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ANNAMALAI UNIVERSITY

DIRECTORATE OF DISTANCE EDUCATION

Diploma in Industrial Safety

COURSE – IV

SAFETY MANAGEMENT AND THE LAW

UNITS : I – V

DIPLOMA IN INDUSTRIAL SAFETY

COURSE–IV : SAFETY MANAGEMENT AND THE LAW

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Aim

The course is aimed at making the student to understand the principles of safety management and the legal aspects.

Objectives

On completion of course the students are expected to be familiar with the rules and regulation regarding safety and various acts enacted for the benefits of employees.

Unit – I

OHSAS-18001 and OSHA-Introduction-OH & S Policy-Process Safety Management (PSM) as per OSHA-Performance measurements to determine effectiveness of PSM. Safety Management Principles-definitions-incident, accident, injury, dangerous occurrence, unsafe at, unsafe condition, hazard, error, oversight, etc.

Unit – II

Measurement and control of Performance-near miss accident-loss time accident. Disabling injury-Accidents reportable under the Factories and ESI Act. Frequency rate, Severity rate, incidence rate, frequency-severity index, Safe-T-score, Temporary and permanent disablement, partial and total disablement. Time charges scheduled in Workmen's Compensation Act and the Indian Standard.

Unit – III

Factories Act 1948, Employees State Insurance Act 1948, Workman's compensation act 1943 and the Factories Rules-History-Provisions under the Factories Act and Rules made thereunder with amendments. Case Laws under the Factories Act. ILO Convention and Recommendations in the furtherance of Safety, health and Welfare.

Unit – IV

Other Important Legislation-Legal Aspects of various factories acts, Mines Act, Boiler Vessels Act, Pollution control act, Child labour and women employee act, etc.

Unit – V

Economics of Safety-Financial costs to individual and family, organization and society. Compilation procedure, utility and limitations of cost data, Budgeting for Safety. Role of trade unions in Safety.

Reference Books

1. Grimaldi & Simonds - Safety Management, AITBS Publishers, New Delhi (2001).
2. The Factories Act with amendments 1987, G vt. of India Publications, DGFASLI, Bombay.

COURSE–IV: SAFETY MANAGEMENT AND THE LAW
CONTENT

1.0 INTRODUCTION

In this unit the basic concept and meaning of unsafe Act, Unsafe condition, hazard, Error, Over sight, Incident, accident will be dealt and then the safety management drive by OHSAS I8OO1 and process safety Management of OSHA (Occupational Safety and health administration) will be dealt in more Comprehensive and structured way.

Practicing professional need to know the above mentioned terms to handle Safety and Health in organization.

OHSAS 18001 deals in detail on Work place evaluation, anticipation and recognition of hazards and then rate the degree of risk associated with those hazards and ways and means to control and manage hazards. This in a way is similar to ISO 14001 environment management system(EMS).EMS deal with reference to Environment aspect and impact, where in OHSAS deal with hazard and risk associated with any process.

(OSHA)Occupational safety and Health Administration in United states of America is similar to Factory Inspectorate in India and it is mandatory in United states to follow PSMS (Process safety management system) for all chemical industries.

OSHA, 29 CFR part 1910.119 rule is the guide reference for the below elements

Process safety management is more relevant for continuous process industries handling chemicals, the fourteen elements of PSM are Process safety information, process hazards analysis, Standard operating procedures, Contractor health and safety, Accident/Incident investigation, Prestart up safety review, Management of change, Mechanical integrity, Training, Audit, Employee participation, Trade secrets.

OSHA performance measurement calculation differ from the frequency rate and severity rate Index. All of these would enable the beginner to know the underlying concept of Management.

Safety Management is never a choice it is always on organizational requirement and safety principles are to be the passion for practicing safety professionals and it can never be for the safe of Job.

The learner need to experience the content by correlating the definitions, and systems by stretching the thought process towards practical work carried out at factory level.

1.1 Course Objective

Theory and practice must go hand in hand the student shall apply the learning at work place with the application of the theory at workplace would enable success for good health safety and environment performance.

Key Aspect

"Knowledge is power and experience is Jockey".

This lesson brings in key definitions and Concept of safety management and the student will appreciate OSHA (occupational safety Health administration) Process safety management system and OHSAS 18001 (Occupational health and safety assessment series)

1.2 CONTENT

A. Safety management principles.
B. Definitions.

Incident, Accident, Injury, Dangerous occurrence; Dangerous operation-Unsafe act- Unsafe condition, hazard, error, Risk, overweight, statistics of safety, Hazardous processes, Noticeable disease.

A. Safety Management

The accomplishment of safety objectives by establishing and attaining safety objectives through the process of planning, organizing, staffing, executing, evaluating, controlling and directing would be the underlying principle of any safety management.

In modern era safety is extended further to health and environment performance. Modern safety deals on product safety and that is much more to support society on environment performance.

Different Management systems are followed which would enhance safety performance and the selection of system goes with the type of industry.

For example, PSM (Process Safety Management) has much to do with chemical Industry and OHASA 18001 could be for any type of industry.

For sound safety management the following are the basic elements.

I. Management leadership

A. Assumption of responsibility

B. Written declaration of policy

II. Assignment of responsibility

Operating department heads.

Safety engineers or Co-ordinators.

Supervisors.

Committees

Employees.

III. Maintenance of safe working conditions

Inspection

Engineering revisions.

Purchasing.

Supervisors.

IV. Training

Supervisors.

Employees.

V. Accident Records

Accident analysis.

Injury\Incident\Near miss reports.

- Measurements of results.

VI. Medical and first aid systems

Placement examination.

First aid services.

Periodic health examinations.

VII. Personnel responsibilities of Employees

Acceptance of responsibility.

Maintenance of interest- (Self motivation)

All the above seven elements are the key basic principle for any safety management which is modified revised and served from time to time.

PROCESS SAFETY MANAGEMENT SYSTEM

(OSHA)Occupational safety and Health Administration in United states of America is similar to Factory Inspectorate in India and it is mandatory in United states to follow PSMS (Process safety management system) for all chemical industries.

OSHA, 29 CFR part 1910.119 rule is the guide reference for the below elements

This standard explains Process Safety Management system (PSMS) concepts and policy guidelines. Process Safety Management System is the application of sound Management principles to the identification, understanding and control of hazards.

PSM System

The goals of the PSM system are to proactively avoid accidents and incidents that have a harmful impact on employees, the community, environment and facility assets.

The elements of the PSM system will integrate the management of process safety into the design, construction, maintenance and operation of all process plants.

Employee involvement and commitment

In implementation of a Process Safety Management System requires dedicated commitment from all employees. It is the responsibility of all employees to participate actively in the successful implementation and continued operation of this system.

The different PSM System elements are:

1. Process Safety Information
2. Process Hazard analysis
3. Standard Operating procedures
4. Contractor control
5. Management of change
6. Emergency planning and response
7. Prestart up safety review
8. Training
9. Safe work practices
10. Mechanical integrity
11. Incident Investigation
12. Compliance Audit
13. Trade secrets
14. Employee participation

Process safety Information (PSI)

Process Safety Information defines the requirements for the documentation and availability of written process safety information, regarding hazards of chemicals used, the technology and equipment covered in the process. This purpose of this standard is to ensure updated availability of process safety information.

Process hazard analysis (PHA)

The PHA defines the format, structure and method for developing and revising specific procedures for operating processes which handle or process hazardous materials.

Hazard and operability form part of process hazard analysis

Contractor control (CC)

The contractor control element provides requirement for contractors who work in or around a hazardous process in the facility. It includes specific record keeping requirements associated with contractors working in hazardous areas.

Emergency planning and response: (ERP)

This ERP provides requirements for establishing facility plans for responding to any emergencies involving hazardous materials. This includes table top simulation drills, Onsite emergency planning and also OFF site plan to a certain extent so that it will be well integrated with the District emergency cell authority Planning of Off site plan

Management of Change

This Management of change defines requirements for written procedures for managing all changes to the process. It includes requirements for ensuring that changes are correctly performed, documented, training is conducted, and process safety information is updated.

Compliance audits

This element defines requirements for organizing and conducting process safety audits, including written reports documenting any deficiencies and recommendations for any corrections.

Employee participation

This element defines requirements of employee participation in the development and continual improvement of the Process Safety Management System.

B. Definitions & Basic terms

Incident

An incident is an undesired event that could result in loss. It could also be expressed as an undesired event that could downgrade the efficiency of business operation \ performance.

Accident

It is an undesired event that results in physical harm to person or damage to property. In other words an accident can be defined as unplanned and unexpected event which causes or likely to cause an injury.

The word accident as defined by IS 3786-1983 as an unintended occurrence arising out of and in the course of employment of a person resulting in injury.

Injury

Injury is an external damage to the human body, disturbance or dysfunction resulted from an accident, . Injury could be psychological and need not always necessarily be a physical harm.

Dangerous occurrence (Section 88 A of factories Act 1948)

As per factories act failure of Hoist, Lift, Derrick etc. are termed under dangerous occurrence.

Dangerous operation

Any manufacturing process or operation carried out in a factory exposing any person employed in it to a serious risk of bodily injury, poisoning, or disease.

e.g : Chemical works comes under dangerous operation.

Unsafe Act

An action of a human resulting in poor safety performance or resulting in injury damage to property. This can also be a management negligence (commission of an act which the person should not have done or negative act).

Unsafe Condition

The factor which lead to an incident or accident such as unguarded machinery, physical, chemical, or environment situation that can harm personnel).

Hazard

A physical situation with a potential for human injury, damage to property or the environment or some combination of these criteria.

Error

Mistake caused due to negligence in a workplace (Gross Negligence)

Risk

The likelihood of a specific undesired event occurring with in a specific period or under specified circumstances. (It can be a probability of hazard likely to happen.

Oversight

This could be purely due to a slip in performing a defined activity at workplace (Unintentional)

Statistics of Safety

The measure of performance of safety at factory considering the humans and duration of work period. Organisation comparison could be made for similar type of industry using the safety index such as incident rate, frequency rate, severity rate etc.

Hazardous processes

Any process or activity in relation to an industry specified in schedule –I of factories act 1948 where in unless special care is taken, raw material used there in or the intermediate or finished product by product waste or effluent would

(i) cause material impairment to the health of the persons engaged in or connected therewith Or

ii) result in pollution of the general environment.

First schedule list 29 Industries of hazardous processes.

Example : a) Ferrous metallurgical

b) Non ferrous metallurgical

c) Foundries industries

d) Fertilizer industries

e) Cement industries etc (Refer Factories act for complete list.)

Notifiable Diseases

Factories act 1948 list 29 occupational diseases as notifiable disease. Section lii of workmen compensation act 1923 also gives a list of 34 occupational diseases; a similar list is also in employee state Insurance act too. Example of few notifiable disease are silicosis, asbestosis, byssinosis, mercury, arsenic, manganese poisoning.

Occupational Health and safety management systems - OHSAS-18001

The general principles of good management and are designed to enable to integration of occupational health and safety management within an overall management system

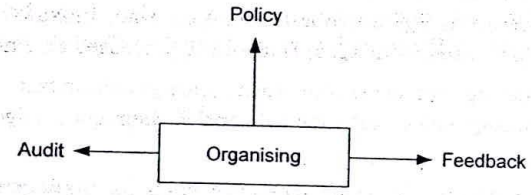
The OHSAS 18001 approach is Initial Status Review, OHS policy, Planning, Implementation and operation, checking and corrective action, Management review and continual improvement for sustenance

OH and S Policy

The organization senior management should define document and endorse its OH & S policy, management should ensure that the policy includes commitment to

1. Recognizing OH&S as an integral part of its business performance
2. Achieving high level of performance with compliance to legal requirement
3. Provide adequate resources to implement policy
4. Ensure that management of OH and S as prime responsibility of line management
5. Ensure better understanding, implementation and maintenance at all levels in the organization
6. Employee involvement and consultation to gain commitment to the policy and implementation
7. Periodic review of policy, the management syatem and audit of compliance to policy
8. Ensure that employees at all levels receive appropriate training and are competent to carry out their duties and responsibilities,

Clause 4.2 Organising



This clause details on assigning the responsibility for occupational health and safety with top management. People at all levels must be,

1. Responsible for the health and safety of those they manage, themselves and others with whom they work
2. Aware of their responsibility for the health and safety of people who may be affected by the activities they control example contractors and public
3. Aware of the influence that their action or inaction can have on the effectiveness of the OH & S management system.

This clause also mentions the organization arrangements required and ensures that its is fully integrated across the organization into all activities irrespective of size and nature of work

This clause speaks of the sufficiency of knowledge required to manage its activities safely, define allocation of responsibilities and accountabilities, necessary authority to carry out their responsibilities, resource allocation, identify

competency gap and training requirements, open communication, provision for specialist advice, effective arrangement for employee involvement

This clause insists on Documentation and states that as Key for review the performance of the management system, this clause states the importance of preserving the Health and safety details and insists in demonstrating compliance to legal requirements, this clause also emphasizes the fact that documents are preserved upto date and applicable for to the purpose for which they are intended to Clause 4.3

Planning and Implementing

It is important that Success or failure of planned activity is clearly seen. This involves identifying OH & S requirements, setting clear performance criteria defining what is to be done, who is responsible, when it is to be done and the desired outcome.

Organization should carry out risk assessment including identification of hazards. The organization should identify the legal requirements, in addition to the risk assessment applicable to it and also any other requirements to which it subscribes applicable to OH & S management.

1.3 Revision points

We have understood basic definitions of Incidents, accidents, injury, dangerous occurrence, dangerous operation, unsafe act, unsafe condition, hazard, error, risk, oversight, safety statistics, Hazardous processes and notifiable disease.

All the above do not cover the entire safety definitions, the students are expected to go through safety websites and enrich their knowledge on various other safety terms.

This chapter covers the basic elements such as management leadership – assignment of responsibilities –maintenance of safe working conditions – training

We also have covered the Aspect of PSM and OHSAS 18001

1.4 Assignment

a) Refer Factories act 1948 and list all 29 notifiable disease mentioned in the Act
b) What are the requirements to be followed when setting up Hazardous process in the industry?
c) Plan Implementation of OHSAS 18001 in the industry you work or Assume and Industry and make a step by step plan
d) Explain When PSM system will be useful what type of industries adhere to it?

1.5 Suggested reading / reference books / Set books

- Indian Factories Act 1948 and rules there under
- Accident Prevention Manual of National Safety Council

Other Important Legislations – Legal aspects of various factories act, mines act, Boiler vessels act, Pollution control act, Child labor and women employee act etc.

2.0 INTRODUCTION

Safety measure was in the past considered to be subjective, now with modern safety practice it has been made possible to measure safety in numbers on various factors other than the conventional quantification such as frequency severity index, frequency rate, severity rate, incidence rate safety score etc

Although many factors are considered in Quantification of safety performance still more weightage is given to accident statistic values, such as frequency rate and severity rate, so it is very much essential for the students / practicing safety professional to understand the basic calculation of frequency rate, severity rate and safety T score

Why is it important to calculate in numbers? How significant is those values? all these questions will get answered as we go into the depth of the subject.

Let us consider and example of two organization(Engineering company) A and B, 1000 employees work in A company for all the three shifts and 500 employees work in B company only in general shift for the year 2006-2007 the reportable accident are one in each company. Can they be ranked as same in safety performance If yes justify and if No explain (Task for assignment).

We need to understand the various terms in this chapter to have fair understanding on the subject

2.1 Objectives

- Data collection and analyses
- Trend analysis
- Motivating to report Near miss incidents / first aid cases / reportable accidents
- Knowing the repercussion of disablement and the cost associated with it.
- Compliance to requirement (Factories act and Employee state insurance act).

Knowing the key terms and ensuring system in place for incident investigation reporting and analyses is the key essence of this chapter. It is imperative that the safety professional is able to convince the management on quantitative numbers on loss that may be associated in case of failure to implement safety management system and enforcing it as equal element in line with other management system.

Safety professional must not analyze the data of the company in which he or she works, they need to bench mark the performance with good organization and this would be possible by having good connectivity with various professional bodies getting to know international data industrial segment wise like Construction industry, engineering Industry, chemical Industries, Metallurgical industries, farming etc.

Magazines and journal to be referred and those data which are stringent need to be considered for bench marking. Knowledge sharing is the key for improvement in safety performance, Unlike technology which need to be maintained as secret safety learning's must not be possessed by an organization, willingness to share and improve is the necessity for present day situation.

In present day context with the improvement in technology abundant resources are available in website for quick guide and reference and e mail communication has made the whole world as global village and distance is no longer a reason for knowledge sharing. All that is required is the urge to collect, compile and compare data and work on system to enable good safety performance.

2.2 CONTENT

Measurement and control of Safety performance

The main purpose of safety performance measurement is to evaluate the effect of safety programme. This would reveal how far the safety programme has helped to reduce the accidents and lossess. The goal of safety programme is to attain zero accident (i.e) no accident/incident at all that is no loss to human / property

Accidents are the outcome of hazard potential in the work area. If the work area is less hazardous then accidents would be less in other words work area to have fail safe machineries and well designed work place that no one can con tribute to an incident/accident.

All safety programmes are designed to control and eliminate hazard potentials so that the safety performance in terms of accidents occurred, however in the present days monitoring and measurement is done giving weightage for the strengthening factors such as work place inspections, training, Job safety analysis and awareness to employees on JSA, etc

Some important terminologies used for safety performance measurement are given below (These terms are defined by IS 3786 -1983 as under)

Reportable accidents

As per factories act the following are reportable accidents.

1. Loss of life
2. Disablement for more than 48 hours

Accident: An unintended occurrence arising out of and in the course of employment of a person resulting in injury.

Death: fatality resulting from an accident

Lost time injury (Disabling Injury)

An injury causing disablement extending beyond a day of shift on which the employee accident occurred.

Non disabling injury

An injury which requires medical treatment only without causing any disablement extending beyond the day of shift on which the accident occurred.

Reportable disabling injury (Reportable lost time injury)

An injury causing death or disablement to an extent as prescribed by the relevant statute (Viz. Factories act and ESI act)

Partial Disablement:

This is of two types, disablement of temporary nature which reduces the earning capacity of an employed person in any employment in which he was engaged at the time of accident resulting in disablement and disablement of permanent nature which reduces the earning capacity in every employment which he was capable of undertaking at that time.

Total disablement

Disablement whether of a temporary or permanent nature, which in capacitates a workman for all work he was capable of performing at the time of the accident resulting in such disablement provided that permanent total disablement shall be deemed to result from every type of injury specified in part A of appendix A or from any combination of injuries specified in part B of appendix A where the aggregate percentage of loss of earning capacity as specified in that part against those injuries amounts to one hundredth percent (IS 3786 : 1983)

Man-hours worked

The total number of employee hours worked by all employees in the industrial premises. It includes employees of permanent and temporary nature (Contract).

Man-hours worked need to include overtime and ideally it must be taken from the payroll data.

Workmen compensation act 1923 also defines partial disablement, permanent partial disablement, total disablement (Permanent and temporary)

Injury rates:

There are three types of injury rates: Frequency rate, severity rate and Incidence rate, from them disabling index can be derived.

We are not covering the Safe T score since none of the industries follow this and it is more advanced measurement system are in place.

MEASUREMENTS OF SAFETY PERFORMANCE

Key Terminology and explanation

Following terms are defined by IS : 3786 - 1983 as under :

Accident: An unintended occurrence arising out of and in the course of employment of a person resulting in injury.

Death: Fatality resulting from an accident.

Disabling Injury (Lost Time Injury): An injury causing disablement extending beyond the day of shift on which the accident occurred.

Non-disabling Injury: An injury which requires medical treatment only, without causing any disablement whether the temporary or permanent nature.

Reportable Disabling Injury (Reportable Lost Time Injury): An injury causing death or disablement to an extent as prescribed by the relevant statute.

Days of Disablement (Lost Time): In case of disablement a temporary nature, the number of days on which the injured person was partially disabled as defined below. In case of the death or disablement of a permanent nature whether it be partial or total disablement as defined below, man days lost means the charges in days of earning capacity lost due to such permanent disability or death as specified in Appendix B in other cases the day on which the injury occurred or the day the injured person returned to work are not to be included as man days lost, but all intervening calendar days (including Sundays, days off, days of plant shut down etc.) are to b e included. If after resumption of work, the person injured is again disabled for any period arising out of the injury which caused his earlier disablement, the period of such subsequent disablement is also to be included in the man days lost.

Partial Disablement: This s of two types: disablement of temporary nature which reduces the earning capacity of an employed person in any employment in which he was engaged at the time of the accident resulting in the disablement and disablement of a permanent nature which reduces his earning capacity in every employment which he was capable of undertaking at the time.

Total Disablement: Disablement, whether of a temporary or permanent nature, which incapacities a workman for all work which he was capable of performing at the time of the accident resulting in such disablement, provided that permanent total disablement shall be deemed to result from every type of injury specified in Part A of Appendix A or from any combination of injuries specified in Part B of Appendix A where the aggregate percentage of the loss of earning capacity, as specified in that part against those injuries, amounts to one hundred percent.

Man-Hours Worked: The total number of employee - hours worked by all employees working in the industrial premises. It includes managerial, supervisory, professional technical, clerical and other worker including contractors labors.

Man - hours worked shall be calculated from the pay roll or time cock recorded including overtime. When this is not feasible, the same shall be estimated by multiplying the total man - days worked for the period covered by the number of hours worked per day. The total number of man days for a period is the sum of the number of persons at work on each day of the period. If the daily hours vary from department to department separate estimates shall be made for each department and the result added together. When actual man - hours are not used, the basis on which the estimates are made shall be indicated.

Scheduled Charge: Charges in days of earning capacity lost due to permanent disability or death.

The Workmen's Compensation Act 1923 also defines following terms ;

Partial disablement and permanent partial disablement, Total disablement (temporary or permanent) Wages Workmen.

Section 4 and Schedule I and IV are important for calculating the amount of compensation. A new concept of relevant (age) factor is added with effect from 1-7-1984.

The Employees State Insurance Act should also be referred where it is applicable. It also contains the similar terms and schedules.

2. Injury Rates

There are three types of injury rates: Frequency Rate, Severity Rate and Incidence Rate. From them Disabling Index can be derived.

Frequency Rate: A question "How often do injuries occur?" is replied by the frequency rate which is defined as the disabling (lost time) juries per 10 man-hours worked.

$$\text{Frequency rate} = \frac{\text{No. of reportable lost time injury} \times 10}{\text{Man - hours worked}}$$

If the injury does not cause loss of time in the period in which it occurs but in a subsequent period, the injury should be included in the frequency rate of the period in which the loss of time begins.

If an injury causes intermittent loss of time, it should only be included in the frequency rate once, that is, when the first loss of time occurs.

A Fatal Accident Frequency Rate (FAFR) of fatalities per 10 hours is used. It is the number of deaths from industrial injuries expected in a group of 1000 people during their working lives (1000 × 40 years × 52 weeks × 48 hours).

FAFR of chemical Industry	
France	8.5
West Germany	8.0
United Kingdom	4.0
USA	5
FAFR in UK for chemical Industry	
Chemical Industry	4
Coal mining	40
Air crew	250
FAFR for Non industrial activities	
Staying Home	3
Travel by Bus	3
Travel by car	57
Traveling by air	240
Motor cycling	650
Rock climbing	4000

Severity Rate: A question "How serious are the injuries?" is replied by the severity rate which is defined as the number of days of lost time per 10 man-hours worked.

$$\text{Frequency rate} = \frac{\text{Man days lost due to reportable lost time injury} \times 10}{\text{Man - hours worked}}$$

Here man days lost due to temporary total disability and man days last according to schedule of charges for death and permanent disabilities are as given in Appendix A (IS : 3786 - 1983).in case of multiple injury, the sum of schedule charges shall not be taken to exceed 6000 man - days. In Appendix A, equivalent man days or death and other total disablement are 6000, and they are gradually decreased with decrease in percentage of loss of earning against named partial disablement.

