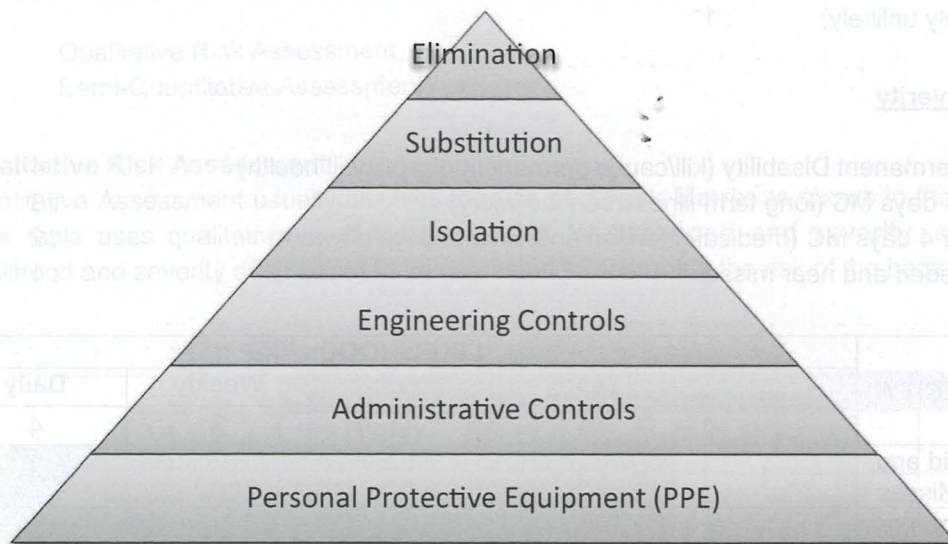
As an example, Aedes breeding grounds are found in classroom XYZ during the inspection done by the OSH committee. The classroom is used by the students 5 days a week. Since you are a part of the committee, you are required to do the risk assessment for the case.

| Location      | Hazard                 | Qualitative Risk Assessment       | Semi-Quantitative Assessment    |
|---------------|------------------------|-----------------------------------|---------------------------------|
| Classroom XYZ | Aedes breeding grounds | Risk = Likelihood x Consequence   | Risk = Likelihood x Consequence |
|               |                        | R = Very likely x Fatality = High | R = 4 x 4 = 16                  |
| Risk Level    |                        | High                              | High                            |

## 6.5 RISK CONTROL

Once the hazards in a workplace have been identified and the risks assessed, priorities can be set for action to control the risks. When you are developing risk control strategies, you should tackle anything with a "High" rating first.

When identifying suitable controls, the following hierarchy should be used. The hierarchy of risk control is a system of control measures used to eliminate or reduce exposure to hazards, which has six levels of control measures. It is used when undertaking a risk assessment, to decide on which precautions are needed to control the risks posed by the hazards.



**Fig. 1 Risk Control Hierarchy**

The most effective measure is at the top of the hierarchy and the least effective is at the bottom. So the idea is that you start from the top of the hierarchy in choosing your control measures, and work your way down.

In most cases a combination of control measures from the hierarchy are chosen to effectively reduce the risk posed by a hazard. The hierarchy of risk control is useful in determining which control measures are appropriate.

The most effective control to deal with a hazard is to eliminate it, but that is not always possible. Some hazards cannot be eliminated. So, the aim of implementing the hierarchy of risk control is to get as many control measures in place so that the risk from a hazard is reduced as low as reasonably practicable.

Here is an example of risk control for operating a power press machine. The possible hazards of power press machine are cut by sharp edges, struck by falling object, caught in between objects, excessive noise exposure and etc. The hierarchy of controls is as follows:

- 1 **Eliminate** the hazard altogether.  
- get rid of the dangerous machine.
- 2 **Substitute** the hazard with a safer alternative.  
- replace the machine with a safer one.



- 3     **Isolate** the hazard from anyone who could be harmed.
  - keep the machine in a closed room and operate it remotely.
  - installing screens or barriers.
- 4     Use **engineering** controls to reduce the risk.
  - attach guards to the machine to protect users.
  - *emergency stop button.*
- 5     Use **administrative** controls to reduce the risk.
  - train workers how to use the machine safely.
  - Standard Operating Procedures (SOP).
- 6     Use **personal protective equipment** (PPE).
  - wear gloves, goggles and ear plug when using the machine.