Incident Rate: General incidence rate is the ratio of the number of injuries to the number of persons during the period under review. It is expressed as the number of injuries per 1000 persons employed.

$$\text{Injury rate} = \frac{\text{No. of reportable lost - time injuries} \times 1000}{\text{Average no. of persons employed}}$$

Disabling Injury Index (Frequency - Severity Indicator)

$$\text{Disabling Index or FSI} = \frac{\text{Frequency rate} \times \text{Severity rate}}{100}$$

This index can be used to compare plant to plant. Square root of disabling index can be used to indicate degree of improvement.

Average days charged or average severity per injury can be determined as below:

$$\text{Frequency rate} = \frac{\text{Total days lost or charged}}{\text{Total no. of disabling injuries}}$$

Risk of accident

Measure of probability (frequency) of the occurrence of an accidental event of a given kind and of its severity (consequences).

Accident Risk Total Loss of all accident occurrences

RAC = (FK SC) A

Where FK = Frequency FK i.e. number of accidents A of a given kind in period of time = A

T

SC = Severity SC I.e. magnitude of consequence from accident A of a given kind = C

A

Motor Vehicle Accident Rate

$$\text{MVAR} = \frac{\text{No. of accidents} \times 10}{\text{Miles of operating exposure}}$$

$$\text{Loss ratio} = \frac{\text{Direct money loss paid out in claims}}{\text{Premium paid to Insurance Company}}$$

Statistical Period

Rates for any period, that is month, quarter or year shall include injuries which occurred during the period, together with any injuries which occurred in the previous 12 months and which have not already been included in earlier calculations.

In some country, the frequency co efficient (F) is determined by

$$F = \frac{\text{No. of injuries for a given period} \times 100}{\text{Total man} - \text{hours of exposure}}$$

The severity co efficient (S) is determined by

$$S = \frac{\text{Man days lost in all accidents for a given period}}{\text{No. of injuries for a given period}}$$

$$\text{Cost Severity Rate} = \frac{\text{Total Costs of accidents} \times 10}{\text{Total production man hours}}$$

A Safety activity rate is determined by the following formula :

$$A = \frac{\text{Safety activity} \times 5 \times 10}{\text{Man} - \text{hours worked} \times \text{Average No. of employees}}$$

Here, "Safety activity " is the sum (during the unit period) of safety recommendation made, unsafe practices reported, unsafe conditions reported and the number of safety meetings held. Thus a safety activity rate curve can be plotted for any period - a week, month, year etc., and the performance can be compared.

The rate of Labor Turnover:

It is expressed as T = S / F

Where T = Rate of labor Turnover

S = No. of Separations

F = Average labor Force for a given period of time.

By multiplying the fraction by 100, the percentage turnover is obtained. If R = No. of Replacements and U = Unavoidable Separations, the rate is also given as T = R and T = R

Significance of the Injury Rates

1. The injury rates are useful to (a) measure the injury experience of a given department, branch or firm, (b) determines from month to month year to year whether that experience is getting better or worse © compare the experience of

operating unit with one or more other units and (d) serve as a basis for an accident - prevention contest between two or more operating units.

2. A serious accident has a considerable effect on the accident severity rate but it does not greatly affect the accident frequency rate.

3. The frequency and severity rates give valuable information on the safety situation of an industry absolutely, and in comparison with other departments within the industry. They are useful in planning the immediate measures to control accidents in the industry.

4. Injury rates can be commutated for a week, a month, a year, or for any period of time by using the same formulas. Thus they form a base of annual accident statistic of different class of factories. The rate are useful in comparing safety records of two or more plants, even though they are dissimilar in size.

5. Frequency rate can be used to compare present safety performance with past, best or good performance of our own or of others. A high frequency rate is a proof that action to reduce it is needed, but, it is unable to give any hint as to what action. The lower the frequency rates, the wider the fluctuations due to chance are likely to be.

6. Reduction in severity rate indicates a reduction in deaths and other serious injuries. Increase in severity rate, even though the frequency rate is decreased, indicates, a definite need for effective measures to eliminate hazards.

7. Severity is much more a matter of good or bad luck than is frequency. Therefore it is said that take care of the frequency rate and the severity rate will take care itself.

8. Frequency rate is the good basis for comparing two or more units, in a safety contest. As the severity rate may be increased by un fortunate or unlucky death or serious injuries increasing number of days lost, it is not a good basis of comparison except when the severity only is to be compared in all units.

9. Whether or not small, minor or first aid cases are included in injuries, to keep the safety record good, it is always important to give first aid or necessary treatment to all such cases and to remove the hazards.

Prompt first - aid and redressing facilities to injured worker decreases the mandays lost by him and, in turn, decreases both, the frequency and severity rates.

10. Safety engineers / officers can use the injury rates (a) to compare their units with the average for the industry, (b) their periodical safety improvement or deterioration, (c) to find less hazardous operations (d) to check how well their departments are doing (an increase in rates indicates lack of supervisory control) and (e) to determine which department had the best performance etc.

Drawbacks of FR and SR measurement

Any one rate is incapable to give complete picture of safety performance. The frequency rate indicates a number of accidents per man hours worked only. Type,

cause, severity agency or factors of accidents cannot be known from it. The severity rate indicates the ratio of total man days lost to total man hours worked only. Type, cause, frequency, agency or factors of accidents cannot be known from it. Thus the injury rates are the partial indicators of human injury cases only and many accidents and property damage or time losses not causing any man days lost are not indicated by them.

2.3 Revision points and summary

This Unit gives detailed description of different tools for the Measurement of the safety performance. This measurement will provide light on the effectiveness of the safety programme in the firm.

This Unit explains some of the important terminologies like Reportable accidents, Accident, Death, Lost time injury, Non disabling injury, Reportable disabling injury, Partial Disablement, Total disablement, Man-hours worked, Injury rates.

Accident is an unintended occurrence which may result in loss of Man, Material or Machineries. Lost Time Injury is an injury causing disablement beyond a day of shift on which the injury happened. Reportable Accident is an accident which makes the employee to be away from for more than 48 hrs or loss of life.

Risk of accident is the measure of the probability of the occurrence of an accidental event of a given kind and of its severity. Injury rate are of three types; Frequency rate, Severity rate & Incidence rate. Frequency rate is defined as disabling injury per 10 man hours worked

Severity rate is defined as number of days of lost time per 10 man hours worked. Incidence rate is the ratio of number of injuries to the number of person during the review. Frequency Severity Indicator is measure used to compare the disabling injury of one plant to other.

The significance of Injury rate is that it

1. Serves as a measure of the injury experience of a given department
2. Compare with other department on safety performance
3. It can used to compare the present safety performance with past

The definitions and explanation on terms above gives the student technicality in discussing with other safety professional. It also helps in setting goals and objective track on key parameters such as reportable accident and enables in better discussion on the subject

The Frequency rate and severity rate calculations help in standardizing the safety performance values and discrepancy in evaluation is nullified.

We have provided fatal accident frequency rate for high performance countries, what is sad to note is unfortunately we do not have all data captured in India.

No Data No Market state is the level of thinking in developed countries and in our country we are weak in enforcement and we are behaviorally trailing behind which is a sad state of affair.

2.4 Assignments

a) Compare safety performance of two organizations.

	FactoryABC	*FactoryXYZ*
Fatal accident	1	2
Near Miss	15	25
First aid	10	7
Reportable accident	7	5
Man days Lost due to reportable accident	77	85

b) Calculate Incidence rate for a factory A and B employing 500 employees and the statistics can be taken from above

c) Let us consider and example of two organization (Engineering company) A and B, 1000 employees work in A company for all the three shifts and 500 employees work in B company only in general shift for the year 2006-2007 the reportable accident are one in each company. Can they be ranked as same in safety performance If yes justify and if No explain

d) In Indian Industry what type of safety performance measurement technique is used widely & what is the Safety programmes used to strengthen the safety?

e) In what way the Hazop, Hazan, JSA, FMEA increase the safety performance of an Industry

f) What is the role of Management in safety in an Industry?

g) If you are the running an Engineering company, what is your role as a Management as per Workers Compensation Act towards Workers welfare?

2.5 Terminal exercises

1. What is Frequency rate?
2. What is Severity rate?
3. Explain Reportable accident?
4. Explain Lost Time accident?
5. Explain the term Partial disablement?
6. What are the drawbacks of FR & SR?
7. Explain the term FAFR?
8. An Engineering Industry which was working in general shift with 200 employees in 2006 there was 3 reportable accident out of which one resulted in closing the Industry for 10 days. Calculate the Frequency & severity rate for the Industry for 2006.
9. What is Frequency Severity Index?
10. What is the significance of the Injury rates?

❑

UNIT - III

3.0 INTRODUCTION

In this Paper-4 safety and law, the abstract of various laws have been taken and provided in simplified version. This chapter cannot be simplified than this and the students need to understand that compliance to law is one of the key job requirements of Heath safety and environment professional. The Safety officer need to be a key advisory personnel to enable compliance, unless the student understands the significance of each and every terms mentioned in this unit it will be impossible to enforce legal requirement in any organization.

All laws are explained in detail covering many aspects to be left uncovered which itself make it appear complex. The student needs to understand law keep reference the community and common man expectations which would make it really simple and interesting.

All Indian acts and laws are well framed, the loophole lies in enforcement, we are not to blame anyone in this context it is expected that the student shall apply the understanding in prudent way to protect the health and welfare of employees and thereby the community.

In European countries the laws are enforced at micro level and new regulation is looked at to protect the community welfare from the point of Health, safety and Environment.

The Seveso, (OSHA) Occupational Safety and Health Administration, Machinery directive, (ROHS) Restriction of hazardous substances, (REACH) Registration Evaluation and Authorization of Chemicals, (ELV directive) End of life vehicle directive are all laws followed in west and European countries and compliance to the law is ensured by several application system like International material data system developed by EDS, (SAP) System application and products in data processing etc

The above are quoted here to understand the fact that our concern to Human and Environment need to be much more since we have population that would also get widely affected due to deterioration of environment. Remediation of environment or health is never to be appreciated since it is a reactive approach. As we grow in industries we need to look at micro level on the impact to health and environment at this stage failing which the future generations would be mostly affected.

3.1 Objective

The objective of this chapter is to make the student aware of various laws which bring legal binding for the organization. The student will also appreciate the importance associated in having systems in organization for compliance to legal requirement.

Multi national organizations having sites across the globe go by stringent laws of the nation and they also insist in complying with country specific regulations more than the corporate requirement.

We in this chapter have tried the maximum to bring in the laws and while we apply this in practical context the student would gain better understanding.

We in this chapter convey to the students that this chapter is an enabler to state the different laws prevailing in the nation and various enforcement authorities available to put this in place, the student after assuming the HSE or EHS or SHE role need to place a process in place in tracking compliance in updating the upcoming legislation by subscribing to Various news letters which surfaces out the recent changes in national and International law. Example ENHESA newsletter can be searched in Google site.

3.2 CONTENT

The Factories Act, 1948/ State Factory Rules

OBJECT OF THE ACT	Law regulating health, safety and welfare of labour in factories.
ENFORCEMENT AGENCY	Chief Inspector of Factories
RELEVANCE FOR COMPANY	Adult, Competent Person, /Hazardous Process, Young person, Transmission Machinery, Manufacturing Process, Worker, Factory, Occupier
DESIGN OF THE ACT	Chapter 1 to Chapter 11 Chapter 3 -Health Chapter 4-Safety Chapter 4A-Provision relating to hazardous processes Chapter 5-Welfare
GENERAL PENALTY FOR CONTRAVENTION OF ANY PROVISION OF THE ACT/ORDERS/DIRECTION	Occupier and Factory Manager (imprisonment for a team which may extend to 2 years or with fine (which may extend to Rs.1.00lakh) Penalty for contraventions of section 41 (B), 41(C), 41(H) imprisonment extends to 7years and fine which may extend to Rs.2.0lakh.
Section 6 (Rule 4/5/6/7/10)	**Approval /Licensing and Registration of Factories:** ❖ No site shall be used or building constructed, re-constructed or extended or taken into use as a factory nor shall any manufacturing process be carried out in any building, constructed, re-constructed or extended without the previous permission in writing. (FORM 2 -Application for registration and grant of License, Renewal of License and Notice of Occupation) ❖ Previous permission in case of installation of additional machinery/prime movers exceeding the horsepower installed in the factory. ❖ No manufacturing process shall be started/carried on unless a license has been granted. ❖ Application for Amendment of Licenses, in case of increase or decrease of the numbers of persons or Horsepower or change of name of factory.

	❖ License to be valid upto 31st December of the every year. ❖ Obtain renewal before the expiry of the Factory License. ❖ License or a copy shall be exhibited at a conspicuous place at the main entrance.
Section 3	Certificate of stability to be issued by person possessing a degree Civil or Structural Engineering prior to carrying out any factory constructed or extended (Form 1A)
Section 7(Rule 12)	Occupier to notify at least 15 days before he begins to occupy or use any premises as a factory in a specified Form 2.Notice of change of manager in Form 3 A
Section 7 A	**General Duties of the Occupier** ❖ To ensure reasonably practicable health, safety and welfare of all workers while they are at work in the factory. ❖ Expect such cases as may be prescribed, every occupier shall prepare return statement of his general policy w.r.t. Health and Safety of Workers and communicate the same to workers.

CHAPTER 3 - HEALTH

Section 11 (Rule 16/17)	General cleanliness (including whitewash/paint) of workrooms/sanitary facilities/staircase/passages/floors/drainage systems/walls/window frames and maintenance of the record of the same in the prescribed register (Exemptions are prescribed).
Section 12(Rule 18)	**Disposal of Waste and Effluent** ❖ Effective arrangements for treatment of wastes and Effluent, so as to render then innocuous.
Section 13(Rule 19/20/21)	**Ventilation and Temperature** ❖ Adequate ventilation by circulation of fresh air and temperature with reasonable conditions of comfort and prevention of injury. ❖ Measures required for cooling, if required.
Section 14	**Dust and Fume** ❖ Effective measures to prevent inhalation and accumulation in any work room/provision of exhaust appliances.
Section 16	**Over Crowding** ❖ 14.2 cubic meter of space every worker (no account shall be taken of any space which is more than 4.2 meter)
Section 17(Rule 34/35)	**Lighting** (General illumination over interior parts shall not be less than 3 foot candles measured in horizontal plane measures at level from the ground floor)

Section 18 (Rule 38 to 43)	**Drinking Water** (Marking of drinking water in an appropriate language/no such place to exist within 6m from washing/sanitary facilities).
Section 23	Employment of young persons on dangerous machines is not permitted if not provided sufficient training/adequate supervision on ❖ Power presses other than hydraulic presses ❖ Milling Machines used in metal trades ❖ Guillotine machines ❖ Circular saws ❖ Platen printing machines ❖ Decorticators ❖ Oil expellers ❖ Band saws used in wood working ❖ Planning machines used in wood working ❖ Effective provision for striking air and devices for cutting of Power.
Section 24	**Striking gear and devices for cutting off power** ❖ Suitable striking gear or devices for cutting off power in emergencies from running machineries. ❖ Locking devices to prevent accidental starting of transmission machinery, which can in advertently shift from "Off to On" position.
Section 25	**Self-acting Machines** ❖ Clear distance of 45cms from traversing part of a Self-acting Machine for material and person movement.
Section 26	**Casing of New Machinery** ❖ Effective guarding of revolving shaft spindle, wheel or pinion.
Section 27	Prohibition of Employment of Woman and Children near cotton openers ❖ No woman or child shall be employed for pressing cotton in which a cotton opener is at work
Section 28(Rule 61/62)	**Hoist & Lifts** ❖ Properly maintained and to be thoroughly examined by a competent person at least once in every six months and maintenance of register in the prescribed format (FORM 31) /Display of maximum safe working load/inter locking facilities for gates.
Section 29(Rule 63/65 B)	**Lifting Machines /Chains/Cranes/Lifting Tackles** ❖ Properly maintained and to be thoroughly examined by a competent person at least once in every twelve months and maintenance of register in the prescribed format/display of identification mark or table showing the safe working load of lifting machines, chains, ropes, tackles (FORM 32)

	❖ Zip cranes to have automatic safe working load indicator and other safety precautions. ❖ All registers to be kept readily available for inspection. ❖ No person shall be allowed to operate a crane, fork-lift truck or give signals unless and eye sight have been examined and declared fit. Examination once in 12 months upto the age of 45 years and once in every 6 months thereafter-record n FORM39.
Section 30	**Revolving Machinery** ❖ Mandatory display of maximum safe working peripheral for grinding machines/effective measure to ensure that safe working peripheral speed is not exceeded for vessels, cage, fly wheel pulley, disc, etc.
Rule 84/85	No process or work shall be carried out in a manner as to cause risk of bodily injury. ❖ No material or equipment shall be stacked or stored in a such a manner as to cause body injury
Section 31 (Rule 65/65A)	**Pressure plant/Gas holders** ❖ Display of safe design pressure /maximum permissible working pressure. Safety measures such as safety valves/pressure gauges/stop valves/suitable drain valve/competent person who thoroughly examined externally once in every 6 months and internally once in every 12 months/hydraulically testing not more than 4 years (certain exemptions are prescribed including water sealed gas holders)/distinctive number.
Section 32/33	Floors. Stairs and means of access /Pits. sumps, opening in floors (securely covered or fenced)
Rule 65 D	**Protective Equipment** All PPE prohibited to workers confirming to ISI or any equivalent standard.
Section 34 (Rule 66)	**Excessive weights** Persons / Maximum weight of material, Article, tool, appliances Adult male — 50 kgs Adult female — 30 kgs Adolescent male — 30 kgs Adolescent female — 20 kgs Male child — 16 kgs Female child — 14 kgs

-Section 35	**Eye protection** Effective screens or suitable goggles for all activities as per Schedule (19 activities) and Schedule 11(welding or cutting of metals.
Section 36	Precautions against dangerous fumes/gases ➢ No person shall be required or allow to enter any chamber, pit, tank, pipe, or other confined space. ➢ Unless it is provided with a manhole of adequate size or other effective means of egress ➢ Until all practical measures have been taken to remove any gas, fume, vapor, dust within the permissible limits. ➢ A certificate in writing has been given by a competent person based on test carried out by himself that the space is reasonably free from such dangerous gases/vapors. ➢ Such person is wearing suitable breathing apparatus and a belt security attached to a rope the free and of which is held by a person outside the confined space.
Section 36 A	Precautions regarding use of portable electrical light ➢ No electrical appliances of more than 24volts confined space.
Section 37	Explosive or Inflammable dust, gas etc. 1. All practical measures to prevent such explosion by ➢ Effective enclosure ➢ Removal or prevention of accumulation ➢ Exclusion or effective enclosure of all source of ignition 2. Where machinery contains any explosive or inflammable gas, such part shall not be opened unless ➢ Flow of supply point is effectively stopped by Stop Valve or other means. ➢ Practical measure to reduce the measures of gas or vapor to atrophic pressure. ➢ Effective measure for securing the fastening of flow of supply
Section 38(Rule 71/77)	**Precautions in case of fire** ➢ Safe means of escape for all people in the event of fire. ➢ Necessary fire fighting equipment and facilities and their operation. ➢ Workers are familiar with the means of escape.
Section 39	Power to require specification of defective parts or tests of stability to carry our tests and inform the inspector.
Section 40(Rule	Safety of Buildings and Machinery

79/79 A)	➢ Measures to be undertaken as per the instructions of inspector. Fragile Roof ➢ No person to be allowed to stand, walk or do any work on a roof/ceiling covered with sheets, corrugated or otherwise, made of cement, asbestos, etc., unless safety measures are prescribed followed (work permit for working on fragile roof is mandatory) ➢ Belts to be regularly examined ➢ Safe access shall be provided.
Section 40 A	**Maintenance of Buildings** ➢ Order of the inspector for Building/Factory maintenance in case of dangerous conditions.
Rule 86	**Electricity** ➢ No electrical installation shall be provided so as to be dangerous to human health or safety in the opinion of the inspector. ➢ Provision of earth leakage and overload relays in switchboards of factories.
Rule 87	**Motor vehicle speed and light** ➢ Speed not to exceed 16km/hr within the factory (exemption in writing for wide roads)
Section 40 B (Rule 88A)	**Safety Officers** ➢ If numbers of workers equal to or more than 1000. ➢ As notified by the State Government in case of dangerous processes. ➢ Qualification and duties and facilities to be provided to Safety Officers as per rule 88A
Rule 88B	Ovens and Driers (expect used in laboratories or kitchens) Safety measures to be followed ➢ Not to be taken in use for the first time until examined by competent person and certificates maintained. ➢ Effective safety ventilation system.

CHAPTER 4A – PROVISIONS RELATED TO HAZARDOUS PROCESS

Section 41 A (Rule 88D)	Approval/permission by State Site Appraisal Committee specifically constituted by State Govt. for initial location of the factory involving hazardous processes (FORM 41)
Section 41 B (Rule 88 E to 88K)	**Compulsory Disclosure** ➢ Compulsory disclosure of information by the occupier regarding dangers including health hazards and the measures to overcome such exposures to the workers employed in the factory, chief inspector, the local authority and the general public.

	➢ Prescribe the nature/type of information for communication ➢ Occupier to lay down detailed health and safety policy signed by occupier in line with Rule 88 E and submit to inspector and internal communication (except number of workers less than 50). ➢ Collection a development and dissemination of information for Factory having Hazardous Processes (w.r.t. MSDS) and safety measures. ➢ Disclosure of information to workers and inspector as per Rule 88 G & 88 H ➢ Occupier to draw and obtain approval on on-site emergency plan and detailed disaster control measures and make known to workers and the general public in vicinity he safety measures in emergency. ➢ Occupier to submit a copy of approval plan to the district emergency authority.
Section 41 C (Rule 88L-Medical examination/88 P-Health records to workers)	**Specific Responsibility of the Occupier** 1. Appoint persons with qualification and experience in handling of hazardous substances. 2. Provide for medical examination of every worker employed in Hazardous process: a) Before assigning a job involving. b) Once in a period of six months and maintain health in FORM 16 c) Occupier of every factory carrying out hazardous process shall make accessible the health records of workers (Procedure Prescribed) d) Maintain a sickness, absenteeism Register in FORM 40 in duplicate and furnished to the Inspector for each calendar month before 15th.
Rule 88 M	Occupational Health Centre in respect of Factories hazardous Processes as per prescribed specifications, Medical Staff and Facilities based on number of workmen (up-to 50, 51 to 200, more than 200).
Rule 88 N	Ambulance Van in Respect of Factories having Hazardous Processes with prescribed facilities (exemption for a factory employing less than 200 workers and if arrangements with near by hospital).
Section 41 D	Power of Central Government to appoint Enquiry Committee ➢ Central Government to appoint an inquiry committee to inquire into the Standards of Health and Safety in an extra-ordinary situation. The recommendation shall be advisory in nature.

Section 41 E	Emergency Standards ➢ DGFASLI to prescribe standard respect of a hazardous process or clause of hazardous process where no standards have bee prescribed.
Section 41 G (Rule 88 C-Safety Committee)	Workers participation in safety management ➢ Occupier to appoint Safety Committee (in case of hazardous processes) or hazardous substances or used. ➢ Safety committee consisting of equal numbers of representatives of workers and management. ➢ Tenure to be 2 years. ➢ Meeting frequency at east once in 3 months.
Section 41 H	Right of workers to warn about imminent danger ➢ Workers right to inform about imminent danger. ➢ Duty of the occupier, manager, personnel in charge to take an immediate remedial action, if he is satisfied with such dangers. ➢ In case occupier, manager or the person in charge is not satisfied shall refer such matters to the Inspector.

CHAPTER 5 - WELFARE

SECTION 42	Washing Facilities/Facilities for sitting/Rest Rooms/Lunch Rooms/Shelters.
Section 45 (Rule 91/92)	First-Aid Appliances ➢ Requirement and type of First Aid Boxes(Red Cross on white back ground) to be maintained with prescribed facilities (at least One First Aid box for every 150 Workers) ➢ Each First Aid Box shall be kept in the charge of a separate responsible person, who hold a certificate in First Aid Treatment recognized by State Government or who shall always been readily available in working hours. ➢ Ambulance room and facilities/staff as prescribed in case of more than 200 workers. Ambulance room shall be under the charge of one whole time Medical Officer with specified facilities.
Section 46 (Rule 93 to 99 A)	Canteens (In case, number of workers are more than 250) ➢ Canteen Managing Committee ➢ Annual Medical Examination for each member of the canteen staff for routine blood examination/bacteriological testing/X-ray. ➢ Canteen facilities as per prescribed rules.
Section 47 (Rule 100)	Shelters, rest rooms and lunch rooms ➢ Adequate and suitable shelters/lunch room, wherein more than 150 workers are employed.

Section 48 (Rule 101)	Crèches ➢ In every factory, wherein more than 30 women workers for the use of children under the age of 6 away from furnes, odors, and dust.
Section 49	Welfare Officer in case, number of workers is more than 500. ➢ Weekly hours/holidays/compensatory holidays/ daily hours/interval for rest/spread over/ night shifts/ overtime/restriction on double employment/register of adult workers in a specified format/prohibition on employment of young children (no child who has completed less than 14 years shall be allowed to work in any factory)/Certificate of Fitness for employment/ Register of Child Workers. ➢ Dangerous Operation ➢ Listings of 20 activities /dangerous operations are provided Safety Measures/Cautionary Notices/ Protective Equipment /Medical Examination requirements by certifying surgeons are prescribed.

CHAPTER 6- WORKING HOURS OF ADULTS

Section 51 to 66	➢ Working Hours of Adults related Provisions.

CHAPTER 9- SPECIAL PROVIONS

Section 87 (Rule129)	Dangerous Operations ➢ State Government to specify the manufacturing process or operation as dangerous operation ➢ Prohibiting or restricting the employment of women, adolescent or children. ➢ Periodical Medical examination of persons employed are seeking to be employed and prohibiting the employment of persons nor certified as fit. ➢ Prohibiting, restricting or controlling the use of specified materials. ➢ Provision of additional welfare and sanitary amenities and personal protective equipment/ clothings.
Section 88 (Rule 130)	Notice of Certain Accidents (FORM 17) WITHIN 12 HRS BY THE MANAGER OF THE FACTORY. ➢ Death or likely to cause his death (to District Magistrate/Office in-charge of the Police Station/relative of the injured or deceased person) ➢ Notice of Certain Accidents (FORM 17) WITHIN 24 HRS immediately following the accidents. ➢ Prevented from working for a period of 48 hours or more (to Inspector) by the Manager of the Factory. ➢ Authority to make an inquiry within 1 month.

Section 88 A(Rule 130)	Notice of certain Dangerous Occurrences (FORM 17 A) 1. To notify dangerous occurrences as prescribed whether causing any injury or not within 24 hours, immediately following the dangerous occurrences (to inspector) by the Manager of the Factory. 2. Six kinds of occurrences are included as dangerous occurrences. ➢ Bursting of plant used for steam. ➢ Collapse of failure of a crane. ➢ Explosion, fire bursting out, leakage or escape of molten metal or hot iron or gas causing bodily injury to any person or damage to any room or place. ➢ Explosion of Air receiver. ➢ Collapse or subsidence of any floor, roof, bridge, chimney or other structure.
Section 89 (Rule 131/131 A)	Notice of certain Dangerous disease (FORM 18). ➢ To notify dangerous as per third schedule in the prescribed format and prescribed time (to Chief Inspector and Certifying Surgeon and Administrative Medical Officer, ESI Office) by the Manager of the factory.

CHAPTER10 - PENALTIES AND PROCEDURE

Section 92	General penalty for offences.

CHAPTER 11 - SUPPLEMENTAL

Section 107	Appeal ➢ Occupier /Factory Manager may appeal in 30 days of the service of the notice/Order to Chief Inspector or State Government as per the procedure.
Section 108(Rule 133)	Display of Notices ➢ To display the abstract of the act in the prescribed manner near main entrance in legible conditions (FORM 19).
Section 110 (Rule 134)	Submission of half-yearly and annual Returns/Combined annual return (FORM 20).
Section 138	Register of Accidents and Dangerous Occurrences (FORM 23).
Rule 139	Maintenance of Inspection Book.
Rule 141	Maximum number of Workers to be posted prominently by means of a notice.
Rule 142	Intimation of intended closure of Factory.
Section 111	Obligations of Workers ➢ Not to willfully interfere or misuse any appliances/other things. ➢ Not to willfully and without reasonable cause do any thing likely to endanger him or others.

	➢ Not to willfully neglect make use of any appliances. ➢ In case of contravention shall be punishable (up-to 3 months or ➢ Rs.100 or with both.
Forms	FORM 1 to 41.

THE CONTRACT LABOUR (REGULATION & ABOLITION) ACT 1970 & ITS CENTRAL RULE 19

Section /Rules	Legal Provision/Requirements.
Section 4 of the Act	Applicability of the above Act: ➢ To every establishment in which twenty or more workmen are employed or were employed on any day of the preceding twelve months as contract labor: ➢ To every contractor who employs or who employed on any day of the preceding twelve months twenty or more workmen.
Section 7 of the Act/Rule 17 of the Rules	Every principle employer to undertake registration of establishment from labor commissioner for employing contractor labor.
Section 12/13 of the Act/Rule 21 of the Rules	To ensure valid license with its contractors, having more than 20 workmen.
Section 16/17/18/19 of the Act	Ensure availability of canteen, rest room, sanitary facility, first aid to contactors employees.
Rule 74 of the Rules	Establish, maintain and update Register of Contractors in the prescribed Format (Format 12)
Rule 75/76 of the Rules	Ensure availability of updated Register of Persons employed in the prescribed from with each contractors and contractor will issue Employment Card/services card to its employees. (Form 13/Form 14).
➢ Rule 82 part - 1 of the Rules	Ensure submission of half yearly return by contractors in the prescribed form (XXXIV) to the licensing officer.
➢ Rule 82 part - 2 of the Rules	Ensure submission of annual return b principle employer of the registered establishment in the prescribed form (#XXV) to the licensing officer.

THE WORKMEN COMPENSATION ACT, 1923 /2000

Pay compensation to workmen including contractors' workmen or commissioner for personal injury and or contracting any diseases peculiar to that employment arising out of and in the course of his employment within the scope based on the prescribed calculations & specification.

Report to Commissioner on any serious bodily injury or fatalities occurring within seven days of incident indicating circumstances in the form EE.

Submit Annual Return in the prescribed form to the Commissioner on compensation paid for the work related injuries/fatalities/disease in the year indicating details of persons receiving the same.

Submit details of memorandum signed, in the prescribed form: K/L/M on the basis of the settlement made to a woman or a person under a legal disability for lump sum payment, to Commissioner for registration & information.

CASE STUDY – 1

The Supreme Court has in J.K.Industries Ltd. And others v. Chief Inspector of Factories and Boilers and others {1996(2) CLR.832} has held that provision (ii) to section 2 (n) is constitutionally valid and is not ultra virus Articles 14, 19 (1) (g) and 21 of the Constitution of India.

By the Amending Act of 1987 it appears that the legislature wanted to bring in a sense of responsibility in the minds of those who have the ultimate control over the affairs of the factory so that they take proper care for maintenance of the factories and safety measure therein. The fear of penalty and punishment is bound to make the Board of Directors of the company, more vigilant and responsive to the need to carry out various obligations and duties under the Act, particularly in regard to the safety and welfare of the workers. Provision (ii) was introduced by the Amending Act, couched in a mandatory form =- "any one of the directors shall be deemed to be the occupier "- keeping in view the experience gained over the years as to how the directors of a company managed to escape their liability, for various breaches and defaults committed in the factory by putting up another employee as a shield and nominating him as the 'occupier' who would willingly suffer penalty and punishment. The state of unemployment in the country being what it is, it is not difficult to "hire" the service s of some only for this "job" Provision (ii} now makes it possible to reach out to a director of the company itself, who shall be prosecuted and punished for breach of the provision of the Act, to a great extent ensures that more care is taken for the maintenance of the factory and various safety measures prescribed under the Act for the health, welfare and safety of the workers are not neglected. IN the case of a company, the main part of Section 2(n) would not be workable unless that provision is read along with Provision (ii) The definition of an occupier under Section 2 (n) is of general application and different situations have been covered by the legislature only in different Provisions appended to Section 2 (n). These situations were, to a large extent earlier covered y Section 100 of the Act wand with the deletion of Section 100, it became imperative to take care of different situations of dealt therein. By enabling various provisions to Section 2 (ii) of course the expression shall be deemed to be an occupier in second Provision Section 2(n) indicates the creation of a legal fiction but it is wrong to presume that such legal fiction can come into play only where the substantive provision of Section 2(n) is not attracted. The substantive provision of Section 2(n) can become workable only in the case of a company, when the same is read along with Provision (ii). The deeming provision does not override the substantive provisions of Section 2 (n) hut clarifies it. Provision (ii) is not ultra virus the main provisions of Section 2 (n) and

as a matter of fact there is no conflict at all between the main provision of Section 2 (n) and Provision (ii) thereto. Both can be read harmoniously and when so read in the case of a company the occupier of a factory owned by a company would mean ' any one of the directors of the company who has been notified / identified by the company to have ultimate control over the affairs of the factory' and where no such director has been identified, then for the purposes of prosecution and punishment under the Act the Inspector of Factories may initiate proceedings against any one of the directors as the deemed occupier. The apprehension that on account of Provision (ii), the Inspector of Factories has acquired 'unguided, unfettered or absolute powers' to pick and choose any director of the company for prosecution and punishment is not well founded.

The Supreme Court has held that after the 1987 amendment, in the case of a company, which owns the factory, the company cannot nominate any one of its employees or officers, except a director of the company, as the occupier of the factory. IN other words, an occupier of the factory in the case of company must necessarily be any one of its directors who shall be so notified for the purposes of the Factories Act. Such an occupier cannot be any other employee of the company or the factory. This interpretation of an "occupier" would apply to all provisions of the Act, wherever the expression "occupier" is used and not merely for the purposes of Section 7 and 7-A of the Act.

Where the company fails to nominate one of its directors as the occupier of the factory, the Inspector of Factories shall be at liberty to proceed against any one of the directors of the company, treating him as the deemed occupier of the factory, for prosecution and punishment in case of any breach or contravention of the provisions of the Act or for offences committed under the Act.

Prior to 1987, Section 2 (n) of the Act which defined "Occupier of the factory" had necessarily to be rated along with Section 100 of the Act to find out an occupier under different situations. Sub-sec (2) of Section 100 provided that where the occupier of a factory was a company, any one of the Directors thereof may be prosecuted and punished for any offence under Chapter × for which the occupier of the factory was punishable. Under the Provision to Section 100 (2), the Company had an option to nominate one of its Directors, resident in India, who on such nomination would be deemed to be an occupier for purposes of prosecution and punishment under the Act. There was, thus, no compulsion under Section 100 (2) that only a director would be nominated as an occupier, even though in the definition of "occupier" under Section 2 (n), it was provided that an occupier means the person who has the ultimate control over the affairs of the factory and where such affairs are entrusted to a managing agent, such agent shall be deemed to be an occupier. Some of the companies taking advantage of the option as contained in the Provision to Section 100 (2) of the Act and noticing the stringent provisions for punishment for breach of some of the provisions of the Act, instead of nominating a Director, as the occupier, used to nominate some other employee or officer as an occupier of the factory and, thus, whenever any violation of the Act was committed,

it was that employee or officer who was subjected to penalty and punishment and not the directors or any one of them. Thus, by nominating an employee or an officer as the occupier, the directors of the company who are primarily an officer as the occupier, the directors of the company who are primarily responsible for ensuring safety measures in the factory and take care of health hygiene and welfare of the workers being in ultimate control of the management of the company which owns the factory, were able to escape prosecution and punishment even if they were found to be negligent or indifferent to the welfare of the workmen or had failed to provide adequate and proper safety measures in the factory as well as in cases where the breach was found to have been committed with their consent or connivance, or due to lack of diligence on their part. After a tragedy occurred in Delhi by the leakage of chlorine gas, the Supreme Court noticed the "escape route' which had been carved out by the Directors of the Company, which owns or runs the factory, and voiced its concerns and opined that if there was negligence in looking after the safety requirements, in a hazardous industry, in particular, even the Chairman and the Managing Director besides the Board of Directors must be held responsible and liable (even when they are not the actual offenders) as that alone could ensure reduction of, if not altogether elimination of, risk and hazard to workmen.

After the Supreme court judgment in M.C. Mehta and another v. Union of India and others [AIR. 1987 S.C.982: 1986 (2) SCC. 325], the Parliament stopped in and passed the Amendment Act 20 of 1987 which besides amending the definition of an occupied under Sec. 2 (n) of the Act by addition of various Provisions thereto also made some more significant changes in the Act. According to the definition of the 'occupier' under Section 2 (n), an occupier means a person who is in 'ultimate control of the affairs of the factory'. Though the word 'person' has not been defined under the Act. But under Section 3 (42) of the General clauses Act, a person has been defined to include a company or association or body of individuals, whether incorporated or not. Such a person, Clause 2 (n) of the Act, therefore, could be a company or a partnership or an association of persons or an Individual. Where the factory is owned or run by a company, it would be that company, which would be the occupier of the factory. Under Section 100, as it stood originally, where the occupier of the factory was a company, any one of the directors may be prosecuted and punished and the company could give a notice identifying such a director. It was, therefore optional for the company to notify a director as the occupier. The company could nominate any other officer or employee also as an occupier. The Amending act of 1987 eliminated altogether section 100 and instead introduced into Section 2 (n) various Provisions and in Provision (ii) provided a deeming fiction, as to what would happen if the occupier was a company. Criminal liability in case of a default would primarily attach to the company, as the occupier of the factory and, therefore, it has been provided that in case of company, anyone of the directors of the company shall be deemed to be the occupier. To remove the ambiguity and ensure that a mere 'authorization' by the Board of Directors of any of

its employees of officers, by a resolution, to be the occupier was not allowed to defeat the object of the Act, particularly in matters of punishment and penalty, the Parliament also enacted Sections 7 and 7-A of the Act by the Amending act of 1987 [J.K.Industries Ltd., and others v. Chief Inspector of Factories and Boilers and others – 1996 (2) clr. 832.]

There is a vast difference between a person having the ultimate control of the affairs of a factory and the one who has immediate or day-to-day control over the affairs of the factory. In the case of a company, the ultimate control of the factory, where the company is the owner of the factory, always vests in the company, through its Board of Directors.. The Manager or any other employee of whatever status can be nominated by the Board of Directors of the owner company to have immediate or day-to-day or even supervisory control over the affairs of the factory. Even where the resolution of the Board of Directors says that an officer or employee, other than one of the directors, shall have the 'ultimate' control over the affairs of the factory, it would only e a camouflage or an artful circumvention because the ultimate control cannot be transferred from that of the company, to one of its employees or officers, except where there is a complete transfer of the control of the affairs of the factory. Mechanical recitation of the words of Section 2 (n), as a Mantra in a resolution nominating an employee or an officer as the occupier by stating that he shall have 'ultimate control over the affairs of the factory' cannot be permitted to defeat the object of the amendment.

Though, the expression "ultimate control" was used in Section 2 (n) even prior to the 1987 amendment also, but read with the Provision to Section 100 (2) it gave an opportunity to the companies owning the factory to dilute the rigour of the provisions by not notifying one of its directors to be the occupier and instead nominating some employee or the other to be the "occupier" for purposes of punishment and penalty. The ultimate control which vests in an owner and in the case of a company in the Board of Directors cannot be vested in anyone else without completely transferring the control over the factory to those other persons. The law does not countenance duality of ultimate control. If the transfer of the control to another person is not complete, meaning thereby that the transferor retains its control over the factory to that other person. The law does not countenance duality of ultimate control. If the transfer of the control to another person is not complete, meaning thereby that the transferor retains its control over the affairs of the factory, the transferee, whosoever he may be, (except a director of the company, or a partner in a partnership firm) cannot be considered to be the person having ultimate control over the affairs of the factory notwithstanding what the resolution of the Board states. The litmus test, therefore, is who has the 'ultimate' control over the affairs of the factory.

The Supreme Court held that the law laid down by the High Courts of Allahabad, Madhya Pradesh, Rajasthan and Patna is the correct enunciation of law in regard to the ambit and scope of the Provision (ii) to Sec. 2 (n) and that the

decisions of the High courts of Bombay, Orissa, Karnataka, Calcutta, Guwahati and Madras is not the correct law.

In case of a factory owned or controlled by the Central Government, the State Government or the local authority, the person or persons appointed to manage the affairs of the factory by the Central Government, State Government or the local authority, as the case may be, shall be deemed to be the occupier. Therefore, if it is a case of a factory in fact and in reality any local authority then in case of such a factory the person or persons appointed to manage the affairs of the factory shall have to be deemed to be the occupier, even though for better management of such a factory or factories a corporate form is adopted by the Government.

The provision to sub-section (2) though enacted as an exception to the main part of sub-section (2) is truly by way of a separate provision made in the case of a factory belonging to the Central Government or any State Government or any local authority. While making the amendment in 1987 in Sec., 2(n) and deleting Sec. 100 an independent Provision to Section 2 (n). That also clearly indicates the intention of the Legislature that it wanted to make a separate provision for deeming who should be the occupier of a Government factory. [Indian Oil Corporation Ltd. V. Chief Inspector of Factories and others; Indian Oil Corporation Ltd. v. Labour Commissioner – 1998 (4) LLN. 37: 1998 LLR. 769:1998 (2) CLR.506: 1998 (80) FLR.45]

CASE STUDY–2

Sec 22 (1)

The person working in the factory in order to become a worker must be employed exclusively in that manufacturing process or in cleaning the machinery or the premises used for the manufacturing process or in any kind of work incidental to or connected with the manufacturing process or the subject of the manufacturing process. In the instant case, the people working in the laundry are not exclusively employed in the laundry. They are the employees of the Hospital doing all kinds of work in connection with the Hospital in the various departments of the Hospital such as clinical, medical, surgical, sanitary, etc., who are by turns asked to do the work in the laundry. They are not therefore workers within the meaning of Sec. 2(1) of the Factories Act and hence the laundry in the Christian Medical College Hospital is not a factory as defined in the Act. [Dr. P.S.S. Sundar Rao (General Superintendent) Christian Medical College & Hospital, Vellore v. Inspector of Factories, Vellore – 1984 (2) LLJ. 237.]

CASE STUDY–3

Sec 51

This Section provides that no adult worker shall be required or allowed to work in a factory for more than forty-eight hours in any week and subject to this provision, Section 54 of the Act provides that no adult workman shall be required or allowed to work for more than nine hours a day and this limit could be exceeded only to facilitate change of shifts and with the previous approval of the Chief

Inspector. There is no compulsion under the terms and conditions of service of the workmen that they should work overtime for any specific number of days in any month. It is only under the circumstances when management is permitted to engage the services of a workman overtime in terms of the provisions of the Factories Act and a workman offers to work overtime that the management may allow him to work overtime on payment of double the rate for the period of overtime work as prescribed under section 59 of the Factories Act. It is not obligatory for any workman to work overtime and the management has also no right to compel a workman to work overtime and further even if the workman agrees, he cannot be engaged to work overtime regularly as it is controlled by the aforesaid provision of the Factories Act. Therefore, it is clear that overtime work cannot be regarded as either an express or implied term of the contract of employment. [Hind Art Press, Mangalore v. Employees' State Insurance Corporation and another – 1989 (75) FJR. 73.]

International Labour Organization (ILO)

ILO 1919 – 1969- Fifty Years in the Service of social Progress

Fifty years ago, at the end of 1918, the First World War was drawing to a close. Not only had peace to be made, it must be a durable peace. The peace Treaty signed in Versailles on 28 June 1919 set up the League of Nations whose essential task was to avert future conflicts. But it had already been understood that universal and lasting peace "can be established only if it is based upon social justice". The International Labour Organization was therefore created alongside the League of Nations with the responsibility of setting up international collaboration for the study of labour problems and for the adoption of international standards of workers protection.

Of this structure, only the ILO was to remain after the Second World War. Relying on the confidence of workers, of employers and of governments which constitute it, and drawing on its capital of accumulated achievements, the ILO was ready to face the future. In Philadelphia in 1944, the Organization marked its 25 years of activity by enlarging the scope of social international co-operation and bringing the ILO into the struggle against poverty and insecurity. As the first specialized agency to enter into relations with the United Nations, it threw its weight wholeheartedly - while continuing its work for the protection of workers - into a new and essential undertaking; international technical co-operation.

There were 45 States Members in 1919, there are 118 in 1968.These figures are eloquent, for they demonstrate that the ILO's work affects the whole world and more particularly those countries which have recently become independent and where problems of development are most acute. For the past 20 years, ILO experts have supported the efforts of governments in organization of employment services and labour administration, vocational training for unskilled workers and managers alike, productivity in large and small undertakings, development of co-operatives, workers education, social security systems, better conditions of work and higher living standards.

1969 will see a new departure: the ILO's World Employment Programme, whose aim is it furnish to everyone opportunities for jobs and skills of value to the community and satisfying to the workers. There again, as in the past the ILO's main concern will continue to be Man, the purpose and the means of social progress.

INTRODUCTION

One of the tasks set to the International Labour Organization in the preamble to its Constitution is "the protection of the worker against sickness, disease and injury arising out of his employment."

The present booklet describes the different stages of the activities of the Organization during the last 50 years for the promotion of occupational safety and health.

Such activities cannot be carried on effectively without the co-operation of all the parties concerned, but precisely because of its tripartite structure which comprises governments, employers and workers, the ILO possesses the necessary resources for its activities.

The International Labour Office, which is the permanent secretariat of the International Labour Organisation, considers that safety and health are indivisible, and in its activities it treats them as two aspects of the same question, i.e. the protection of workers.

The work of the ILO is designed to meet the practical needs of the States Members of the Organisation, employers and workers.

Today, occupational safety and health activities are concerned not only with the prevention of occupational accidents and diseases but also with the improvement of the workers safety and health in industrial and social life, in particular by making work more humane as a result of better environmental conditions at workplaces.

The different kinds of activity that the ILO carries on in the field of occupational safety and health may be summarily classified as follows:

- Standard setting and research;
- Technical co-operation, especially with developing countries;
- Collaboration with other international organizations;
- Collection and dissemination of information.

Safety and health in particular occupations

The Model Code of Safety Regulations for Industrial Establishments for the Guidance of Governments and Industries, adopted by a Tripartite Technical Conference in 1948, is a monumental work comprising 244 sets of regulations in 16 chapters and running to some 500 pages.