Risk control measures must also be maintained and review – for example, machine guardings have to be kept in working order, SOP have to be monitored to ensure they are being followed, and PPE have to be kept clean and checked for damage.

To remember the sequence 'eliminate–substitute–isolate–engineering–administrative–PPE', think of this phrase:

Every Sunday I eat a pizza.

#### Discussion Case 6.1

You are required to choose a workplace and identify at least 5 safety and health hazards which includes at least 1 health hazard. Please make recommendations on how to overcome these hazards.

- (i) Identify all the hazards at your workplace and explain how do you identify each of these hazards
- (ii) You are required to assess and evaluate the risks involved and prioritized them accordingly.
- (iii) Explain how would you carry out the control measures to reduce or eliminate the hazards.
- (iv) You are required to provide data or other related documents to support your explanation as Appendix.

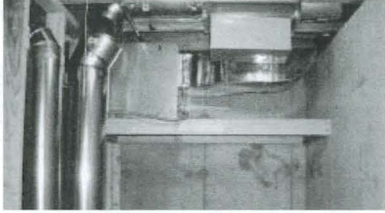
**Simple Exercise for Risk Control Hierarchy**

To understand the hierarchy of risk control, let's take an example for risk control that to be applied on smokers.

| <div>Most effective control</div> <div>↑</div> <div>↓</div> <div>Least effective control</div> | Hierarchy of Risk Control | Examples                                                                                                                                                                                       |
|------------------------------------------------------------------------------------------------|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                | Elimination               | <div>The sales of cigarette is prohibited in country or restrict smoking in certain areas.</div> <div></div> |
|                                                                                                | Substitution              | <div>Replacing cigarettes with E-cigarettes.</div> <div></div>                                              |
|                                                                                                | Isolation                 | <div>There is a designed room for smokers.</div> <div></div>                                               |
|                                                                                                | Engineering Control       | <div>The use of filter during smoking.</div> <div>Exhaust fans to improve air ventilation.</div>                                                                                               |



## REFERENCES

|  |                               |                                                                                                             |
|--|-------------------------------|-------------------------------------------------------------------------------------------------------------|
|  |                               |                           |
|  | <b>Administrative Control</b> | Signage as a reminder<br> |

Complete two activities below with your friends and your lecturer.

#### Group Discussion 1

You are employed by a Sam factory as the Safety and Health Officer. What are your views about incident below? Discuss the strategies that can be used to prevent such accidents.

A worker died at a Sam factory in Seoul after carbon dioxide was mistakenly released, according to Korean news agency Yonhap News. The factory's fire extinguishing system accidentally released carbon dioxide after it malfunctioned when it detected a fire, killing the 52-year-old worker. As Engadget notes, this is not the first factory accident has had: In the past couple years, Sam has suffered from a series of factory incidents. In January 2013, 10 liters of hydrofluoric acid leaked from one of main chip plants in Hwaseong, killing one worker and injuring four others. Sam received a \$1,000 fine and a warning after this incident. Four months later, another hydrofluoric acid leak at the same factory injured three workers. Sam has acknowledged this latest incident on its website and said it would work on ways to prevent future accidents like this one.

#### Group Discussion 2

You are employed by a factory as the Safety and Health Officer. What are your views about incident below? Discuss the strategies that can be used to prevent such accidents.

##### Labourers electrocuted to death

4 Sept 2008

KUCHING: Three labourers were electrocuted to death when they were replacing a wooden telephone post with a steel one at the Stutong Resettlement Scheme here yesterday.

Issac Elkana, 31, his nephew Davendra Sani Asan, 21, and Philipos Loren, 18, all from Kampung Stutong, were raising the steel post into position when it accidentally hit the overhead electricity cables. They were killed instantly.

Issac leaves a wife and five children, while Davendra had just got married a few months ago.

The three were among a group of six workers of a Telekom subcontractor. The other three were unhurt.

Source:

<http://www.thestar.com.my/Story/?file=%2F2008%2F9%2F4%2Fnation%2F22238805&sec=nation>

#### Self Check

1. What are the hazards in an office environment?
2. Describe the sources of electrical hazards.
3. What is a risk assessment?
4. Describe the types of protection against falling.
5. Based on the hierarchy of control, propose the control measure for welding activities.
6. At what sound level is it necessary to begin using some type of personal protection?