The main subjects death with are industrial premises (general requirements, floors, floor and wall openings, stairs, platforms, elevators, yards, lighting, ventilation, temperature, etc.); fire prevention and protection (exists, fire-fighting

facilities, alarm systems storage of explosive an flammable substances, lightning protection etc.); machine guarding (general requirements, prime movers, transmission and working machines of all kinds); electrical equipment; hand tool and portable power-driven tools; boilers and pressure vessels(including air receivers, compressore and gas cylinders);furnaces, kilns and ovens(from blast furnaces to enameling ovens);handling and transportation of material (general requirements, cranes of all kinds, portable hoists, winches, blocks and tackle, conveyors, power and hand trucks, plant railways, piping systems, etc, and lastly, lifting, carrying, piping and storage of material);dangerous and obnoxious substances (flammable and explosive substances, such as commercial explosive, magnesium, celluloid, acetylene, organic dust and cellulose solutions for spray painting; corosive, hot and cold substances and alkalies etc.; infectious, irritating and toxic substances, including carbon monoxide, lead and its compounds, phosphorus and coal-tar derivatives);dangerous radiations (infra-red, ultra-violet, ionizing radiations);maintenance and repairs; health protection (sanitation, exhaust ventilation, etc.); personal protective equipment; selection of workers, medical service and first-aid(included protection of women and young persons and medical examinations);and works safety organization.

Amendments to various provisions of the Model Code relating to the textile industries and to acetylene welding and related subjects were adopted by a meeting of experts in 1955 and have been incorporated in the Code. Amendments to the provisions concerning radiations were drafted in 1957 by a committee of experts. Other amendments concerning the safety of lifts and other lifting appliances and the use of dangerous substances are in preparation.

Agriculture

The ILO has for many years been aware of the importance of safety and health in agriculture. The development of mechanization and the increasing use of chemicals in agriculture have led the ILO to prepare specific standards for this sector. Thus a meeting of experts held in 1964 adopted a Code of Practice on Occupational Safety and Health in Agricultural Work comprising nearly 1000 provisions. In addition, two guides, one on safety and the other on health in agriculture, are in preparation.

A panel of consultants on safety and health in agriculture has been set up to assist and guide the office in its work in this field. The panel consists of some 40 specialists from different parts of the world.

Forestry

A study on safety and health in forestry work was compiled in 1957;it included detailed statistics of accidents.

At the request of the joint FAO/ECE/ILO Committee on Logging Techniques and the Training of Forestry Workers, the ILO has published a Guide to Safety and Health in Forestry Work.

A code of practice on Safety and Health in Forestry Work is in preparation.

Protection of Seafarers

In 1946, the International Labour Conference adopted a Convention (No.73) on the medical examination of seafarers which, with minor exceptions, applies to every person engaged in any capacity on board any seagoing vessel other than a fishing vessel and certain small vessels.

Another Convention (No.113), which was adopted in 1959, extends the provisions on medical examinations to fishermen.

On several occasions the maritime consultative body of the ILO, the Joint Maritime Commission, has included on its agenda items referring to health of seafarers and the International Labour Conference, especially at its maritime sessions, has adopted several instruments bearing directly or indirectly on this subject. Particular mention may be made of two Recommendations (No.105 and No.106) adopted in 1958 at the 41st (maritime) Session of the Conference. The first deals with the contents of medicine chest on board ship and recommends the adoption of a standard list of medicaments and surgical instruments, appliances and equipment to be carried on board every ship whether there is a ship's doctor on board or not. The annex of the Recommendation gives the list of suggested medicaments and medical equipment. The second Recommendation deals with medical advice by radio to ships at sea.

The two Recommendations were adopted as a result of a proposal made by the Second Session of the Joint ILO/WHO Committee on the Health of Seafarers which met in 1954.The Joint Committee, which studies seafarers health on a continuing basis and defines the policy to be followed by the two organizations with respect to them in the field of hygiene of seafarers, was established in1949 following a recommendation adopted by the First Word Health

Assembly in 1948.The Third Session of the Joint Committee recommended that ILO, WHO, and IMCO should undertake the establishment on an international scheme to provide medical advice to ships at sea. The main task of the Fourth Session in1965 was the consideration and adoption of this co-ordinated scheme which comprises an international model for a ships medical guide, a new schedule of contents for ships medicine chests and the revised medical section of the International Code of Signals.

Requirements of hygiene are included in Convention No.75, adopted in 1946, and in a revised Convention No.92, adopted in 1949, concerning crew accommodation on board ship. These apply to seagoing ships, except fishing vessels and certain other vessels. A third Convention No.126, adopted in1966, concerns minimum standards of accommodation on board fishing vessels.

These Conventions contain detailed provisions concerning the location, structure, arrangement, dimensions, floor space per person, heating, lighting and ventilation, etc., of crew accommodation. In addition to general provisions there are special provisions for mess rooms, dormitories, sanitary, hospital and recreational accommodation (including open deck space).

The problem of the safety training of seafarers was studied in 1964 by a Joint ILO/WHO/IMCO Committee on the Training of Seafarers in the Use of Aids to Navigation and Other Devices which adopted a document for guidance intended to assist countries in the provision of training related to ship board safety.

In the field of safety, a Recommendation No.48, adopted in 1936, included provisions concerning the fencing of dangerous places in dock areas, lighting in these areas, etc.

The First Session of the Tripartite Subcommittee on Seafarers Welfare of the Joint Maritime Commission, which met in 1959, adopted resolutions and conclusions emphasizing the need for a stricter application of the principles contained in Recommendation No.48, mentioned above, while a conclusion adopted by the Third Session of the Subcommittee in 1966 pointed out that vocational training on general health hazards.

In 1968, a Joint ILO/FAO/IMCO Meeting on Safety on Board Fishing Vessels adopted an international code of practice dealing with the navigational, operational and occupational aspects of the subject, prepared by the three organizations. The code introduces international minimum standards with respect to the safety of fishermen and fishing vessels.

- Moreover, a Medical First Aid Guide to be annexed to the IMCO Code on Dangerous Goods is in preparation with the co-operation of ILO and WHO.

THE EMPLOYEES STATE INSURANCE ACT, 1948 / THE EMPLOYEES STATE INSURANCE (GENERAL) REGULATIONS, 1950 AS AMENDED TIME TO TIME

An Act to provide for certain benefits to employees in case of sickness maternity and "employment injury" and to make provision for certain other matters in relation thereto. The Act in fact tries to attain the goal of socio-economic justice enshrined in the Directive principles of state policy under part 4 of our constitution, in particular articles 41, 42 and 43 which enjoin the state to make effective provision for securing, the right to work, to education and public assistance in cases of unemployment, old age, sickness and disablement.

The Beginning

The Employee State Insurance act was promulgated by the Parliament of India in the year 1948.To begin with the ESIC scheme was initially launched on 2 February 1952 at just two industrial centers in the country namely kanpur and Delhi with a total coverage of about 1.20 lac workers. There after the scheme was implemented in a phased manner across the country with the active involvement of the state government.

Applicability

The ESIC Act applies to non-seasonal, power using factories or manufacturing units employing ten or more persons and non-power using establishments employing twenty or more persons. Under the enabling provisions of the act, a factory or establishment, located in a geographical area, notified for implementation

of the scheme, falls in the purview of the act. Employees of the aforesaid categories of factories or establishments, but drawing wages only up to Rs 6, 500 a month are entitled to health insurance cover under the ESI act. The wage ceiling for purpose of coverage is revised from time to time; to keep pace with rising cost of living and subsequent wage hikes. The present ceiling of Rs6, 500 has been effective from 1 January 1997 the appropriate government state or central is empowered to extend the provision of the ESI Act to various classes of establishment, industrial, commercial, agricultural or otherwise in nature. Under these enabling provisions most of the state governments have extended the ESI act to certain specific classes of establishments. Like shops, hotels, restaurants, cinemas, employing 20 or more persons. But no industry has the right to opt out of the scheme.

Contribution periods and benefit period

Workers, covered under the ESI Act, are required to pay contribution towards the scheme on a monthly basis contribution period means a six-month time span from 1 April to 30 October and 1 November to 31 March. Thus, in a financial year there are two contribution periods of six months duration. Cash benefits under the scheme are generally linked with contribution paid. The benefit period starts their months after the closure of a contribution period,

Contribution period	*corresponding benefit period*
1 April to 30 September	1 January to 30 June of the following year
1 October to 31 March	18 July to 31 December

Registration

Simultaneously with his or her entry into employment in a covered factory or establishment, an employee is required to fill in a declaration form. The employee is then allotted a registration number, which distinguishes and identifies the person for the purposes of the scheme. A person is registered once and only upon his entry in insurable employment. But **SC's judgement in Balakrishna V ESIC** has held that a worker covered under the act would be entitled to benefit from the date of his employment and not from the date of registration after contribution by the employer.

Identity card

On registration every insured person is provided with a 'temporary identification certificate', which is valid ordinarily for a period of three months but may be extended, if necessary, for a further period of 3 months. Within this period, the insured person is given a permanent 'family photo identity card' in exchange for the certificate. The identity card serves as a means of identification and has to be produced at the time of claiming medical care at the dispensary/ clinic and cash benefit at the local office of the corporation. In the event of change of employment, it should be produced before the new employer as evidence of registration under the scheme to prevent any duplicate registration. The identity card bears the signature/thumb impression of the insured person. Since medical benefit is also available to the families of Insured persons, the particulars of family members

entitled to medical benefit are also given in the identity card affixed with a postcard size family photo. If your identity card is lost, a duplicate card is issued on payment as prescribed.

Appointment of office bearers

The doctors in the ESI hospitals, staffs and other office bearers of ESIC are appointed by the respective state governments, except in Delhi where they are appointed by the ESI Corporation.

Local office

A network of local office has been established by the corporation in all implemented areas to disburse all claims for sickness, maternity, disablement and dependents benefit. The local office answers all doubts and inquiries and assists otherwise in filling in claim forms and completing other action necessary in connection with the settlement of claims. These office also interact with the employers of the area. The local offices are managed by a manager and work under the control of the regional office

Social security benefits

Quantum, scale and contributory conditions

Employees covered under the scheme are entitled to medical facilities for self and dependants. They are also entitled to cash benefits in the event of specified contingencies resulting in loss of wages or earning capacity. The insured women are entitled to maternity benefit for confinement. Where death of an insured employee occurs due to employment injury or occupational disease, the dependants are entitled to family pension.

Various benefits that the insured employees and their dependants are entitled to, the duration of benefits and contributory conditions therefore are as under

1. Medical benefit

Full medical facilities for self and dependants are admissible from day one of entering insurable employment. Whereas, the primary, out patient, in patient and specialist services are provided through a network of panel clinics, ESI dispensaries and hospitals, super specialty services are provided through a large number of advanced empanelled medical institutions on referral basis.

Eligibility to Medical benefit

- From day one of entering insurable employment for self and dependants such as spouse, parents and children own or adopted.
- For self and spouse on superannuation subject to having completed five years ininsurable employment on superannuation or in case of having suffered permanent physical disablement during the course of insurable employment.
- The rate of contribution for superannuated/ disabled is Rs 1, 220 per annum payable in lump sum at the local office for availing full medical care for self and spouse.

2. Sickness benefit [cash]

Sickness benefit is payable to an insured person in cash, in the event of sickness resulting in absence from work and duly certified by an authorized insurable medical officer/ practitioner.

- The benefit becomes admissible only after an insured has paid contribution for at least 78 days in a contribution period of 6 months.
- Sickness benefit is payable for a maximum of 91 days in two consecutive contribution period.[one year]
- Payment is to be made by the local office within 7 days of certificate of sickness at a standard rate, which is not less than 50% of the wages. [The logic behind fixing of 78 & 91 days of contribution is based on certain statistics worked by the corporation to give cash benefits. But the officials in the corporation don't know how it is fixed.]

3. Extended sickness benefit [cash]

Extended sickness benefit is payable to insured persons for the period of certified sickness in case of specified 34 long-term diseases that need prolonged treatment and absence from work on medical advice.

- For entitlement to this benefit an insured person should have been in insurable employment for at least 2 years. He/ she should also have paid contribution for a minimum of 156 days in the preceding 4 contribution periods or say 2 years.
- ESI is payable for a maximum period of 2 years on the basis of proper medical certification and authentication by the designated authority.
- Amount payable in cash as extended sickness benefit is payable within 7 days following the submission of complete claim papers at the local office concerned.13

4. Enhanced sickness benefit [cash]

This cash benefit is payable to insured persons in the productive age group for under going sterilisation operation, viz., vasectomy/ tubectomy.

The contribution is the same as for the normal sickness benefit.

Enhanced sickness benefit is payable to the IP's for 14 days for tubectomy and for seven days in case of vasectomy.

The amount payable is double the standard sickness benefit rate that is, equal to equal to full wages.

5. Maternity benefit [cash]

Maternity benefit is payable to insured women in case of confinement or miscarriage or sickness related thereto.

For claiming this an insured woman should have paid for at least 70 days in 2 consecutive contribution periods i.e. 1 year.

The benefit is normally payable for 12 weeks, which can be further extended up to 16 weeks on medical grounds.

The rate of payment of the benefit is equal to wage or double the standard sickness benefit rate.

The benefit is payable within 14 days of duly authenticated claim papers.14

6. Disablement benefit [cash]

Disablement benefit is payable to insured employees suffering from physical disablement due to employment injury or occupation disease.

- An insured person should be an employee on the date of the accident.
- Temporary disablement benefit at 70% of the wages is payable till temporary disablement lasts and is duly certified by authorized insurance medical officer.
- In case of permanent disablement, the cash benefit is payable is payable for life. Amount payable is worked out on the basis of earning capacity determined by a medical board.
- Disablement benefit is payable within one month of submission of the complete claim papers.15

7. Dependants benefits [cash]

Dependants benefit [family pension] is payable to dependants of a deceased insured person where death occurs due to employment or occupational disease.

- A widow can receive this benefit on a monthly basis for life or till remarriage.
- A son or daughter can receive this benefit till 18 years of age.
- Other dependants like parents including a widowed mother can also receive the benefit under certain condition.
- The rate of payment is about 70% of the wages shareable among dependants in a fixed ratio.
- The first installment is payable within a maximum of 3 months following the death of an insured person and thereafter, on a regular monthly basis.16

8. Other benefits

1. Funeral expenses: On the death of an insured person subject to a maximum of a Rs. 2, 500 payable at the local office.

2. Vocational rehabilitation: In case of disabled insured persons under 45 years of age with 40% or more disablement.

3. Free supply of physical aids and appliances such as crutches, wheelchairs, spectacles and other such physical aids.

4. Preventive health cares services such as immunization, family welfare services, HIV/AIDS detection, treatment etc.

5. Medical bonus Rs250 is paid to an insured woman or in respect of the wife of an insured person in case she does not avail hospital facilities of the scheme for child delivery

3.3 Revision Points and Summary

Factories act 1948 & State Factory Rules is a law regulating the Health & safety of the Labours in the Factories. Chief inspectors of factories will be the enforcing authority of the act in the Factory. Each state has there own State Factories Rules like Tamil Nadu Factory Rules, Karnataka State Factory Rules etc. It provides the general safety, health & welfare requirements for workers in Factories, which has to be established, based on their applicability.

Factories Act states the requirement for the Approval & licensing of a new factory or a modification to the existing one. It also states basic health requirement

like cleanliness, ventilation, temperature, illumination etc., welfare requirements like rest rooms, Medical centre, lunchroom, washing room etc for a worker in a Factory.

One safety Officer should be appointed for every 1000 Employees enforced by the act.

This act provides a list of process considered to be hazardous processes & the safety requirements necessary for the factories running this Hazardous process.

Any dangerous occurrences, accidents or notifiable disease in a factory should be communicated to the chief Inspectors of factories & other relevant persons within 24 hours in prescribed format.

Workman Compensation Act 1923/2000 provides details of the compensation to workmen to workmen including contractor's workmen or commissioner for personal injury and or contracting any diseases peculiar to that employment arising out of and in the course of his employment within the scope based on the prescribed calculations & specification. This act is applicable for firm, which employs equal to twenty or more number of contract labors in the twelve-month period of a year.

International Labour Organisation was formed with the basic motto of protection of workers against sickness, injury & disease arising out of his Employment. ILO promotes the Occupation health & safety for the welfare of the Labour by different kinds of activities

Employee's state Insurance Act 1948 was amended in the interest of the certain benefits to the Employees in case of sickness, maternity & employment related injury. It states the details of the medical benefits which can be acquired by the Employee. It details the amount of contribution of an Employee & Employer towards ESI. Present ceiling limit of wages upto which the health insurance is applicable as per ESI is Rs 6, 500/-.

3.4 Assignments

1. If you have been appointed as a safety Officer in a factory what are the registers you need to maintain as per Factories Act
2. Explain the role of the Chief Inspectors of Factories in enforcing the laws in factories
3. Assume you are opening a chemical Industry manufacturing fertilizers what are all the legal requirements you need to take care as per Factories act
4. If you have to employ contract labors for your firm, explain the legal requirement which have to be complied as per Contract Labor Act
5. If there is an accident in your factory, what is your role as a safety officer?

3.5 Terminal Exercises

1. Factory license should be renewed from Inspectors of factories every
   a. Bi annually
   b. Yearly
   c. Four years once

2. Half-yearlCanteen facility should be provided to the workers if the number of workers are more than
   a. 250
   b. 150
   c. 100
   d. 50
3. A Adult Male can carry _____ kgs of weight as per Indian Factories act
   a. 25
   b. 50
   c. 75
4. 40Pressure vessels should be hydro tested by competent person in not more than
   a. 1 year
   b. 2 years
   c. 3 years
   d. 4 years
5. Portable Electrical appliances of not more than _____ volts should be used in a confined space
   a. 15 V
   c. 20 V
   b. 24 V
   d. 8 V
6. Those Firm which employs more than _____ numbers of Contract employees should possess a valid license from Labor commissioner
   a. 10
   c. 20
   b. 30
7. d. 40The main task of the International Labour Organisation is
   a. Protection of the labours from poverty
   b. Protection of the labours from harassments from the society
   c. Protection of the worker against sickness, disease and injury arising out of his employment
   d. Protection of the childhood labours
8. ESI Act is to provide benefits to Employees in case of
   a. Sickness, maternity and employment injury
   b. His personal commitments like marriages etc
9. The present ceiling limit for the ESI act for Employees is Rs
   a. 6500/-
   b. 8500/-
   c. 10, 000/-
   d. 15, 000/-
10. ILO stands for
   a. Indian Labour Organization
   b. International Labour Organization
   c. International Logistics operation

❑

UNIT - IV

4.0 INTRODUCTION

This Lesson gives updates on various other legal requirements such as Indian Electricity rules, Gas cylinder rules, Manufacture storage and import of hazardous chemical rules, Boiler act and rules, Explosives act and rules, Static and Mobile pressure vessels rules, petroleum act and rules, Noise pollution and regulation

Other than these requirements such as Bio medical waste management and handling rules, Environment protection act 1986, Municipal solid waste management and handling rules need to be understood by the student. We will recommend this to be considered as assignment as student wherein they can refer web sites or from libraries and collect data and can make salient summary on these regulations

In lesson 3 we have covered factories act 1948 and background of factories act which is the ILO the introduction given for that chapter would remain the same.

In short legal requirement assessment need to be done for all types and size of organization and no one type fits all. Gap assessment need to be done during the preliminary stage of project to have compliance to legal requirements.

If there is anything which can bring down the company performance and can result in huge compensation it can be only deviation or non compliance to legal requirements.

Many multi national companies are paying heavy compensation and have paid in the past huge remediation cost on legal non compliance. So the understanding of legal subject is essential.

The following terms are frequently discussed with respect to any legal adherence, they are,

Compliance	-	Full implementation of legal requirements
Non Compliance	-	Breach of law
Contravention	-	Infringement or Violation of law
Non conformity	-	Non fulfillment of a requirement

Emerging Environment health and safety trend is due to the following key parameters,

- Global competition
- More demand for transparency
- Increasing public concern for safety, health and environment
- Public interest litigations
- Area specific environmental standards
- Integration of environment health and safety at planning stage
- Global improvement in Environment health and safety law

Almost all laws are listed below,

- The water prevention and control of pollution act 1974
- The water (prevention and control of pollution) cess act, 1977 and rules, 1978, amendment act, 2003

- The air prevention and control of pollution act 1981 and the air prevention and control of pollution rules, 1982, 1975
- Environment protection act, 1986 and environment protection rules, 1986
- The hazardous waste management and handling rules, 1989/2000/2003
- Manufacture storage and import of hazardous chemical rules, 1989/1994/2000
- The bio medical waste (Management and handling) rules, 1998
- The noise pollution (Regulation and control) rules 2000
- Gas cylinder rules, 2004
- The petroleum act 1934 as amended till 1977 and the petroleum rules, 1976 (As amended till 2002
- The central motor vehicles rules, 1989
- The batteries management and handling rules, 2001
- Environment (Protection) second amendment rule concerning Noise / Emission from DG sets
- Indian Boiler act, 1923 / Indian Boiler regulations, 1950
- Indian electricity rules 1956
- The ozone depleting substances (regulation and control) rules, 2000
- The Indian factories act, 1948 and State factories rules
- Building and other construction workers (Regulation of employment and conditions of service act 1996, central rules 1998
- The static and mobile pressure vessels (unfired rules) rules, 1981
- Explosives Act, 1884 / Explosives, 1983
- Atomic energy (Radiation protection) rules, 2004
- The energy Conservation act, 2001
- The Mines act 1952, an act to amend and consolidate the law relating to the regulation of labour and safety in mines
- The mines rules, 1955
- The coal mines regulation, 1957
- The metallic ferrous mines regulation, 1961
- The mines vocational rules, 1966
- The oil mines regulation, 1984
- The mines rescue rules, 1985
- The dock workers (Safety, Health and welfare) act, 1986- An act to give effect to the convention concerning the protection against accident of workers employed in loading and unloading ships
- The dock workers (Safety, Health and Welfare regulations, 1989
- The plantation labour act, 9151 and rules there under
- The inflammable substances Act, 1952
- The Municipal Solid wastes (Management and Handling) rules, 2000
- The shops and Commercial establishments Acts enacted by respective state governments
- The drugs and cosmetic act, 1995
- The Indian Ports act, 1908
- The Dangerous machines (Regulation) Act, 1983
- The public liability Insuarance Act 1991 and rules, 1991
- Key global protocols
- Global warning
- Basel convention

- Montreal protocol
- Stockholm convention on persistent organic pollutants, 2004
- United nations recommendation on transport of dangerous goods

The content above enlist the various act and rules enacted by the central and state government to protect Environment health and safety, the students are expected to refer websites and book to go into the details and the act to fully understand the key terms and applicability of relevant standards. We will be covering Key regulations having direct impact on Health and safety.

The students are expected to review the protocols from public / private library or google search in internet

4.1 Objective

- The student will be able to know the structure and importance of Act, rules, the enforcement agency attached with the act and rules, key definitions, relevance for the company and design of rules.

4.2 Content

- Indian electricity act and rules there under
- The contract labour (regulation & abolition) act 1970 & its central rule.
- Explosive act, 1884 / explosives rules, 1983
- The static and mobile pressure vessels (unfired) rules, 1981
- The petroleum act, 1934 (as amended till 1977)and the petroleum rules, 1976 (as amended till 2002. 16th september 1934
- The noise pollution (regulation & control) rules, 2000
- Gas cylinder rules
- Manufacture storage and import of hazardous chemical rules
- The Indian Boiler act 1923

INDIAN ELECTRICITY RULES, 1956

OBJECT OF THE RULES	Law related to regulation of Electricity Generation, transmission, distribution &safety requirements.
ENFORCEMENT AGENCY	Chief Electrical Inspector for Safety Requirements.
RELEVANCE FOR COMPANY	Construction, Operation&Maintenance of Electric Supply lines and apparatus.
KEY DEFINITIONS	Authorized Person, Low Voltage, Medium Voltage, High Voltage, Extra High Voltage, Occupier.
DESIGN OF THE RULES	Chapter 1 to Chapter 11 Chapter 4-General Safety Requirements Rule3-Authorization Rule 45-Precautions to be adopted by Occupier, Electrical Contractors, Electrical Workman Rule 63-Approval by Inspector.

INDIAN ELECTRICITY RULES, 1956

Section/Rules	Legal Provision/Requirements
Rule 3 (1)	Authorization of any person in the establishment for the purpose of electrical work (handling of electrical supply line and apparatus/working on medium/high/extra high voltage installations/use of energy at high and extra high voltage and others)
Rule 3(2)	No person shall be authorized unless he is competent to perform the duties assigned to him and posses either an appropriate certificate of competency or permit to work.
Rule 3 (2)a	No person shall be authorized to operate or undertake the maintenance of any part or whole of generation station of the capacity 100MV on above unless adequately qualified and trained(Annexure14)
Rule 3(3)	No person shall be deemed to authorize under sub Rule 1 as above unless his name been entered in a list at the premises of the person authorizing him and giving the purpose for which such person is authorized and entry has been attested by the authorized person and the person authorizing him.
Rule 3 (6)	Appointments of the person by the Management for the observance of Safety Provisions under IER, 1956, who Shall periodically inspect such installation, get Them tested and maintain records.

Section/Rules	Legal Provision/Requirements
Rule 5	Allow entry and inspection of the premises by government inspectors
Rule 29	Construction, Installation, protection, operation and maintenance of electric supply lines and apparatus. All electric supply lines and apparatus shall be of sufficient ratings for power, insulation and estimated fault current and of sufficient mechanical strength, for the duty which they may be required to perform under the environmental conditions of installation, and shall be constructed, installed, protected, worked and maintained in such a manner as to ensure safety of human being, animals and property/material to confirm IS Specifications, where laid down.
Rule 33 (2)	To take all reasonable precautions to prevent mechanical damage to the earth terminal and its lead belonging to the supplier of electrical energy.
Rule 34	Adequate control on: Preventing access to bare conductors in the building (making them in accessible) And provide readily accessible switches for rendering them dead whenever necessary And others safety measures.

Rule 35	Danger notices Every medium, high and extra high voltage installation shall affix permanently in a conspicuous position a danger notice in Hindi, English or in any other local language, with a sign of skull and bones as per ISS No.2551 on: Every motor, generator, transformer and other electrical plant and equipment. All supports of high and extra-high voltage overhead lines.
Rule 36	Handling of electric supply lines and apparatus Before any conductor or apparatus is handled, adequate precautions shall be taken, by earthing or other suitable means, to discharge electrically such conductor or apparatus. No person shall work on any live electric supply line or apparatus and no person shall assist such person on such work, unless he is authorized in that behalf, and takes the safety measures approved by the inspector. Every person who is working on electric supply line or apparatus or both shall be provide with tools and devices such as gloves, rubber shoes, safety belts, ladders, earthing devices, helmets, line testers, hand lines and like.
Rule 37	Supply to vehicles, cranes, etc A vehicle or traveling crane to which energy is supplied from an external source should be efficiently by a suitable switch enabling all voltage to be cut-off continuous and earthed.
Rule 41	Distinction of different circuits The owner of the every installation including sub-station, double pole structure, four-pole structure or any other structure having more than one feed, shall ensure by means of indication of a permanent nature, that the installation is readily distinguishable from other installations. Ensure circuits and apparatus are arranged in a manner so that no accidental charge occurs.
Rule 43	Provisions applicable to protective equipment Fire buckets filed with dry sand, first aid boxes and two or more gas masks (for enclosed sub stations with transforming capacity of 5 MVA and above)shall be conspicuously marked and kept in all generating stations/Fire extinguishers shall be tested once in a year and record shall be maintained. The fire extinguisher shall be tested for a satisfactory operation at least once a year and record of such test shall be maintained.
Rule 44	Instruction for restoration of persons suffering from electric shock Instruction in English or Hindi and local language of the district, for the restoration of persons suffering from electric shock, shall be affixed by the owner in a conspicuous place in every generating station, enclosed switch station. It shall be ensured that all authorized persons employed by him are acquainted with and are competent to apply the instructions. In every high voltage generating station, sub-station an artificial respirator shall be provided and kept in good working condition.

Rule 44(A)	Reporting of any electrical accident resulting in loss of life or likely to have loss of life of human shall sent a written report in the prescribed From (Annexure13 under IER, 1956)with in 48 hours of the knowledge of occurrence of fatal accidents.
Rule 45	Occupier to ensure that no electrical work (excluding replacement of lamp, fans, fuses, switches, low voltage appliances)shall be carried out in the premises except by An Electrical Contractor licensed by the State Government and Under the direct supervision of a person holding a certificate of competency issued or recognized b the State Government and by a person holding a permit.
Rule 46	Periodical inspection and testing of installation by (not exceeding 5 years) inspector or his authorized person.
Rule 48	Precautions against leakage before connection To prevent leakage while installing high voltage equipments the insulation resistance value should be followed as stipulated in the relevant Indian Standard. At a pressure of 1000V applied between each live conductor and earth for a period of one minute the installation resistance of HV installation shall be at least 1 mega ohm or as specified by the bureau of Indian Standards from time to time. For medium voltage installation-at a pressure of 500 V applied between each live conductor and earth for a period of one minute, the insulation resistance shall be at least 1mega ohm.
Rule 51	Provisions applicable to medium, high or extra voltage installations. When energy at medium, high or extra-high voltage is supplied, converted, transformed or used-all conductors (other than those of overhead lines) shall be completely enclosed in mechanically strong metal casting or metallic covering which is electrically an mechanically continuous and adequately protected against mechanical damage unless the set conductors are accessible only to an authorized person and protected to the satisfaction of the inspector so as to prevent danger. All metal works, enclosing, supporting or associated with the installation shall be connected with an earthing system as per standards laid down in the Indian Standards. Specification for switch boards to be complied with.
Rule 51	Specification for installation in premises where inflammable material including chemicals is produced, handled or stored, the electrical installation must comply with the requirements of flame proof, dust light, totally enclosed or other suitable type depending upon the hazardous zones.
Rule 60	Test for resistance of insulation Where any electric supply line for use at low or medium voltage has been disconnected from a system for the purpose of addition or alteration or repair, such electric supply line shall not be reconnected to the system until the supplier or the owner as applied the test prescribed under rule 48 I.e. precautions against leakage before connection.

Rule 62	System at medium voltage When a medium voltage supply system is employed, the voltage between earth and any conductor forming part of the same system shall not, under normal conditions, exceed low voltage.
Rule 63	Approval by Inspector To obtain approval of inspector for high/extra high voltage supply lines or apparatus.
Rule 65	Manufacturers Test Certificates for electrical installations Prior to approval by the inspector.
Rule 68	General conditions as to transformation and control of energy Where energy at high voltage is transformed, converted, regulated or otherwise controlled in sub-stations or switch-stations or in street boxes constructed undergrund, the following provisions shall have effect: Outdoor sub-stations except pole type sub-stations and fencing not less than 1.8 meters n height shall efficiently protect outdoor switch-stations. Under ground street boxes, which contain transformers, shall not contain switches or other apparatus, and switches, cut-outs or other apparatus required for controlling or other purposes shall be fixed in separate receptacles above ground. Where energy is transformed suitable provisions shall be made either by connecting with earth a point of the system at the lower voltage or otherwise to guard against danger.

THE CONTRACT LABOUR (REGULATION & ABOLITION) ACT 1970 & ITS CENTRAL RULE 19

Section /Rules	Legal Provision/Requirements.
Section 4 of the Act	Applicability of the above Act: a) To every establishment in which twenty or more workmen are employed or were employed on any day of the preceding twelve months as contract labor: b) To every contractor who employs or who employed on any day of the preceding twelve months twenty or more workmen.
Section 7 of the Act/Rule 17 of the Rules	Every principle employer to undertake registration of establishment with the from labor commissioner for employing contractor labor.
Section 12/13 of the Act/Rule 21 of the Rules	To ensure valid license with its contractors, having more than 20 workmen.
Section 16/17/18/19 of the Act	Ensure availability of canteen, rest room, sanitary facility, first aid to contactors employees.
Rule 74 of the Rules	Establish, maintain and update Register of Contractors in the prescribed Format (Format 12)
Rule 75/76 of the Rules	Ensure availability of updated Register of Persons employed in the prescribed from with each contractors and contractor will issue Employment Card/services card to its employees. (Form 13/Form 14).

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Rule 82 part -1 of the Rules	Ensure submission of half yearly return by contractors in the prescribed form (#XXXIV) to the licensing officer.
Rule 82 part - 2 of the Rules	Ensure submission of annual return b principle employer of the registered establishment in the prescribed form (#XXV)to the licensing officer.

EXPLOSIVE ACT, 1884 / Explosives Rules, 1983

Section / Rules	Legal Provision /Requirements
Section 5	Central govt. empowered to make rules for licensing of manufacture, possession, use, sale, transportation, import, export of explosives.
Section 6 A	Prohibition on manufacture, possession, sale or transport by young person (less than 18 years) and other persons specified.
Rule 3	Classification of explosives a follows: Class 1 Gunpowder Class 2 Nitro-mixture Class 3 Nitro-compound Class 4 Chlorate-mixture Class 5 Fulminate Class 6 Ammunition Class 7 Fire Works Class 8 Liquid Oxygen Explosives
Rule 5	No person shal import, export, transport, manufacture, possess or sell any explosive which is not authorized.
Rule 6	To make an application to chief controller in case of inclusion under the list of authorized explosives.
Rule 8	Packing of explosives to be undertaken in the manner as laid down in the Schedule II.
Rule 9	Marking of explosives shall confirm to rule 9.
Rule 32/87	Obtain license for transportation /manufacture of explosives.
Rule 89	Prior approval of manufacturing process is to be obtained.
Rule 113	Obtain license for possession, sale and use from Chief Controller of Explosives. Possession to be carried out only in the licensed premises.
Rule 116 to 134	Various precautions for storage, handling of explosives and magazines prescribed.
Rule 144	No person shall use explosives for blasting purposes unless he employs a qualified shot-firer holding a shot -firer permit.
Rule 146 to 153	Blasting safeguards are prescribed.
Rule 164 / 165	Amendment / Renewal of license prescribed.
Rule 169	Appeal: An appeal against the order of the licensing authority within 30 days of the date of order.
Rule 182	To notify accidents to chief controller explosives within 24 hours.

THE STATIC AND MOBILE PRESSURE VESSELS (UNFIRED) RULES, 1981

Section / Rules	Legal Provision / Requirements
Rule 3	General Exemption: These Rules shall not apply to vessels which form part of a processing (in which unit processes/unit operations are carried out).
Rule 4	No person shall fill, manufacture, import any vessel unless such vessel has not been manufactures as per the code/prior approval of Chief Controller.
Rule 5	No person shall deliver/dispatch any vessel with compressed gas to any person unless he is a license holder.
Rule 6	No repairs, additions or alterations to any vessel & method of execution unless approved.
Rule 8	No person under the age of 18 years or who is in state of intoxication shall be employed for loading /transport.
Rule 9	Prohibition on smoking, fire, lights in proximity.
Rule 9 A	Supervision and operation by trained supervisors having knowledge of Hazards and Fire fighting conditions.
Rule 12	Specification for construction and fitments of pressure vessels are prescribed (IS 2825).
Rule 19	All vessels shall be hydraulically tested by a competent person at a pressure marked on the vessel not more than 5 years after the first test (in case of vessels ontaining the corrosive/toxic gases, the period of inspection shall be once in two years).
Rule 20	Precautions during hydrostatic testing specified.
Rule 21 and 32	Specifications for storage requirements (minimum safety distances/foundations/fencing /earthing/fire-protection/loading and unloading facilities/electrical installations and others).
Rule 33	A Certificate of safety before usage of any vessel for storage OR after the alterations by competent person.
Rule 35 to 44	Vehicle for transport of compressed gas shall be of a type approved.
Rule 45 / 46	Obtain license for storage and transport of compressed gas.
Rule 53	Obtain prior approval in writng before carrying out any alterations by submitting drawings to the licensing authority.
Rule 47	Obtain prior license for transport of compressed gas.
Rule 51 (¾)	Mandatory display of license number in the premises and also the emergency information.
Rule 54 / 55	Amendment of license in case of alterations /additions/Renewal of License.
Rule 59	Appeal: An appeal shall lay with the Central Govt. against the order of Chief Controller for refusal/cancellation of license within 60 days of the order.
Rule 66	Notice of Accident, in case of loss of human life or serious injury to persons or property due to accident by explosion or fire. Chief Controller in case of loss of human life or serious injury to

	human or property within 24 hours. Office In charge of nearest Police Station. To the District Magistrate concerned. Leave all wreckage and debris untouched except a removal of bodies of any persons killed or rescue of persons injured.

THE PETROLEUM ACT, 1934 (AS AMENDED TILL 1977)AND THE PETROLEUM RULES, 1976 (AS AMENDED TILL 2002. 16TH September 1934

OBJECT OF THE ACT	An act to provide the Rules relating to import, transport, storage, production, refining and blending of petroleum.
ENFORCEMENT AGENCY	CHIEF Controller of Explosives.
RELEVANCE FOR COMPANY	Proper storage, transport and handling of petroleum.
KEY DEFINITIONS	Petroleum, Petroleum Class-A, Class-B.Class-C.
DESIGN OF THE ACT	Chapter I to IV Chapter I - Control over Petroleum.
Section /Rules	Legal provisions/Requirements
Section 3	No one shall import/transport or store any petroleum save in accordance with the rules made there under Section 4 of the Petroleum act, 1934.
Section 7 / 8 & Rule 116	Explanation: No license needed for transport or storage of limited quantities of Class B or C: Petroleum Class B If the total quantity in possession at any one place does not exceed 2500litres and none of it is contained in a receptacle exceeding 1000liters in capacity. Petroleum Class C If the total quantity in possession at any one place does not exceed 45, 000liters and such petroleum is transported or stored in accordance with the rules under section4. No license needed for import, transport or storage of small quantities of Class A: Petroleum Class A In case it is not intended for sale and the total quantity in his possession does not exceed 30 liters. Petroleum Class A possessed without a license shall be kept in security stopper receptacles of glass, stoneware or metal which shall not exceed 1 litre in capacity or in case of receptacles of metals exceed 25 litres in capacity.
Rule 3	Restriction on delivery and dispatch of petroleum - no person shall delivery or dispatch petroleum to any one in India other than the holder of a storage license issued under these rules or his authorized agents or a port authority or a railway administration or to a person authorized under the act to store petroleum without a license.
Rule 4	Approval of containers - Containers exceeding 1 litre in capacity for petroleum - Class -A and 5 liters in capacity for Class - B or Class C shall be of a type approved by CCE.

Rule 5, 6, & 7	Rules for construction / specifications for Class - A/Class-B/Class - C are specified and to be complied with. An sir space of not less than 5 percent of its capacity shall be kept in each container for petroleum class B and not less than 3 percent of its capacity in each container for petroleum class C. Empty receptacles shall be securely closed. No person shall repair by the use of hot work any container until thoroughly clean from vapour.
Rule 10	Prohibition of employment of children: No child under the age of 18years and no person who is in state of intoxication shall be employed on the loading, unloading or transport of petroleum product or in any license premises.
Rule 28	No leaky tank or container containing petroleum shall be tendered for transport.
Rule 63	Tank vehicle - every tank vehicle used for transport of petroleum in bulk on land shall be built, tested and maintained as per the requirements mentioned in the 3rd schedule of these rules and be of a type approved by CCE.
Rule 71	Specification for Electrical installation in vehicles employed for transportation specified and to be complied with for pressure of electrical circuit not to exceed 24volts and for electrical wiring/junction boxes.
Rule 72, 73, 74	A portable fir extinguisher (10 kg DCP type or equivalent) shall be provided. Additionally 1 DCP of 1 kg shall be in the driver's cabin /vehicles to be constantly attended / no vehical carrying petroleum shall be parked on a public road /congested area or at a place within 9 meter from any source of fire.
Rule 75	Obtain license for transportation in bulk of petroleum Classes A and B by road.
Rule 78	➢ Precaution against Static Charge or prescribed and to be complied with including: o Petroleum pipelines entering any tank vehicle loading or unloading area shall be electrically continuous and be efficiently earthed. o An earth boss with a flexible cable having robust clamping device shall be provided adjacent to the loading point. o Sound and Electrically continuous hoses or metal pipes. o The tank, filling pipe and the chassis of the tank shall during of a tank vehicle shall be efficiently bonded and connected with the earth boss. ➢ The bonding and earthing connections shall not be broken until loading of the tank vehicle has een completed and the filling and dip pipes thereof have been securely closed. ➢ Dip road shall be lowered into the tank before loading operation.Such a road shall not be completely raised about the liquid level during or within1 minute of the completion of such loading.

	➢ No tank vehicle shall be loaded at a rate exceeding 1 meter / second at the delivery and of the filling pipeis completely submerged in petroleum and hereafter the loading rate may be gradually increased, but it shall no time exceed 6 meters / second at the delivery of the filling pipe.
Rule 114	Certificate of electrical installation: Before engineering any electrical circuit and any electrical apparatus for the first time and after each repair maintenance or alteration work, a competent person shall issue a certificate of electrical installation under his signature to the effect that the circuit and the apparatus have the safe characteristics as per their approval.
Rule 116	Obtain license for storage except the exemption granted under section 7, 87 and 9 and comply license conditions.
Rule 117, 118.119, 120	Precautions on fire - no person shall smoke in any installation /storage shed/service station/no fire/furnace or other combustion source in the license premises/adequate number of fire extinguisher or DCP type/supervision of operations by experienced supervisor and conversant with the license conditions/cleanliness of installation or storage shed to be maintained / drainage in the enclosure to be provided.
Rule 121 / 122	The protected area surrounding any installation and storage shed shall have a wall or fence of at least 1.8 meter in the height /only petroleum to be stored in the license premises.
Rule 123	The capacity in liters or kiloliters of every tank in an installation shall be conspicuously marked on the tank.
Rule 124	Construction specification of the tank are specified: An air space of not less than five percent of the total capacity of the tank or the space prescribed in the code or specification, whichever is less shall be kept in each tank.
Rule 125	Testing of Tanks: All storage tanks before being put into use shall be tested with water pressure by a competent person. The competent person shall issue a Certificate of Tank Testing in the prescribed Performa.
Rule 127/128	Specification for Earthing are prescribed. The resistance to earth shall not exceed 7 and the resistance to any part of the fitting to the earth plate or to any other part of fitting shall not exceed 2.
Rule 129	No installation or shed shall be open to work between sun set and sun rise.
Rule 130	Certificate to Safety: Competent person shall issue a certificate of safety in the prescribed format before any installation is used for storage of petroleum product.
Rule 131	Obtain prior approval of specification and plans of premises proposed to be licensed for storage.
Rule 144	Obtain no objection certificate from district authority for the purpose of license for storage purposes.
Rule 146 /147	Prior approval necessary for alteration in the license premises / amendment of license.

Rule 148	Obtain renewal of license before expiry.
Rule 200	Notice of Accident: In case of loss of life or serious injury to a person or a property. Occupier to report accidents to CCE and other authorities during handling, transportation, storage, filling of gas cylinders in case of loss of human life or serious injury to human life or property. a) Chief Controller of Explosives of the area through telegraphic message followed by a letter giving particulars of the occurrence within 24 hours. b) District Magistrate. c) Officer In-charge of the Police Station. No wreckage and debris shall touch except for rescue of persons/ recovery of the bodies of the persons / restoration of the traffic.

THE NOISE POLLUTION (REGULATION & CONTROL) RULES, 2000

Section / Rules	Legal Provision / Requirements
Rule 4 (1)	The noise level in any area / zone shall not exceed the ambient air quality standards in respect of noise as specified in the Schedule.
Rule 4 (2)	Authorities shall be responsible for enforcement of Noise Pollution Control Measure and the due compliance with above standards.

Note:

1. Day time shall mean from 6.00 a.m. to 10.00 p.m.
2. Night time shall mean from 10.00 p.m. to 6.00 a.m.
3. Silence zone is an area comprising not less than 100 meters around hospitals, educational institutions, courts, religious places or any other area which is declared as such by the competent authority.
4. Mixed categories of areas may be declared as one of the four above mentioned categories by the competent authority.
5. *dB(A) Leq, denotes the time weighted average of the level of sound in decibels on scale A which is relatable to human hearing.
6. A "decibel" is a unit in which noise is measured.
7. "A", in dB (A) Leq, denotes the frequency weighting in the measurement of noise and corresponds to frequency response characteristics of the human ear.
8. Leq : It is an energy mean of the noise level over a specified period.

Ambient Air Quality Standards in respect of Noise

Area Code	Category of Area /Zone	Limits in dB(A) Leq*	
		Day time	Night time
(A)	Industrial area	75	70
(B)	Commercial Area	65	55
(C)	Residential Area	55	45
(D)	Silence Zone	50	40

Note:

1. Day time shall mean from 6.oo a.m. to 10.00 p.m.

2. Night time shall mean fron 10.00 am to 6.00 p.m.

3.Silence zone in an area comprising not less than 100 meters around hospitals, educational institutions, courts, religious places or any other area which is declared a such by the competent authority.

4.Mixed categories of areas may be declared as one of the four above mentioned categories by the competent authority.

*dB(A) Leq denotes the time weighted average of the level of sound in decibels on scale A which is relatable to human hearing.

A "decibel" is a unit in which noise is measured.

"A", in dB(A) Leq, denotes the frequency weighting in the measurement of noise and corresponds to frequency response characteristics of the human ear.

Leq : It is an energy mean of the noise level over a specified period.

GAS CYLINDER RULES, 2004

21st September' 2004

OBJECT OF THE RULES	Gas Cylinder Safety during filling, possession , transport , use and handling.
ENFORCEMENT AGENCY	Chief Controller of Explosives.
RELEVANCE FOR COMPANY	Compressed Gas Cylinder Safety requirements.
KEY DEFINITIONS	Compressed Gas , Critical temperature , dissolved acetylene cylinder , dissloved gas , flammable gas , Gas cylinder , poisonous gas , working pressure for permanent gas , working pressure for low pressure liquefiable gas.
DESIGN OF THE RULES	Chapter I to Chapter VIII Chapter IV - Filing and Possession
PENALTY for Contravention of Any Provision of the Act/ Rules/Orders/Directions	Contravention of conditions of the license. Punishment with imprisonment which may extend to 3 years or with fine which may extend to Rs.5, 000 or both.
Section /Rules	Legal Provision ?Requirements
Rule 3 to 7	Provision related to specifications for walls , safety relief devices , marking on cylinders / walls.
Rule 8	Identification of color: Every gas cylinder to confirm specified color coding as per : -IS 4379 for industrial gas cylinder and -IS 3933 for medical cylinders.
Rule 9 (1) and (2)	Every cylinder shall be labeled with the name of the gas, name and address of the person by whom the cylinder was filed.

	Warning Instruction: Every gas cylinder to have mandatory warning cylinder pasted on every cylinder namely -Do not change the colour of the cylinder. -This cylinder should not be filled with any gas other than one it now contains. -No flammable materials should be stored in the close vicinity of this cylinder or in the same room in which it is kept. -Please look for the next date of test, which is marked on a metal ring inserted between the valve and next of the cylinder and if this date is over, do not accept the cylinder for filling. - No oil similar lubricant should be used on the walls/fittings.
Rule 11	No person shall repair or cost to repair any leakage in the body of seamless gas cylinder.
Rule 12	Welded or brazed cylinder showing leaks at any place other than the welded or brazed seams shall not be required and shall be unserviceable.
Rule 13	No child under the age of 18 years and no person who is in the stage of intoxication shall be employed n loading and unloading operation.
Rule 14	Prohibition on smoking, fire lights, and dangerous operations in gas cylinder storage areas.
Rule 15 / 18/21	General Precautions for proper storage, handling, use prohibition on heat treatment, application of oil on the valves, exposure to sun are flammable material etc. or prohibited. Guidelines for proper handling , storage and use of gas cylinders: Cylinder shall be stored in a cool, dry, well-ventilated place under cover away from boilers, open flames, steam pipes or any other source of heat. Storage room shall be of fire-resistance construction. Thin wall cylinders such as LPG gas cylinder and dissloved gas cylinders shall not stacked in a horizontal position. Cylinders containing flammable and toxic gases shall be kept separated from each other and from cylinders containing other types of gases by an adequate distance or by a suitable partition wall. Cylinders shall not be stored under any condition which will cause corrosion. Cylinders shall not be stored along with any combustible material. Empty cylinders shall be segregated from the filled-ones. All electrical installations in storage area shall be flame-proof construction. Sliding, dropping or playing with cylinders is prohibited. Welded cylinder shall not be used for filling for any permanent or high - pressure liquefiable or highly toxic gas.