## REFERENCES

- Alli, B.O. (2008). "*Fundamental Principles Of Occupational Health And Safety.*" 2<sup>nd</sup>. Ed. International Labour Office – Geneva.
- Department of Occupational Safety and Health, Malaysia. (n.d). *Guidelines On occupational safety and health*. Retrieved from <http://www.dosh.gov.my>
- Department of Occupational Safety and Health (2004). *Guidelines On First Aid In The Workplace*. 2<sup>nd</sup> Edition. Retrieved from <http://www.dosh.gov.my>
- Department of Labour New Zealand. (2011). "*First Aid for Workplaces –A Good Practice Guide*". Achieved from <https://www.redcross.org.nz/yk-files/b29e18e0b30b99580fc109aa1ad5896f/first-aid-2009.pdf>.
- Dr. Khoo Yoong Khean (2013). "First Aid & Basic Life Support." The Malaysian Medical Gazette.
- Electricity Supply Act 1990. Retrieved from <http://www.agc.gov.my/Akta/Vol.%209?Act%20447.pdf>.
- Factories and Machinery Act 1967 with Regulations. (2011). Kuala Lumpur: MDC
- Goetsch, D.L. (2011). Occupational safety and health for technologists (7<sup>th</sup> ed.). USA: Pearson Education.
- Garis Panduan bagi Pengenalpastian Hazard, Penaksiran Risiko dan Kawalan Risiko (HIRARC), Jabatan Keselamatan dan Kesihatan Pekerjaan, Kementerian Sumber Manusia, Malaysia. 2008.
- Health and Safety Authority, Dublin. (2008). "*Guidelines on First Aid at Places of Work.*"
- Holt, A.S.J., (2006). "Principles of Construction Safety." Oxford: Blackwell.
- Occupational Safety and Health Act and Regulations. (2010). Kuala Lumpur: MDC
- OSHAcademy Course 600 Study Guid. (2012) "*Introduction to Occupational Safety and Health.*" Geigle Safety Group Inc.
- Occupational Safety and Health Service of the Department of Labour, New Zealand. (2001). "*Guidance Notes On Providing First Aid Equipment, Facilities And Training.*" Retrieved from <http://www.waikato.ac.nz/hrm/internal/health&safety/firstaid.pdf>
- Margaret Falconio-West RN. (2013). "Three Basic Principles and "Must Have's" for First Aid Preparedness". The American National Red Cross. Achieved from <http://mkt.medline.com/clinical-blog/channels/clinical-solutions/three-basic-principles-and-must-haves-for-first-aid-preparedness>.
- Raemy Md. Zain. (2008). "OSH At Workplace-OSH Awareness Talk Series." Ergonomic Division NIOSH.
- Rozanah, A.R., (2009). "*Development of Occupational Safety and Health Legislation in Malaysia: With Special Reference to the Factories and Machinery (Amendment) Act 2006.*" The Law Review 2009, 70–82.

Sanjeev A/L Janardhanan. (2005). "*Occupational Safety and Health Practices at Selected Companies in Johor*." Open University Malaysia.

Texas Education Agency. (2012). "*Principles of First Aid and Medical Emergencies*". Retrieved from [http://cte.unt.edu/content/files/HS/documents/curriculum/principles/principles\\_of\\_first\\_aid.pdf](http://cte.unt.edu/content/files/HS/documents/curriculum/principles/principles_of_first_aid.pdf) on 10 September 2014.

Takele Tadesse. Mengesha Admassu. (2006). "*Occupational Safety and Health-Lecture Notes*." University of Gondar, Ethiopia.

Training Manual for Safety & Health Officer Certificate Programme, National Institute of Occupational Safety and Health, Malaysia. 2005.

Universiti Tunku Abdul Rahman. (2011). "*Guidelines On First-Aid In The Campus*." Retrieved from <http://www.utar.edu.my/osh/file/UTAR%20GUIDELINES%20First%20Aid.pdf>



00027849

**TARIKH DIPULANGKAN  
(DATE DUE)**

|  |  |  |
|--|--|--|
|  |  |  |
|  |  |  |



**OCCUPATIONAL  
SAFETY & HEALTH**  
DUW1012 – POLITEKNIK MALAYSIA

ISBN 978-967-5677-39-7



9 789675 677397