	No person shall fill any cylinder with any compressed gas unless the cylinder has been examined and subjected to hydrostatic stretch test, as the case may be The cylinders shall not be allowed to fall upon one another Provide warning stickers to every cylinder containing permanent or liquefiable gas Color coding to be followed as per IS 4379 for industrial cylinders and IS 393 for medical cylinders. Valves fitted with gas cylinders shall comply with prescribed IS standards Cylinders containing obnoxious or poisonous Gases shall not be provided with any safety device.
Rule 20	Cylinders filled with any compressed gas shall be transported duly complying with the provisions as per Schedule VI transport of cylinders.
Rule 22	Electrical Installation In premises for filling and storing flammable gases in cylinders all electric matters , distribution boards, switches , fues , plugs and sockets , all electric fittings , fixed laps .portable hand lamps and motors , shall be flame proof construction conforming to IS - 2148 or such other specification as approved by the Chief Controller and shall be effectively earthed.
Rule 24	A cylinder exposed to fire shall not be used unless it has undergone proper examination and hydrostatic stretch test.
Rule 26	Re - testing of Cylinders A cylinder for which prescribed periodical re-test has become duc shall not be charged and transported until such re-test has been properly made.
Rule 27	Owners Record The owner of a cylinder shall keep for the life of each cylinder, a record containing the following information regarding each cylinder , namely: cylinder manufacturers name and the rotation number; The specification number to which the cylinder is manufactured; Date of original hydrostatic test or hydrostatic stretch test; Cylinder manufacturers test and inspection certificates; Number and date of letter of approval granted by the Chief controller.
Rule 29	Prior License for Import of Gas Cylinders
Rule 35	Periodicity of Examination and testing of Cylinders for hydrostatic test or hydrostatic stretch test as per IS 8868.
Rule 37 to 42	Provisions related to dissolved Acetylene Gas Cylinders.
Rule 43 / 44	Requirement for Gas Cylinder License for filling and possession of Gas Cylinders No license needed for transport. No license is needed for possession of cylinders filled with

	License shall be responsible for all operations connected with the filling & possession in the license premises.
Rule 47 /49/50/53-58	Obtain prior approval of specifications and plans /license / alteration of license premises / renewal of license before expiry.
Rule 67	Accident Reporting: Notice of Accident, in case of loss of human life of serious injury to persons or property due to accident by explosion or fire Chief Controller in case of loss of human life serious injury to human life or property within 24 hours. To the District Magistrate concerned. Office In charge of nearest Police Station. Leave all wreckage and debris untouched except a removal of bodies of any person killed or rescue of persons injured.

No license for filling and possession is needed, when

Liquefied petroleum gas	When the total quantity of gas does not exceed 100kg at a time.
Any other flammable but non-toxic gas	When the total number of cylinders containing such gas does not exceed 25 or the total weight of gas does not exceed 200 kg, whichever is less at a time?
Any non-flammable , non-toxic gas	When a total number of cylinders does not exceed 200 at a time.
Any toxic gas	When a total quantity of such gas does not exceed 5 at a time.
Acetylene gas contained in cylinders in dissolved state	When the total quantity of such cylinders does not exceed 50 at a time.

GAS CYLINDER RULES, 2004

Rules	Legal Provision /Requirements
Rule 47 / 49/50 /53-58	Obtain prior approval of specifications and plans / application and grant / renewal of license /prior approval necessary for alteration of license premises.
Rule 59	Appeal: in writing within 60 days of the Order / License condition / Refuse of the license.
Rule 67	Notice of Accident : In case of loss of life or serious injury to a person or a property .Occupier to report accidents to CCE and other authorities during handling , transportation , storage , filling of gas cylinders in case of loss of human life or serious injury to human life or property. a) Chief Controller of Explosives of the area through telegraphic message / e-mail (explosives @ explosives .gov.in) followed by a letter giving particulars of the occurrence within 24 hours. b) District Magistrate. c) Officer In-charge of the Police station. No wreckage and debris shall touch except for rescue of persons/ recovery of the bodies of the persons / restoration of traffic.

THE MANUFACTURE, STORAGE AND IMPORT OD HAZARDOUS CHEMICAL RULES / AMENDMENT RULES, 1989/1994/2000 5th December, 1989

OBJECT OF THE RULES	Safe Guards with respect to handling of hazardous substances.
ENFORCEMENT AGENCY	Designated authorities are defined in Schedule 5. Isolated storage - Central/ State Pollution Control Board. Industrial installations and isolated storage covered under the Factories Act, 1948 - Chief inspector of Factories. Industrial installations and isolated storage dealing with hazardous chemicals and pipelines - Chief Controller of Explosives.
RELEVANCE FOR COMPANY	Manufacturing, storage and import of hazardous chemicals in accordance with our Rules.
KEY DEFINITIONS	Hazardous Chemicals, Major Accidents , Major Accident Hazard installations (MAH), Threshold quantity , isolated Storage.
DESIGN OF THE RULES	Rule 1 to Rule 20.
PENALTY for contravention of any Provision of the Act/Rules/Orders/Directions	Imprisonment for a term which may extend to five years with fine which may extend to Rs.1.00 lac or with both. Additional penalty for continuing contravention.

HAZARDOUS CHEMICALS - DEFINITIONS 2 (e)

"HAZARDOUS CHEMICAL" Means:

1. Any chemical which satisfies any of the criteria laid down in

Part 1 of (Schedule 1) or

Listed in Column 2 of Part II of this Schedule.

2.Any chemical listed in Column 2 of Schedule 2.

3.Any chemical listed in Column 2 of Schedule 3.

TOXIC CHEMICALS

Chemicals having the following values of acute toxicity and which owing to their physical and chemical properties are capable of producing major accident hazards:

Toxicity	*Oral LD 50 (mg/kg)*	*Dermal LD50 (mg/kg)*	*Inhalation LC50 (mg/l)*
Extremely toxic	<5	<40	<0.5
Highly toxic	>5-50	>40-200	>0.5-2.0
Toxic	>50-200	>200-1000	>2-10

FLAMMABLE CHEMICALS

Flammable gases	Gases at 20 C and SP 101.3 KP a which are: a) ignitable when in a mixture of 13% or less by volume with air. b)have a flammable range with air of at least 12 percentage points regardless of the lower flammable limits.
Extremely flammable liquids	Chemicals having boiling point (BP) <35 C and flash point (FP) <23 C.
Very high flammable liquids	Chemicals having FP < 23 C and Initial BP > 35 C
Highly flammable	Chemicals having FP < 60 C but > 23 C
Flammable liquids	Chemicals with FP >60 C but 90 C

EXPLOSIVE CHEMICALS

It is defined as a Solid or Liquid or a Mixture of Substances or an Article,

Which is in itself capable by chemical reaction of producing gas at such a temperature and pressure and at such a speed as to cause damage to the surroundings,

Which is designed to produce an effect by heat , light , sound , gas or smoke or a combination of these as the result of non-detonative self sustaining exothermic chemical reaction.

PRINCIPLE SCHEDULES

Part 1 Schedule 1	Indicative criteria listed (toxicity /inflammability / explosiveness)
Part 2 Schedule 1	List of hazardous and toxic chemicals (684 chemicals)
Schedule 2 Part 1 Schedule 3	Isolated storage (threshold quantity 30 chemicals / class of chemicals provided). List of 179 chemicals in Groups 1, 2, 3 & 4 (toxic /highly reactive / explosive substances)
Part 2 Schedule 3	Group 5 flammable chemicals (Flammable Gases / Extremely Flammable Liquids / Highly Flammable Liquids , which remain liquid under pressure, Highly Flammable Liquids, Flammable Liquids)
Schedule 4	Installations for production use processing or treatment of organic or inorganic chemicals (6 types of installations listed)

LEVELS OF CONTROL

Low level controls	Irrespective of threshold quantity of hazardous chemicals involved	Non MAH Unit installation
Medium level controls Applicability (Rule 5, 7 to 9 and 13 to 15) in addition to low level and high level controls in addition to low level controls	Quantity of hazardous chemicals involved Is equal to or more than Column 3 of Schedule 2 Is equal to more than Column 3 of Schedule 3	Medium Hazard MAH Installation.

High level controls Applicability (Rule 10 to 12) in addition to low level and high level controls	Quantity of hazardous chemicals involved Is equal to or more than Column 4 of Schedule 2 Is equal to or more than Column 4 of Schedule 3	High Hazard MAH Installation.

Major Accident Hazard Installation - Means isolated storage (Schedule 2) and industrial activity at a site handling (Schedule 3) (including transport through carrier / pipeline) of hazardous chemicals equal to or in excess of threshold quantities specified in column 3 of Schedule 2 and 3 respectively

ISOLATED STORAGE- DEFINITIONS 2 (I)

"ISOLATED STORAGE":

Means storage of a hazardous chemical, other than storage associated with an installation on the same site specified in Schedule 4 where that storage involves at least the quantities of that chemical set our in Schedule 2.

LOW LEVEL CONTROL

APPLICABLITY - INDUTRIAL ACTIVITY INVOLVING HAZARDOUS CHEMICALS FALLING IN PRT I OR PARTVII OF SCHEDULE I.

Rule 4 (2) a	Evidence to identify major accident hazards.
Rule 4 (2) b	Adequate Steps to prevent such major accidents limit their consequence and provide persons working on the site - information, training and equipment.
Rule 5	Notification of Major Accident within 48 hours to the concerned authority (Schedule 5) Involving loss of life inside or outside of the installation Are 10 or more injurious inside and / or one of more injurious outside. Are releases of toxic chemicals or Explosion or Fire or spillage of hazardous chemical resulting in on - site or off-site emergencies or Damaged equipment leading to stoppage of processes or adverse effects to the environment.
Rule 17 (2)	Obtain or develop safety sheets as specified in Schedule 9.
Rule 17 (4)	Label every container safety data sheets as specified information.
Rule 18	Follow specified procedure for import Informed prescribed authorities before 30 days or as reasonably practicable but not later than. Maintain the record of import in Schedule 10.
Rule 18 (6)	Ensure transport as per Motor Vehicle Act 1988 in case involved in import.

MEDIUM LEVEL CONTROLS (In addition to Low level control)

APPLICABILITY - INDUSTRIAL ACTIVITY INVOLVING HAZARDOUS CHEMICALS EQUAL TO OR MORE THAN COLUMN 3 OF SCHEDULE 3 OR IN CASE OF ISOLATED STORAGE, EQUAL TO OR MORE THAN COLUMN 3 OF SCHEDULE 2.

Rule 7 (1)	Not to undertake any industrial activity unless submitted and obtained written approval "notification of site " (Schedule 7) to the concerned authority at least 3 months before commencing the activity or before.
Rule 8	Update notification of site in case of change in the threshold quantity (increase or Decrease in the maximum threshold quantity)
Rule 13	Prepare and keep up - to- date on -site emergency plan (Schedule 11) including name of person who is responsible for safety on the site and other authorized persons. Conduct mock drill every six months and submit report to the concerned authority immediately.
Rule 14	Preparation of off-site emergency plan (Schedule 12) by district authorities and conduct rehearsal at least once in a year.
Rule 15	Occupier to provide information to persons liable to be affected before commencement of the activity about The nature of major accident hazards Safety measures and Do's& Don'ts in event of major accident.

HIGH LEVEL CONTROLS (In addition to Low & Medium level Control)

(APPLICABILITY - INDUSTRIAL ACTIVITY INVOLVING HAZARDOUS CHEMICAL EQUAL TO OR MORE THAN COLUMN 4 OF SCHEDULE 3 OR IN CASE OF ISOLATED STORAGE, EQUAL TO OR MORE THAN COLUMN 4 OF SCHEDULE 2)

Rule 10 (1)	Prepare and submit to concerned authority "Safety Report (Schedule 8)"before Commencing industrial activity.
Rule 10 (4) & (5)	Carry out "Independent Safety Audit Report" with the help of an expert not associated with such industrial activities and forward to the concerned authority within 30 days.
Rule 10 (6)	Carry out "Safety Audit Update Report" once in a year by conducting fresh Safety Audit and submit to the concerned Authority within 30 days.

INDIAN BOILER ACT, 1923/ INDIAN BOILER REGULATIONS, 1950

Indian Boiler Act, 1923

OBJECT OF THE ART	Law related to Steam boiler
ENFORCEMENT AGENCY	Chief Inspector of boiler
RELEVANCE FOR COMPANY	Registration, Inspection & Operation of Steam Boilers.
KEY DEFINITIONS	Accident, economizer, Owner
DESIGN OF THE ACT	Section 1 to Section 35 Section 7 – Registration

INDIAN BOILER ACT, 1923 / INDIAN BOILER REGULATIONS, 1950

Section / Rules	Legal Provision/ Requirements
Section 7	Owner to obtain registration of the boiler Inspector to provide 10 days notice of examination of boiler Chief Inspector to register the boiler and assign a registration number/ refuse to register the boiler Chief Inspector to issue certificate of registration for a period not exceeding 12 months at a pressure not exceeding the maximum pressure
Section 8	Owner to obtain Renewal of registration before the expiry of the period Certificate of registration shall cease when any accident occurs to the boiler
Section 10	When the period of the certificate relating boiler has expired the owner shell the entitled to use the boiler at the maximum pressure [as entered in the former certificate] provided he has applied for renewal before the expiry
Section 12	No structural alteration, addition or renewal shall be made in unless sanction has been obtain and writing.
Section 13	Owner to submit a report in writing of his intention to make any structural alteration, addition or renewal to any steam pipe attached to the boiler and submit particular
Section 14	Duty of owner to provide information as required by Inspector
Section 17	Power of Entry
Section 18	Report of accident - if any accident occurs to a boiler or steam pipe, the owner or person in charge shall within 24 hours report the accident in writing to Inspector
Section 19/20	Appeal to chief inspector of Appellate authority in case of grievance against order.

THE AIR (PREVENTION AND CONTROL OF POLLUTION ACT, 1981 AND THE AIR (PREVENTION AND CONTROL OF POLLUTION RULES, 1982, 1975)

OBJECT OF THE ACT	An act to provide for the prevention, control and abatement of air pollution, for the establishment, with a view to carrying out the aforesaid purposes, of boards, for conferring and assigning powers / functions of these boards.
ENFORCEMENT AGENCY	State Pollution Control Board.
RELEVANCE FOR COMPANY	Restriction on establishment or operation of any industrial plant in an Air Pollution Control Area. Not to allow emission of Air Pollutants in excess of the standards laid down by State Boards.
KEY DEFINITIONS	Occupier / Air Pollutant / Air Pollution / Chimney / Emission /Industrial Plant.
DESIGN OF THE	Chapter -I to Chapter-VII

ACT	Chapter -V - Prevention and Control of Air Pollution Chapter - VI - Penalties and Procedures.

Section / Rules	Legal Provision / Requirements
Section 21	Application for consent to establish (before taking any step for establishing any plant causing emission of Air Pollutants) in the prescribed Form 1 of the State Pollution Control Board along with prescribed fee.
Section 21	Application for consent to operate (before commissioning of the facility having source of Air Pollution of the establishment) in the prescribed Form 1 of the State Pollution Control Board along with the prescribed fee. Application for renewal of consent to operate before its expiry in the prescribed Form 1 of the State Pollution Control Board along with the prescribed fee. Submit fresh Application for consent to Establish in case of alteration in any control equipment or chimney.
Section 22	Persons operating any industrial plant not to discharge / permit emission of air pollutants in excess of the prescribed emission standards w.r.t different sources of emissions in the establishment.
Section 22 A	SPCB to make application to court for restraining persons from causing Air Pollution.
Section 23	Furnishing of Information to State Pollution Control Boards and other agencies in certain cases (district collector, health officer, municipal local body, nearest police station in case of emission in excess of standards occurs or likely to occur due to accident or other unforeseen act or event.
Section 24 & 25	To allow entry of SPCB for inspection purposes & provide information for the purpose o enforcement o the Act / Rules.
Section 26	SPCB to take samples from any chimney, dust, or any other outlet. The results of the analysis shall not be divisible as an evidence in legal proceedings unless complied the specific procedure (legal sampling).
Section 31	Appeal in case of not agreeing to any condition of the order made by the State Pollution Control Board within 30 days from the date of communication of the order. Appeal to appellate authority in prescribed Form and with Fee.
Section 31A	Board may provide directions in writing to any person, officer or authority and the same shall be binding for compliance. The closure, prohibition or regulation of any industry, operation or process ; or The stoppage or regulation of supply of electricity, water or any other services. Opportunity of hearing for not less than 15 days from the date of services of the notice to file objections against the proposed directions. Board to decide within 45 days from the date of receipt of objections. Board may not provide opportunity of hearing for reasons to be recorded in writing.

Section 37 /38 / 39	Penalty in case of not obtaining the previous consent of the Board or causing emissions in excess of prescribed standards - imprisonment not less than 01 year and six month and extended upto 06 years with fine.

PROCEDURE FOR LEGAL SAMPLING (UNDER SECTION 26 (3) & (4)

SPCB Officer to serve a notice to occupier or s agent, then and their in prescribed form (Notice of Intention to have sample analyzed).

In the presence of occupier or his agent, collect a sample for analysis.

Sample to be kept n a container, marked, sealed and signed by both.

Send without delay container to the laboratory established or recognized by the State Board or, if a request is made by the occupier or his agent when the notice is served on him as above to the laboratory established / specified by the State Government for the purpose.

In case of willful absent of the occupier or his agent at the time of taking sample, SPCB shall send the sample without delay to the laboratory established or specified by the State Government Appointed Analyst about willful absent or refusal to sign the container.

Government appointed analyst to submit the report in the prescribed Form to CPCB / SPCB in triplicate

SPCB to send one copy of the report to occupier or his agent / second copy to be produced in court of law and third copy retained by CPCB / SPCB.

In case of sample sent to State Government established / specified laboratory, the government analyst to submit the report in triplicate as above.

SECTION 21 - Restriction on Establishment / Operation of any Industrial Plant in an Air Pollution Control Area.

Application for consent to establish before taking any step to establish any industrial plant (having source of emission of Air Pollutants).

Application for consent to operate prior to operation of industrial plant.

Applications in prescribed Forms and submitted with prescribed Fee.

State Board may make inquiry in respect of the application submitted following due procedures(Serving of notice for consent inquiry and site inspection)

State Board to grant the consent imposing conditions and for specified period within four months after the receipt of the application.

Industry to comply with consent conditions.

Industry to be provided reasonable opportunity of hearing before canceling a consent or refusing of further consent.

THE WATER (PREVENTION AND CONTROL OF POLLUTIN ACT, 1974 AND THE WATER PREVENTION AND CONTROL POLLUTION RULES, 1975

OBJECT OF THE ACT	An act to provide for prevention & control of water pollution and the maintaining or re-storing of wholesomeness of water, for the establishment with a view to carrying out the purposes aforesaid of boards for prevention control of water pollution and powers / functions of these boards.
ENFORCEMENT AGENCY	State Pollution Control Boards/ Pollution Control Committees.
RELEVANCE FOR COMPANY	Restriction on new outlets and new discharges. • Prohibition on use of stream or well for disposal of polluting matter not in accordance with prescribed standards,
KEY DEFINITIONS	Occupier/ Outlet / Pollution /Sewage effluent /Trade effluent / Sewer
DESIGN OF THE ACT	Chapter - I to Chapter - VIII Chapter - V - Prevention and Control of Water Pollution Chapter - VI - Penalties and Procedures.

Section / Rules	Legal Provision /Requirements
Section 20	Power to obtain information
Section 21 / 22	Power to take samples of effluents. Form any stream / well / samples of sewage / samples of trade effluent. Adminisability in the court of law as an evidence subject to specified procedures (legal sampling).
Section 23	Allow entry to Pollution Control Board Officials into the premises.
Section 24	Not to knowingly cause or permit discharge of any polluting manner not in accordance with prescribed standards by State Pollution Control Board (directly or in-directly) into any stream or well or sewer on land.
Section 25	Restriction on New Outlets and New Discharges Application for Consent to establish (CFE) in the prescribed of the State Pollution Control Board along with prescribed fee before taking any step for Establishing any premises, operation or process, any treatment or disposable system or An extension or addition in above which is likely to discharge sewage or trade effluent. Bring into use any new or altered outlet for the discharge of sewage or Begin to make any new discharge of sewage. Occupier to comply with stipulated consent conditions.
Section 25 and Rule 31	Application for Consent to Operate (CFO) (before commissioning the facility of the company) in the prescribed Form 1 of the State Pollution Control Board along with the prescribed fee. Occupier to comply with stipulated consent conditions. Application for renewal of consent to operate before its expiry in the prescribed Form 1 of the State Pollution Control Board along with the prescribed fee.

	Submit fresh Application for Consent to establish and, operate, in case of new discharges / altered outlets resulting in increase in effluent quality composition volume, rate of discharge, temperature.
Section 27	Refusal or withdrawal of consent by State Board State Board may review time to time the conditions imposed under consent to establish / operate and may serve a notice for making any variation or revoking such conditions. State Board may refuse grant of such consents.
Section 28	Any person aggrieved by an consent order may Appeal within 30 days to Appellate authority following specified procedure (Form & Fee) Appellate authority to provide opportunity of hearing to both.
Section 31	Furnishing of information to State Pollution Control Board and other agencies in certain cases (district collector, health officer, municipal local body, nearest police station in case of severe water pollution occurred or likely to occur due to accident or any other unforeseen act / event).
Section 33	Power of Boards to make application to courts for restraining apprehended pollution

PROCEDURE FOR LEGAL SAMPLING (UNDER SECTION 21 (3), (4), & (5))

SPCB Officer to serve a notice to occupier or his agent, then and their in prescribed form (Notice of intention to have sample analyzed).

In the presence of occupier or his agent, divide the sample into two parts.

Each to be placed in a container marked and sealed and shall also be signed by both.

Send one container to the laboratory established or recognized by SPCB as the case may be.

On the request of the occupier or his agent send the second container to the laboratory established or specified by Central Government / State Government as the case may be.

In case of willful absent of the occupier or his agent, SPCB the sample sealed, marked signed in a container shall be sent to laboratory established or recognized by the SPCB and inform the government appointed analyst about the willful absence of the occupier or his agent.

In case of notice served, however no request for dividing the sample into two parts at the time of taking the sample, the sample shall be placed in container, marked, sealed and signed by the person taking the sample and shall be sent to the laboratory established / recognized by SPCB as the case may be.

Government appointed analyst to submit the report in the prescribed form to SPCB in triplicate.

CPCB / SPCB to send one copy of the report to the occupier or his agent / second copy to be produced in court of law and third copy retained by SPCB.

In case of sample sent to Central Government/State Government established/ specified laboratory, the movement analyst to submit the report in triplicate as above.

In case of any inconsistency or discrepancy between, or variation in the results, the analysis carried out, the report of latter shall be prevail.

SECTION 25 - RESTRICTIONS ON NEW OUTLETS AND NEW DISCHARGES

Application for consent to establish before taking any step to establish any industry, operation or process or any treatment and disposal system or an extension or addition which is likely to discharge sewage or trade effluent.

Application for consent to operate prior to bring into use any new or altered outlet for discharge of sewage or begin to make any new discharge of sewage.

Applications in prescribed Forms and submitted with prescribed Fee.

State Board may make inquiry in respect of the application submitted following due procedure (serving of notice for consent inquiry and site inspection)

State Board to :

Grant consent imposing conditions.

Consents will be valid for specified time.

Conditions are blinding.

Refuse such consents for reasons to be recorded in writing.

Maintain consent register.

DEEMED CONSENT

Consent shall be deemed to have been given unconditionally on the expiry of the period of 04 months of the making of an application complete in all respect to State Board.

Complete in all respect

The determination of fulfillment of this term lies in objective assessment of the information asked for (in the application form) and information accordingly provided by the applicant on the parameters of appropriateness, adequacy and correctness i.e. not the suppression / misrepresentation / concealment of the fact.

In case, the information provided by the applicant does not fulfill the above criteria and the same can be justified by objective / verifiable evidence, the application may be held (not complete in all respect) and accordingly, the benefit of the above provision may be determined as invalid.

THE ENVIRONMENT (PROTECTION) ACT, 1986 AND THE ENVIRONMENT (PROTECTION) RULES, 1986

OBJECT OF THE ACT	An act to provide for the protection and improvement of environment.
ENFORCEMENT AGENCY	Ministry of Environment & Forest, Govt. of India . State Pollution Control Board.

RELEVANCE FOR COMPANY	Prior permission from MoEF for setting up any industry / modernization / expansion of existing industry, if following under the prescribed Schedule / of the Act. Hazardous Chemical /Hazardous Waste Management . Not to cause emission / discharge of an effluent in excess of the prescribed standard. Submission of environmental statement.
KEY DEFINITIONS	Environment / Environmental Pollutant / Handling / Hazardous Substance / Occupier.
DESIGN OF THE ACT	Chapter -I to Chapter -IV Chapter -III - Prevention, Control and Abatement of Environmental Pollution Chapter -III (15) - Penalties.
PENALTY for Contravention of Any Provision of the Act/ Rules /Orders/Directions	Imprisonment for a term which may extend to five years with fine which may extend to Rs.1.00 lac or with both. Additional penalty for continuing contravention.

Section / Rules	Legal Provision / Requirements
Section 5	MoEF may issue the following directions in writing : The closure, prohibition or regulation of any industry, operation or process, or Stoppage or regulation of the supply of electricity or water or any other services. Compulsion to comply with these directions. Opportunity of filling objections of not less than 15 days from the date o service of the notice. MoEF to confirm, modify or decide not to issue the proposed directions within 45 days from the receipt of the objections.
Section 6 of EPA, 1986 Rule 5 of the Environment Protection Rule, 1986 and Rules & EIA Notification s.o. 801 (E) of July 2004	MoEF to make Rules for protection and improvement of environment. Prohibition and restriction on location of industries and carrying on processes and operations in different areas. Occupier to comply with stipulated environmental clearance conditions.
Section 7	Industry operation or process not to emit or discharge of environmental pollutants in excess of the prescribed standards (as specified in Schedule I to VI). The State Boards may specify more stringent standards. Standards for emission / discharge of environmental pollutants shall be complied within a period of 01 year (Central Government / State Board ay notify lesser period for compliance. The combined effect of emission or discharge of environmental pollutants in an area shall not be permitted to exceed the relevant concentration in an ambient air as specified in Schedule VII.

Section 9	Occupier to inform prescribed authorities (Central Pollution Control Board, District collector, district police, health officer) in case of environmental pollutants inexcess of the prescribed standards occurs or is apprehended to occur due to any accident / unforeseen act or event and shall be bound to prevent or mitigate the environmental pollution.
Section 10	Allow entry to MoEF or their designed officials for the purpose of inspection.
Section 11	MoEF are their authorized representative to collect samples for purpose of analysis (Air, water, Soil, or Other Substances from any factory, premises or other places). The result of any analysis of a sample as above shall not be admissible in any legal proceeding unless complied with Sub-Sections -(3) &(4).
Section 12	Furnishing of information to authorities incertain cases, where the discharge of air pollutants in excess of the prescribed standards occurs or is apprehended to occur due to any accident or other unforeseen Act. Agencies to include officer in-charge for emergency operations, SPCB, as listed in Schedule IV.
Environment Protection Rule, 1992-1993	Submit Environmental Statement to the State Pollution Control Board in the prescribed Form V before 30th September every year for the last financial year.

PROCEDURE FOR LEGAL SAMPLING UNDER SETION 11 (3) &(4)

To serve a notice to occupier or his agent, then and their in prescribed form (Notice of intention to have sample analyzed).

In the presence of occupier or his agent, collect a sample for analysis.

Sample to be kept in a container, marked, sealed and signed by both .

Send without delay container to the laboratory established or recognized by the Central Government.

In case of willful absent of the occupier or his agent at the time of taking sample, send the sample without delay to the laboratory established or recognized by the Central Government and inform the government. Appointed Analyst about willful absent or refusal to sign the container.

Government appointed analyst to submit the report in the prescribed Form to MoEF in triplicate.

MoEF to send one copy of the report to occupier or his agent / second copy to be produced in court of law and third copy retained by MoEF/ authorized representative.

Revision points and Summary

The Indian Electricity act and rules is more common rule and is applicable for all types of industries small, medium or large, It provides the safety requirements required to mandatory to comply.

Contractor labor act and rules related, states the various obligations need to be met in any industry

Static and mobile pressure vessels unfired rules explain the requirement to be adhered to in installing the chemical storages above 1000 liters capacity, this chapter has been structured mentioning the key requirements, the IS (Indian Standard) design code that need to be followed in constructing the pressure vessel, the relief fitting requirement, the need and the absolute requirement to be followed in case of any modification done on vessel. The notification requirement in case on any incident or accident ion the licensed premises etc

Gas cylinder rules covers the provisions and explain the need for licensing the enforcement agency the definition of gas cylinder under the act (exceeding 500 ml and not exceeding 1000 liters water capacity and notification and licensing requirement

Manufacture storage and import of hazardous chemicals rules mentions the 684 list of chemicals covered, the toxicity and classification as toxic, highly toxic and the values associated with Inhalation, Skin absorption and oral value. It also specifies the requirement to inform pollution control board and Director General foreign trade 30 days before import of any dangerous chemicals specified in list or falling within the values of toxicity boiling point and flashpoint specified under the rules.

MSIHC also states the need to have emergency plan and procedure for such installation.

Noise regulation states the need of noise level permitted in Industrial area, Residential area, Hospital area etc it also indicates the values that need to be maintained during day time and night time.

Indian Boiler act and rules states that any vessel generating steam of greater than 22.4 litres water capacity will be considered as boiler and it must be registered and need license and inspection at regular intervals.

Modification if any carried out need to be informed and then inspected by authorities concerned.

4.3 Assignment

1. Prepare a compliance checklist for a medium sized engineering industry having 200 employees and 100 contract employees. The company has two steam generators and three Boilers and they also handle chemical for spray painting application
2. Explain the requirement of License for Liquid LPG storage of 15 Kilo litres Capacity and 150 number of LPG cylinders
3. Explain which rule will be applicable for importing Dangerous chemical and what procedure need to be followed?
4. Define Boiler? State the requirement for Boiler operation in an Industry?
5. What are the requirements prescribed for Noise?

6. Explain the requirements in Setting up a Textile industry which handles trade effluent of 100 KL per day
7. What are the requirements to be met to set up a Diesel generator set of greater than 2 mega watt capacity
8. Explain Ambient air quality standards. Explain the test method involved in sampling measurement, and analysis.

4.4 Suggested readings

1. Factories Act 1948 and Tamilnadu factories rules
2. Indian Boiler Act 1923
3. Environment protection act 1986
4. Static and mobile pressure vessel (Unfired) rules
5. Gas cylinder rules
6. Indian Electricity Act and rules
7. Contractor Labour act

4.5 Glossary

"ISOLATED STORAGE":

Means storage of a hazardous chemical, other than storage associated with an installation on the same site specified in Schedule 4 where that storage involves at least the quantities of that chemical set our in Schedule 2.

UNIT -V

5.0 INTRODUCTION

Economics of Safety – Financial costs to Individual and Family, organization and society- Compilation procedure, utility and limitations of cost data – Budgeting for safety, role of trade unions in Safety

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

Economics means one thing to the specialist and another to the general public. When most people hear the word "economics", they think it has to do with the management of money. In particular, "the economics of occupational safety and health" suggests for many little more than "how can better working conditions be made profitable for business?" Certainly, the role of OSH, its financial costs and benefits, in business management is an important aspect of economic analysis, but it does not exhaust the topic. Above all, economics is a social science; its perspective is that of society as a whole, which includes workers, their families and their communities as well as enterprises, and it recognizes that not all the effects of ill-health show up in monetary transactions. In order to understand the contribution of economics, then, it is important at the beginning to be clear on just what economics is.

Economics has two general features that distinguish it from other social sciences. First, and obviously, it focuses primarily on the economy, the ways in which individuals and communities produce, distribute and consume goods and services. Modern economics is most comfortable studying market economies, since much more is known about the workings of markets than other types of economic mechanisms, but there are many economists who also study the economics of households, enterprise organization, and non-market societies of the past and present. In addition, economists generally assume that all decisions are made in a "rational" manner, where rationality has a very specific meaning. To be economically rational, a decision-maker is (a) outcome-oriented, basing his or her choices entirely on the predicted consequences of each action, and (b) systematically calculating, estimating the probability of each possible outcome and assigning each a positive or negative value. Because of this, the calculus of costs and benefits plays a central role in economic reasoning. Of course, this is not an

entirely accurate account of how decisions are made in the real world, and in many situations calculations of costs and benefits play a minor role. Nevertheless, while conventional economics does not provide a complete explanation of human behavior, its explanations will be more effective where market competition is an important element--as it is increasingly coming to be.

Broadly speaking, there are three general purposes that economics can serve for OSH. First, identifying and measuring the economic costs of occupational injury and disease can motivate the public to take these problems more seriously. This is true at all levels, from the enterprise that may be only dimly aware of the toll that worker ill-health takes on its performance to national governments that may not realize the impact of OSH problems on economic growth and development. Second, understanding the connections between the way firms and markets function and types of OSH problems that arise is crucial for the success of public policy. Why conditions are better in some sectors or regions than others, and why are particular groups of workers at greater risk? What is the likely effect of changes in social insurance coverage, government regulation, or, for that matter, new international patterns of trade and investment? As the pace of economic change picks up throughout the world, these questions need to be addressed on a continuing basis. Finally, as important as the protection of worker health and well-being is, it is not the only objective of modern society. Economic analysis can help show when safeguarding working conditions is complementary to other social goals, and it can illuminate the tradeoffs when it is not. Clearly, to the extent that there are tradeoffs, they don't go away if we refuse to measure them.

For all of these goals, a central concept is that of costs. On the one side, we have the costs of improving the conditions of work, in order to reduce the incidence of injury and disease. On the other, we have the costs of *not* doing these things. But the concept of costs is not simple; there are many kinds of costs, and the distinctions are important for the analysis of OSH.

Importance of safety budgeting will be appreciated only when we are able to have logical reasoning towards expenditure to Health safety and environment towards the management. It is also important that trade unions play a significant role towards safety performance. For example in India in Few of the Chemical / cement Industries unions compromise with some benefits like coconut oil and jaggery of say 1 liter and 2 kgs respectively for a month as a benefit to employee. Where as they do not look into the crucial facts of ergonomic comfort or Industrial hygiene comfort such as good Ventilation Lighting, Noise less environment etc

Union need to constructively debate with management from the design stage, technical compromise must not be done for fringe benefit of jaggery coconut oil soap etc.

The Safety and Health can be protected by scientific design and work place design suiting the employee and not by fitting the employee to the job requirement.

5.1 OBJECTIVES

This chapter deals with the effect of Incident or accident on employee and how it affects his family and the effect to community. Any event need to be quantified to show the real effect of the event and to communicate the learning or to bench mark performance standard within the country or to bench mark with international standards on Loss due to incident / accident.

It is not all easy to compile in terms of cost and the effect of an incident or accident. For example the emotions of family cannot be measured, the indirect impact of emotions towards Health cannot be measured, sorrow cannot be measured, however all reasonable effort to quantify measurable aspects such as medical expenditure, remediation expense, etc can be summarized and cost can be arrived.

In this Lesson the student will get to know the various prepositions on safety Economics.

5.2 CONTENTS

a. Economics/ Non economic cost
b. Private Vs social cost
c. Financial Vs implicit cost.
d. Economic cost to Individuals and Families
e. Accident cost of the injured person
f. Accident cost to the management
g. Factors of hidden accident cost
h. Accident cost to the society
i. Cost compilation procedure
j. Craig sinclair's study of accident cost , prevention cost and their relationship
k. Budgeting for safety
l. Role Of Trade Union

A) Economic vs noneconomic costs. Without going deeply into the subtleties of economic theory, it is enough to say that economic costs are those which can be expressed in monetary units. They include the costs paid or expected to be paid by individuals and organizations acting within the economy, as well as the monetary values implicit in activities undertaken and foregone. Noneconomic costs are no less real, but for one reason or another cannot be captured in monetary terms. In the case of injury and disease, the noneconomic costs are above all the subjective costs of pain, fear, and loss suffered by the victims, their families, and their immediate communities.[1] For shorthand, we will refer to them as the "human costs" of ill-health or premature death. In addition, it should be recognized that the

loss of life and health is often opposed for reasons that are not reducible to their cost in either the economic or noneconomic sense. This is particularly the case when standards of social justice are violated: what may make a particular injury unacceptable, for instance, may not be (only) its cost, but also the fact that it could have been prevented but wasn't, due to the employer's obsession with making the greatest possible profit.

B) Private vs social cost. All the costs of worker ill-health, to whomever they might accrue, could be added up; this sum would be the full social cost. "Society" has traditionally been thought of as equivalent to the nation, but it makes increasing sense to think of the entire world as our society, due to economic integration. Within this overall accounting, however, costs fall on different parties. The particular portion of the cost paid by any one individual or organization is called the private cost, and this is the cost relevant for decision-making on that level insofar as the decision-maker is economically rational. Three points should be borne in mind. First, private costs do not necessarily enter into the social cost, because they may be offset by benefits to other members of society. Suppose, as a result of a catastrophic industrial accident, a firm loses half its market share. This constitutes an enormous private cost to the firm, but if the sales are taken up by other firms this is not a component of social cost. If the firm suffering the accident was more efficient than its competitors, however, the increase in the cost to society of supplying the goods (a much smaller sum) would qualify as social. Second, not all social costs appear as private costs. For instance, a significant portion of the medical cost of occupational injury and disease in the industrialized countries is indemnified by social insurance systems. Who pays this cost and how? Some of it can ultimately be traced to specific contributors, but the cost may be so spread out as to be invisible at the private level. Moreover, imagine that the insurance system borrows money to finance the extra cost, and that the ultimate effect is to reduce the funds available for other projects--how would this be allocated to particular individuals and organizations? Rather than pursue such hopeless investigations, we simply say that the cost is social but not private. Third, the possibility for social costs to be borne by one group or another gives rise to the concept of *cost-shifting*. A firm, for instance, may try to reduce its exposure to OSH costs by shifting some of them to their workforce, to other firms, or to society as a whole. This is another reason why studying private costs may be a poor guide to social costs. Nevertheless, for the purpose of understanding why individuals and firms behave the way they do, the study of private costs is indispensable.

C) Financial vs implicit cost. All economic costs could be expressed in monetary units, but not all take the form of actual money changing hands. When monetary payments are made, we can speak of a financial (or out-of-pocket) cost, but these are often dwarfed by costs that can be inferred from their effects and given estimated monetary values. Consider, for example, an accident to a worker that results in medical treatment as well as damage to a machine. The firm may pay "real" money to the health care provider; this is a financial cost. But if the

useful life of the machine is reduced by two years, and if there is no other factor to attribute this to other than the accident, the increased depreciation is also a cost, just as real despite being an inference. Ultimately, from an economic point of view, financial costs are potentially deceptive, since, as we have seen, they may be more or less than true social cost. Only the inferred cost of an event in terms of all its impacts on society, based on full information and careful analysis, can be a satisfactory basis for social cost. Economists refer to this as the *opportunity cost*--the difference between the value of the goods and services available to society with or without the event, decision, etc. As we will see, calculating opportunity cost is a difficult enterprise and usually depends on a willingness to make questionable assumptions--but, economically speaking, there is no alternative.

D) Economic Costs to Individuals and communities : Without question, the most important costs of occupational injury and disease to workers and those who care about them are noneconomic. There is no need for economic calculation to replace the deep human emotions that arise when life is unnecessarily shortened or impaired. Nevertheless, economics can make two sorts of contributions to our understanding of these costs. First, it can help identify groups particularly at risk and explain why these patterns occur. In addition, it can shed light on the specifically economic costs of OSH--their amounts, who pays them, and again why.

Groups at risk. Traditionally epidemiological analysis views risk as a function of exposure to hazardous conditions or substances, but this can be supplemented by social science approaches in which risk is the result of social position, pressures, and incentives. In the discussion that follows, I will not consider which industries or occupations are more dangerous; there is already a very large literature that does this, and economics plays a small role in it. Rather, I will look at economic factors that can in turn lead people to be exposed to risks in the more traditional sense.

As a generality, one can say that the most dangerous jobs are the ones lowest in the economic hierarchy: precarious employment, informal employment, work in small and medium enterprises (SME's), and work performed by groups subject to discrimination and marginalization. I will consider each in turn.

Precarious employment. There has been a steady expansion in recent years of work that does not conform to the traditional model of a permanent, full-time relationship between the worker and the enterprise at which the worker works. "Nonstandard" work consists of the various alternatives, individually and in combination: temporary employment, leased employment, "self-employment" (where the nominally self-employed worker works at the location and under the direction of another enterprise), part-time employment, and multiple employments. In addition, outsourcing can lead to employment relationships that are essentially nonstandard in the above sense, even when the worker and the subcontractor have a formally standard relationship. The term "precarious" or "contingent" employment has been applied to nonstandard work that has the effect of attenuating the employment

relationship: reducing its expected duration, increasing its uncertainty, or undermining the claims that workers and employers can make on one another by virtue of the employment relationship itself. Part-time work does not fall into this category, but it can have similar effects insofar as it reduces the degree of commitment entailed in employment.

The literature documenting the spread of precarious employment in the developed countries has become enormous; for recent evidence, see Quinlan (1999), Kalleberg et al. (1997), and Estevão and Lach (1999), among others. Why this trend has occurred is beyond the scope of the paper, but proposed causes include changes in technology, increased international competition, new patterns of consumer demand, and changes in government policy. Until recently, however, little attention was given to the implications of changing employment patterns for safety and health at work. In the last few years evidence has begun to accumulate indicating that work which is precarious in employment terms is likely to be physically precarious as well. As Quinlan (1999) shows, every form of precarious employment has been linked to increased risk, and studies are often able to show the specific mechanisms involved. Outsourced and contract workers receive less training and have less awareness of their rights; in some instances they do not even know who their employer actually is. Pressure to maximize output and minimize time, which makes precarious workers attractive to some employers, also leads them to cut corners and take greater risks. (Salminen, 1995) Accident rates are systematically higher for such groups, including the self-employed. Moreover, safety and health problems often go unrecognized in the case of leased and outsourced workers because accident data are not categorized by the industry or establishment in which the accidents actually occur. (Blank et al., 1995) Workers employed by temporary health services had more reported injuries and lost work days than a matched sample of "regular" workers in the same risk classifications, using data from Washington State (US); deficiencies in training are suspected. (Foley, 1998) Similar results for the U.S. are surveyed in NAS/NRC (1998), along with evidence that racial and ethnic minorities, migrants, and workers with less education are also at greater risk.

One of the more worrisome characteristics of precarious employment is that these workers have little input into their work conditions. Aronsson (1999), for instance, reports that non-permanent workers have less knowledge about their work environment; 30% feel constrained by their status to "refuse work environment deficiencies", while 41% said it was more difficult for their voice to be heard. Quinlan and Mayhew (2000) find that precarious workers are far less likely to be represented on health and safety committees. The data collected by Letourneux are also revealing. Among the aspects of work over which precarious workers had less control were the ability to change temperature, lighting, ventilation, and work location, and the freedom to choose when to take personal leave. All of these are important for overall health considerations. Remarkably, of permanent workers, just under 52% could not change the position of their seat; for

precarious workers this percentage ranged from the low to mid 60's. Taken together, these and similar studies paint a picture of increasing polarization of the labor force, with the bottom tier excluded from many of the workplace protections long taken for granted in industrialized societies.

The safety and health concerns of precarious workers have begun to attract the attention of policy-makers. The European Agency for Safety and Health at Work (1998), reporting on its survey of EU member governments, found that 5 paid particular attention to the situation of atypical workers during the past decade, and 7 intended to do so during the coming 3-5 years. The corresponding numbers for self-employed workers were 3 and 8. There is no indication as yet, however, that this concern has had an impact on the formulation of policies that may contribute to the growth of precarious work. (Quinlan, 1999)

Informal employment

It is in the nature of informal employment that we will have poor information about it. For the most part, this type of work is concentrated in developing countries, although there are signs of a re-emergence of informal production in the industrialized world. (Branigin, 1997) In all probability, workers in the informal sector are at high risk relative to their industry and occupation.

Small and medium enterprises. Logically, one would expect greater occupational safety and health problems at SME's. There are several reasons for this. First, many OSH interventions have a substantial overhead cost, and the smaller the firm, the smaller the revenue base over which these costs can be distributed. Second, the level of expertise is frequently lower at SME's. Third, the SME environment is generally more competitive and finance is more difficult to obtain, leading to shorter time horizons (lower investment in general) and fewer expenditures on what may be perceived as "nonessential" items. Nevertheless, for many years it was thought that the relationship between firm size and workplace risk was an inverted U-shape: lower risk among the smallest and largest firms, higher risk for those in the middle. Today this is seen as an artifact of data collection: small firms are less likely to keep accident records, but tend to have even higher incidence rates than medium-size enterprises. [Mendeloff and Kagey (1990), Hunting and Weeks (1993), Leigh (1989), Tombs (1988), Nicholls (1989), Oleinick et al. (1995)] Thus, there is now a generally accepted view that size and risk are inversely correlated at all levels of scale. As we will see in the section on enterprise-level costs, the concentration of risk in SME's poses difficult problems of economics as well as health and well-being.

It should be borne in mind that not all workers have an equal likelihood of ending up in employment categories surveyed above. Both women and children are, for different reasons, disproportionately represented in precarious employment and SME's in particular. In the case of women, little is currently known about their comparative health status, due to problems in data collection (especially concerning diseases and chronic pain) and the longstanding orientation of the OSH field toward

problems primarily experienced by men. (Messing, 1999) Concerning children, a major study was undertaking by the U.S. National Academy of Sciences (NAS/NRC, 1998). It found that, while children are not generally more susceptible to risk physiologically, they are more susceptible socially and psychologically, and the consequences of a major accident or illness, of course, can be more devastating. Considering the restrictions on the employment of minors in the U.S., measured rates of occupational injury are high, and fatalities are a problem particularly in agriculture. One of the reasons cited for the OSH problems of young workers is their concentration in precarious, part-time, and small-establishment employment.

Overall, it seems to be the case that all groups that have lower socioeconomic status have, on average, more dangerous working conditions. Thus, based on the U.S. experience, racial and ethnic minorities have higher accident rates (Loomis et al., 1997; Robinson, 1989), as do immigrants (Bollini and Siem, 1995), and workers with less formal education (National Center for Health Statistics, 1993). Indeed, the ultimate test of this relationship is probably income itself, and here the evidence suggests that low income is associated with higher risk (Robinson, 1988), even, for most workers, when other factors affecting wages are controlled for (Dorman and Hagstrom, 1998). Taken together, these studies point to profound equity problems in the distribution of risk: those who suffer the most from poor working conditions are also the most likely to bear other social and economic costs.

This portrait of groups at risk is cast in general social terms, but it has a particular salience for economics. Certain forms of employment appear to be more dangerous, and certain groups find themselves congregated in them. The kinds of jobs created and the distribution of those jobs are both economic phenomena; they stem from the choices, rational or otherwise, that enterprises, workers, and governments make in their pursuit of economic goals. In particular, the global trend towards more informal or precarious employment suggests that fundamental economic forces are at work. We have barely begun the enormous effort to identify, and hopefully counteract, these forces. For now it is enough to note that these forms of employment present an obstacle to the improvement of OSH conditions and exacerbate the unequal exposure to those conditions within society. These effects should be taken into consideration when employment policies are weighed.

The burden of economic costs. There are two main economic costs that result from disability and premature death at work. The most important is the worker's lost wages during the period of absence from work and possible reduced wages after return to work, either of which may or may not be a social cost, depending on whether otherwise unemployed substitute workers are found to do the same tasks. Because of the role of workers' compensation in wage replacement, the extent of lost wages has been studied in considerable detail in developed countries. This is a difficult enterprise. Some of the questions that have to be answered are:

- If the worker does not return to work, to what extent is this due to disability versus other factors?
- Should subsequent spells out of work after the initial return be attributed to the disability?
- What would have been the likely future trajectory of the worker's wage if there had been no disability?

Research for the United States has found that disability plays an important role in economic outcomes. Approximately one in every ten workers has a disability that limits the amount or kind of work that can be performed. The rate of participation in the labor force for disabled workers is about 2/3 that of the nondisabled, and only half of the likelihood of being in a full-time job. (Weil, 1999) While the ratio of disabled workers' earnings to those of the nondisabled has varied over time, by the mid-1980s it was only about half. For minority workers this ratio was a shocking 15% in a well-constructed study. (Haveman and Wolfe, 1990) Ominously for developing countries, the earnings ratio falls for workers with less education; Haveman and Wolfe found that disabled workers with eleven or fewer years of education made on average only 1/3 the wage of comparable nondisabled workers. Part of this employment and wage gap represents the diminished productivity of the worker following a disabling illness or injury, but a substantial part also represents discrimination. (Baldwin and Johnson, 1994, 1995) This bias is now illegal in the United States following the passage of the Americans with Disabilities Act, but the law is difficult to enforce. From a social cost standpoint, it is often assumed that lost wages are a reasonable indicator of lost worker productivity. This is difficult to justify in a precise way, but it is the only measure we have.

The second major economic element is the cost of medical treatment, care during the period of disability, and rehabilitation. In countries with well-developed social and health insurance systems most of these costs are easy to measure, but there are also household costs that can escape detection. In one US sample, for instance, one in six injured workers needed some other family member to take care of him or her, and almost 2/5 required other family members to perform some or all of their household tasks. (Weil, 1999) Even though these contributions of time and effort by the families of injured workers have no prices in the marketplace, they certainly represent economic costs. We can expect that the invisible cost of care plays a much more important role in developing countries, and that failure to measure it leads observers to falsely conclude that the economic costs of poor health are low. Assigning prices to care by family members is not difficult in principle: we could either use the going rate for similar work in clinics, rest homes, etc. or we could estimate the opportunity cost of the time spent on care--the value of the other activities foregone.

E) Accident Cost to the Injured Person. Accidents are costly to the injured , to the management and the society . Let us see how much an injured worker would loss due to an accident to him.

If a worker is not covered by any insurance scheme , he has to bear the loss of wages and the cost of medical expenses ,transport , fruits , foods etc . if he suffers permanent disablement he loss his earning capacity for life.

If a worker insured under any scheme , he gets some compensation , medical expenses and some daily allowance which are rarely adequate . No costing is possible for his suffering pain , worry and incapacitation . Even after return to duty , he is unable to perform his normal work for some time and therefore may lose incentive and overtime wages during that period . Another loss is his inability to social functions and recreation.

Example:

Let us take an example of a worker who meets with an accident at his age of 20 years and loses his total earnings capacity. His monthly wage is Rs 5000.

As per Workmen's Compensation Act,

He will get (50% of 5000) × the relevant factor = 2500 × 224 = 560000 or Rs 240000 whichever is more , thus he will get the compensation of Rs . 560000.

If the accident would not have happened, he would have worked for another 40 years and would have earned as follows: 5000 per. month wage × 12 months 40 years = 24,00,000 . Considering yearly increment of Rs. 200 throughout the span of 40 years , I.e. increasing Rs 200 × 12 = 2400 each year for 40 years. (wage ceiling is not considered because of the periodical wage rise) = (2400 × 1) + (2400 × 2) + (2400 × 3) +..... (2400 × 40) = 2400 (1+2+3+.....40) = 2400 × 820 = 10, 96,000.

Therefore total earning = 10,96,000.

Thus against, Rs. 10, 96,000 he gets only Rs 5,60,000, which seems inadequate ,

Suppose, he would have died , his family gets (40% of 5000) × the relevant factor = 200 × 224 = 4,40,800 or Rs 2,00,000 whichever is more , i.e. Rs 4,40,800 a still a less amount than the compensation for permanent total disablement.

F) ACCIDENT COST TO THE MANAGEMENT:

A management suffers two types of costs as follows:

Direct or Insured cost

This includes the compensation paid to the injured person, medical and hospital charges. This is hardly one -fourth of the total cost when indirect costs are also considered as below:

Indirect or Hidden or Un insured cost

The ratio 4 to 1 : In 1927 , H.W. Heinrich presented a paper at the National Safety congress (USA) and placed the indirect cost at on an average 4 times the

direct cost . This was the origin of the much discussed and controversial 4 or 1 ratio.

Some studies yielded ratios ranging from 8 to 1 to 1 to 1, but , in general , they supported Heinrich s findings.

Heinrich writes, "It is not contended that the 4 to 1 proportion holds true for every industrial accident or every individual plant, and it is granted that in nationwide application the ratio may vary, yet It has already been tested sufficiently to provide approximate confirmation".

There is a great significance of this ratio to statisticians, employers, employees, safety officers and insurance salesmen. It supplies powerful stimulus to preventive action.it emphasizes that cost estimates in million - rupees are to be increased 4 to 5 times, that the employers must worry about accident cost and accept accident prevention as their duty , that the work of safety officers has a real monetary value and that it enhances the value of the service of an insurance salesman.

G) Factors of Hidden Accident Cost

The list given by Heinrich is as below :

1. Cost of time lost by other employees who step work.
2. Cost of time lost by other employees who stop work.
   - Out of curiosity.
   - Out of sympathy.
   - To assist injured employee.
   - For other reasons.
3. Cost of time lost by foremen , supervisors or other executives as follows :
   - Assisting injured employee.
   - Investigating the cause of the accident .
   - Arranging for the injured employees production continued by some other employee.
   - Selecting, training, or breaking in a new employee to replace the injured employee.
   - Preparing state accident reports, or attending hearing before state officials.
4. Cost of time spent on the case by first - aid attendent and hospital department staff, when not paid for by the insurance carrier.
5. Cost due to damage to the machine, tools or other proper or to the spoilage of material.
6. Incidental cost due to interference with production, failure to fill orders in time, loss of bonuses, payment of forfeits and other similar causes.
7. Cost to employer under employee welfare and benefit systems.
8. Cost to employer in continuing the wages of the injured employee in full , after his return - even though he services of the employee (who is not yet fully recovered) may for a time be worth only about half of their normal value.

9. Cost due to the loss of profit on the injured employees productivity and on idle machines.
10. Cost that occurs in consequences of the excitement or weakened morale due to the accident.
11. Overhead cost per injured employee - the expense of light , heat , rent , and other such items which continues while the injured employee is a non producer.

Relationship: The following table shows the relationship (ratio) between these costs in some countries.

Country	Year	Direct Cost	Indirect Cost
U.K.	1967	1	6.7
U.S.A.	1962	1	8.0
GERMANY	1954	1	10.7
AUSTRIA	965	1	6.4

In India, such record is not available, but it can be roughly estimated to be1 to10.

Example:

Let us consider an example of a worker drawing Rs 9000 p.m. and meeting with an accident at his age of 40 (completed) and losing three fingers of one hand (I.e. 30% permanent partial disablement).

Direct Cost (Rs).

1. Compensation under W.C. Act,

30% of (50% of 9000 the age factor or Rs. 24000 whichever is more) = 0.30 (4500 × 184.17) = 0.30 × 828760.50 = 2,48,630.

2. Medical & Hospital charges including fees, medicines, milk, fruits etc = 21370

3. Transportation charges = 2000

Total Direct Cost =2,72,000

Indirect Cost (All estimated in Rs)

1. Cost of lost time -

A. By injured worker	8700
B. By other worker	3300
C. By supervisors & executives	12400
D. By first - aid staff and clerical expense	2600

2. Cost of production loss due to -

A. Idle machine and clean up etc.	3900
B. Damage to the machine	23100
C. Damage to materials	16500
D. Spoilage of materials	36200
e. Damage to tools	5500

3. Incidental cost due to ---

Fulfilling order (supply) in time (worked overtime)	Rs 12800
b. Payment of forefeits	Nil
c. Welfare & benefit system	Rs 8400
d. Less production by the injured after his return to work	Rs 8560
e. Loss of profit & productivity	Rs 23560
f. Production loss by weakened morale of others	Rs 26440

4. Overhead & Administrative expense Rs. 18000.00

Total indirect (un insured) Cost Rs. 2,87,000

Total cost of the Accident 2,72,000 + 2,87,000 Rs. 5,59,000

Here the ratio comes to be @ 1 : 1 , but , this is widely variable depending upon each case . Suppose due to an fatal accident 3500 workers do not work for one shift or day , that estimate only would cost Rs 3500 X 400 = 14,00,000 and adding to the indirect cost , the ratio would be 1;6 . The ratio is higher for small accident where the direct cost is much less than the indirect cost.

H) ACCIDENT COST TO THE SOCIETY

The society suffers losses in three waus : 1) The family - a part of the nearest society - suffers pain, inancial hardship and service or maintenance loss by the injured person or his death. 2) The society as consumers pay the increased cost of production due to direct and indirect cost to the management , and 3) The society bears the social and financial burden of maintenance of all injured persons and their families . Thus knowingly or unknowingly every member of the society bears a proportion of the costs of the accidents.

Therefore employee, employers and society all have to work collectively for accident prevention.

I) COST COMPILATION PROCEDURE

Following examples illustrate the cost compilation procedure.

Example:

A worker dies in an accident at his age of 65 when he was drawing RS 16000 p.m. He was very experienced worker and leader of the factory of 3650 workers. If he would have not died, he would have worked another 5 years. Calculate the cost of this accident to his family, his management, the society and the overall cost totaling ail the three factors.

1) Cost to the family:

As per the W.C. Act, section 4 (1) (a) and Explanation, his family will get 40% of 10000 the relevant factor = 0.40 X 10000 X 99.37 = Rs 3, 77,480.

If he would have not died and worked for further five years, he would have earned 16000 × 12 × 5 = Rs 9,60,000 considering yearly increment of Rs 500 throughout the span of 5 years , increasing Rs 500 × 12 = 6000 each year for 5 years. = (6000 × 1)+ (6000 × 2)+.....(6000 × 5)

= 6000 (1+2+3+4+5)

=6000 X 15 =90000.

Therefore his total earning Rs 9,60,000+ 90,000 = 10,50,000.Deducting the compensation receive , cost of the accident to his family = 10,50,000 - 3,74,480 = Rs 6,72,520..... (1)

2) Cost to the management (Estimates)

A) Direct Costs

Compensation under W.C. Act	3,77,480
Medical & Hospital Charges	-
Transportation charges	2520
Total direct cost	3,80,000

B) Indirect Cost

1. Cost of lost time by -

a. Injured worker (including extra payments)	42560
b. Other workers.	27440
c. Supervisiors & executives	64230
d. First aid staff and clerical expense	770

2. Cost of production loss due to -

a. Idle m/c and clean - up etc	83750
b. Damage to the machine	1250
C Damage to tools / equipments	4120
D Damage to materials	1880
E Spoilage of materials	2000

3. Incidental cost due to -

a. Fulfilling order in time (required overtime)	16820
b. Payment of forfeits	-
c. Welfare & benefit system	23180
d. Loss due to preparing substitute	82560
e. Loss of profit & productivity	19440
f. Loss of production by weakened morale of others	36890
g. Wage & production loss by one day work - stoppage by all workers	730000

4. Overhead and Administrative expense 3,110

Total indirect cost 11,40,000

The ratio D.C. : I.C. = 38: 114 = 1:3

If the direct cost is insured by some insurance agency and if we consider the annual insurance premium as Rs 114000, the direct cost would be Rs 114000 and the ratio, then, will be 1:10.

The total cost to the management = 380000+11,40,000 = 1,50,0000 ... (2)

(3) Cost to the society (Estimated)

A. Loss to his family, other than the wage loss (in the form of other services)

Rupees 1, 58,000

B. 20,000 consumers pay the product price rise assuming of Rs 2 each, then

Rupees 4, 00,000

C. Social and financial help by the society

Rupees 42,000

Cost to the society Rs 6,00,000 ... (3)

Therefore the overall (national) cost totaling above three factors

=(1) +(2)+(3) = 672520 +15,20,000 +6,00,000 =Rs 27,92,520

Thus one fatal accident costs to the nation at least more than Ten lakh rupees.

Estimating @ 800 fatal accidents in factories per year , the minimum total costs of all these accidents would be 8000 lakhs rupees , and estimating @ 12,00,000 total fatalities (of all kinds) , their total national cost would be Rs 12,00,000 10,00,000 = 12 X 10^10 what a great target (and cause) for all safety people to minimize this national annual loss.

J) CRAIG SINCLAIR'S STUDY OF ACCIDENT COST, PRECENTION COST AND THEIR RELATIONSHIP

T.Craig Sinclair on behalf of the Robens committee on Health and Safety carried out a detailed study and published a paper " A cost effectiveness approach to industrial safety , HMSO London , (1972) ", A brief summary of his concept is given below:

Estimate of Accident Costs:

The costs of accidental injuries are made up of three parts, fatalities, serious injuries (over 4 weeks off work) and other injuries. Thus we can write.

CA = RD(ASD +AOD) + RS (ASS + AOS) + RO (ASO + AOO)

Where CA = annual accident cost per worker

RD = annual risk of Death per worker

RS = annual risk of Serious injury per worker

RO = annual other injury per worker

Average AS = Subjective element of cost

AO = Objective element of cost

With second subscription D, S or O for death, serious injury and other injury.

Sinclair has applied this method with meaningful results to large groups of workers in entire industries including agriculture. The method is not useful for very small groups where the results will have little statistical significance.

Estimate of Prevention cost:

Sinclair has grouped preventive costs under the following three heads:

A . Design cost

1. All redundant control features installed for safety reasons.

2. All machine guards and protective devices installed on the machine to protect employees.

3. The part of the cost caused by additional metal thickness (under appropriate design code) which is required to provide a margin of safety.

4. Systems installed to remove toxic and explosive materials produced by the process and maintain a safe and healthy working environment .

5. Fire protection measures - escape routes , fireproof materials , and barriers.

6. Additional costs involved in layout for safety reasons.

B. Operational costs

1. Cost of the safety department which can e attributed to the plant under study ;

A) Salaries and overheads.

B) Publicity materials.

C) Training.

D) Protective clothing.

2. Cost of extra manning for safety reasons.

3. Cost of operating within restricted range of conditions (temperate , pressures , rate etc) for safety reasons , as compared with the wider range which would otherwise be possible.

4. Cost of medical and first aid department.

C. Planning and consequence limiting costs

1. Cost of insurance.

2.Cost of works fire brigade.

3.Cost of fault studies , hazard analysis , safety audits.

4. Cost of environmental sampling and analytical programmes, biological controls.

5. Cost of toxicity tests on drugs food etc.
6. Cost of testing for leaks of hazardous materials.
7. Cost of testing for electrical safety.
8. Cost of loading and pressure tests.
9. Cost of flammability tests.
10. Cost of R&D department.

Relationship between the costs

The graphs of Costs Vs, Risk reduction shows that he costs n injuries and damage are reduced as more money is spent on prevention, and the point must come when the incremental saving on accident costs. This is at the minimum total cost of accidents plus expenditure on prevention.

Sinclair makes the simplifying assumption that the total of accidents (including preventive measure) are minimized when the annusl cost of preventative measures has reached the annual costs of accidents. This assumption appears to create more questions than explanations.

It therefore seems reasonable to modify Sinclairs approach (for an existing plant or factory) by taking the plant as designed and built as ones datum point , and only include those costs incurred by providing additional protection.

Example: The estimated risk amounts in Sinclairs formula are as given below. Calculate the annual Accident cost of a factory employing 30 workers. Also estimate the preventive cost necessary.

Data given: (per worker)

RD = Annual risk of death (insurance premium)	4000
RS = Annual risk of serious injury (")	2000
RO = Annual risk of other injury (")	1000
ASD = Subjective cost of death	360
ASS = Subjective cost of serious injury	620
ASO = Subjective cost of other inury	800
AOD = Objective cost of death	140
AOS = Objective cost of serious injury	280
AOO = Objective cost of other injury	400

Then, Annual accident cost per worker

CA = RD (ASD+AOD)+RS (ASS+AOS)+RO (ASO+AOO)

= 4000(360+140)+2000(620+280)+1000(800+400)

=4000(500)+2000(900)+1000(1200)

= 200,000 +180,000+120,000 = 500,000 Rs.

Total annual accident cost of 30 workers.

=30 × 500,000 = 15,000,000 (Rs)

This is a reasonable foreseeable risk if all such accidents happen every year. It emphasizes that it can be greatly reduced, if no death or on serious injury takes place.

If this Rs 1.5 crores (accident cost) are saved by preventive measures of Rs 1.5 crores there is no loss. But most of the employers think that as hardly any or a few accidents takes place in their plants, they need not to spent any amount on preventive measures. These calculations (mostly widely variable) show that they should realize such heavy risk in case of accidents (which is always probability) and should be prepared for preventive measures well in advance.

K) Budgeting for Safety

Once a plant is put into operation it does not mean that it could be sustained by regular operational budget, certain critical budgeting is required to improve safety standards.

Process safe technologies could be integrated in the initial stage of commissioning and making the plant operational , the recurring expenditure such maintenance of fire protection systems, Procuring latest personnel protective equipments , External audit and compliance to the recommendations, regular work place monitoring and health monitoring, Employee training, Up gradation of engineering controls etc all require Budget.

The Key elements to be considered for Budgeting are as follows,

a. Up gradation cost to Engineer safe control mechanisms
b. Recurring expenditure for Personnel protective equipment
c. Work place monitoring
d. Audit (Internal and External)
e. Statutory compliance requirements
f. Employee Health Monitoring
g. Training
h. Equipments calibration and new equipment for work place monitoring (Includes Noise , Illumination, Vibration monitoring also)
i. Employee Motivation activities (Celebration of Events such as Safety day, environment day, Fire service week, chemical disaster prevention day etc)
j. Improving the material handling equipments , waste collection equipments etc
k. Maintenance fire protection systems and upgrading the existing systems

L) Role of trade unions in safety

Participation of trade Unions on improving safety will fetch immense benefits, unfortunately our trade union members are not knowledgeable on HSE aspects and so they always compromise with Management for fringe benefits like soap, oil etc.

Trade unions need to be much more knowledgeable and they need to have close contact with enforcement authorities and they need to understand more from them.

Trade unions need to be supportive to the safety officer and they need to also enforce safety measures. Trade unions can seek incentive for good safety performance. Trade union members can be good part-time trainers on various safety topics like material handling, Road safety , transport safety , Ergonomics, Hygiene and its importance .

Trade unions need to share their safety performance with members of other organizations when they observe compromise they need to raise to the situation.

Union members must insist for specialized training and they need to be active in implementing safety systems and sustaining them.

To repeat Trade union exists to represent, protect, advise and Educate their members and so serve their interest. The management has the responsibility to provide and maintain safe working conditions and safe system of work. whereas the workers have the responsibility to follow the safe procedures adopted by the management in order to prevent accidents which can minimise the loss inturn of economics and to reduce human sufferings. The responsibilities shall be as follows:

1) Trade union / workers can co-operate with the employers in the investigation of accidents the union can persuade the members to accept the modifications which are in the interest and can educate them to follow safe procedures.

2) A section of Factories Act imposes duty of workers engaged in Hazardous process. Workers are responsible to inform the occupier and inspectorate of factories of any possibilities of imminent danger of their lives or health. The management duty is to adopt reasonable preventive measures on such dangerous. The workers have to fight for legally defined minimum safety standards for their members.

3) The Trade Union / workers have to put more effort to reduce the toll of accidents and to improve working conditions.

After attaining their goal of zero accidents they can ask the management to give safety gift / award in order to motivate them to achieve the highest scale of safety standard and also to achieve the target at production.

4) The employer can take the active help and participation of Trade Union in modifying the operating procedures and formulating safety and health policy.

5) The Section 41G of Factories Act 1948 imposes workers participation in safety management. The occupier shall set up a safety committee consisting of equal number of representative of workers and the management to promote co-operation between the workers and management in maintaining proper safety and health at work to review periodically the safety measures. The workers can represent their safety related problems to their worker representatives in safety committee, who in turn will discuss every aspect in the apex safety committee and seek remedial measures. They have to play a vital role in smooth running of safety committee and should generate positive challenge to accept the safety promotion attitude.

6) In general the greater the employees participation in the safety programme, the more effective it will be. Therefore the management should make as many activities in which the workmen can take part as possible and further it should give them the major roles.

5.4 Revision Points /summary

We have covered the different aspects of Economic cost, non economic cost, Private vs social cost, *Financial vs implicit cost,* Economic cost to Individuals and Families.

This gives an understanding to student on how safety and cost can be related to each other.

We also have covered the cost due to accident which is a burden for the injured and for the management. Concretely we need to admit that organizational image and value cannot be estimated and similarly pain and suffering cannot be estimated.

We with example have explained the quantification mechanism or cost estimation in the event of incident/accident. The Craig Sinclair model is one which is simple for the students to understand the cost calculation.

It is imperative for the student to know the cost involved in case of injury or accident because that will be basis for justifying the management or the union in emphasizing importance of safety and critical investment necessary for safety and Health.

Unless the safety personnel justify cost for investment for safety and Health it is hard to convince the management on certain aspects. Of course modern day management are eager to promote safety and Health Still this would be prove useful.

We have covered safety budgeting, role of trade union since both are critical, trade union need to support safety and health requirement at all times and they need to ask management fi there are negligence on safety aspects.

5.5 ASSIGNMENT

a. In a Factory involved in manufacturing of Sheet metal, an accident took place due to material handling equipment failure. This resulted in two employee getting injured and one employee need to undergo amputation of two fingers.

b. If you are a leader of a union what strategy would you adopt to gain safety benefit for the employees of your organization?

c. Prepare a safety Budget for a medium sized organization of your choice.

d. Collect Data from an organization on the system they have to quantify cost due to accident and their remediation.

5.6 REFERENCE AND RECOMMENDED READING

- Indian Standard IS 3786 -1983
- Industrial safety by K. U Mistry
- Loss prevention news bulletin
- Safety chronicle
- Accident prevention manual , National safety council
- Industrial hazard and safety handbook by King and John Magid