CHAPTER VII

FINDINGS AND SUGGESTIONS
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CHAPTER VII
FINDINGS AND SUGGESTIONS

7.1. **Objectives of Industrial Safety.** Objectives of industrial safety should be aimed in four folds – societal, organizational, functional, and personal.

7.1.1. **Societal objectives.** Ethically and socially be responsible to the needs and challenges of the society and at the same time minimising the negative impact of such demands in the organisation. The failure of the organisation to use their resources for the society’s benefit in ethical way may lead to restrictions. Industrial safety should not be limited to the four walls of the industry, but it should be in the over all context of the industrial society and society as a whole. For example the industry may limit the resources allocated to or decision through laws that enforce reservation in living and laws that address safety or other areas of societal concern. Involving public in industrial safety will be a right step to address this aspect in the correct direction.

7.1.2. **Organisational objectives.** Recognize the role of safety management in bringing about organizational effectiveness. Safety management is only a tool to assist the organization with its primary objectives. It exists to serve the organization in a way to provide a safe working and a hazard free environment.

7.1.3. **Functional objectives.** To maintain the safety department’s contribution at a level appropriate to the organisation’s needs. Resources are wasted when safety considerations are either more or less sophisticated to suit the organisation’s demands. In most of the cases safety set up is much below the desired level. Notwithstanding the financial fallout safety considerations should be tailored to fit the organization it serves within the societal needs.
7.1.4. Personal objectives. A safe working environment will assist employees in achieving their personal goals at least in so far as these goals enhance the individual’s contribution to the organization. While taking on industrial safety, human resource safety must be efficient if workers are to be maintained, retained and motivated. Otherwise, employee performance and satisfaction may decline, and indirect costs towards production will increase.

7.2. In order to realize the above objectives safety department in any organisation must perform the following functions:

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7.3. Industrial safety principles and policies

7.3.1. Principle is the fundamental truth established by research, investigation and analysis whereas policy is a guide for managerial decisions and actions. Many industrial safety principles have been established through practice, experience and observations. Principles are universal truth generally applicable to all organizations; policies on the other hand vary from organization to organization. Principles guide managers in formulating policies, programs, procedures, and practices.

7.3.2. In respect of industrial safety the principle for the company could be “It is the intention of the company to provide safe plant and a healthy working environment.” This statement is too general to be of any use. A policy statement on the other hand is more specific and commits the management to a definite course of action.

7.3.3. The safety policy of the company should be “Our policy is to institute every practical method for engineering safety into our processes and equipment and to provide protective clothing where necessary, to train employees in safe operating procedures and to vigorously enforce established safety rules. Our policy is to provide a healthy plant by giving adequate attention to cleanliness, temperature, humidity, ventilation, light and sanitation”.

7.4. Training and development

7.4.1. There are several business changes – job changes, change in processes, methods and procedures, changes in technology, changes in personnel, changes in products etc. These are constantly taking place and are rapid. They demand modification and changes in skills, knowledge, attitudes and understanding on the part of workers and managers. They create needs that must be met by training and development of personnel. Training and development is an ongoing process to meet and adapt changes effectively and quickly. For industrial safety
there is a great and pressing demand for training and awareness for workers, managers and the public. A well-trained workforce can obviate accidents caused by unsafe actions, the managers and supervisors will be on the constant look out for improving floor safety and the public will be conscious about industrial hazards. Accidents and damage to machinery and equipment can be avoided or minimized through training. It eliminates suboptimal behaviour, redundancy due to technological upgradation and helps a person in handling conflict, thereby helping to prevent stress, frustration, conflict and tension.

7.5. **Industrial safety and quality circle**

7.5.1. Quality circle is another tool which is being adopted by the industries all over the world to increase the per-capita productivity and make for better quality and human relations in any work environment. The importance and success of quality circles leads us to the fact that widening the scope of quality circles to cover the aspects of industrial safety will contribute to better working environment and increase the per-capita productivity. These quality circles comprise of groups of about ten employees within a particular department. They should have undergone training in problem solving and spend part of their time in studying and solving job – related problems. Once the circle has reached a solution, it is put up before the management who after receiving it decides to accept or reject it. The goal of these quality circles is not only to provide a safe environment but also to see that the worker is involved in the industrial safety system. Quality circles are not meant to displace the safety managerial functions of the safety department – in fact it plays a supportive role and as seen earlier has a wider framework of involvement. Quality circle concept is in vogue in most of the industries, but their involvement in safety management has still not been effected.

7.6. **Industrial safety and work design, job design**

7.6.1. From the beginning of mankind, individual or groups of individuals have engaged themselves in a multitude of activities with a progressive degree of
sophistication and ingenuity to satisfy their basic needs and wants. Over the years the effort has been to provide work and time saving devices, some of which have resulted from flash of genius and long experience rather than from any degree of systematic study of work. The scientific method of work design produced its greatest achievements in the mass production assembly lines. Man has been viewed as an extension of machine rather than an element or cog in a complex production system dominated by costly equipment. Industrial engineers employed a machine theory of man to study and design work, concentrating primarily on the technological side of work resulting in a highly standardized, economically efficient form of work. On the other hand, the social scientists were equally concerned with the work design aspects from behaviour angle.

7.6.2. The continued progress of any enterprise is dependent on its ability to optimally and judiciously allocate and utilize its resources so as to provide desired products at the right time, place, quantity and quality to the community. This requires an integrated approach. The efforts of any industrial unit should be concentrated to raise productivity and reduce industrial accident and loss through it. As all organizations require better productivity and profit, they must seek better and less expensive ways to ensure an accident free environment. When considering about work design, it is a combination of man, machine and the factory environment. Work problems usually originate within the individual workstation. Most of the work systems are open systems; hence there is a great deal of complexity in the forces of interaction and reaction. In fact the work design is aimed at systematic investigation of contemplated and present work systems to formulate an ideal system keeping the safety aspects tuned to the technological up gradation. As productivity and profitability are key issues in industrial circles, work system design is in fact the key element of industrial safety.
7.6.3. Job design is the consciously planned structuring of work effort performed by an individual or team of persons. Aim of job designers is to minimize the amount of physical human effort; along with this they should consider the aspect of industrial safety. There is increasing evidence that poorly designed jobs are a pervasive societal problem affecting the mental and physical health of the worker both on and off the job.

7.7. Industrial safety and environmental factors.

7.7.1. Temperature and humidity. It is a well known fact that temperature and humidity have a definite effect on the performance of workers. Studies have been conducted both in laboratory settings as well as industrial settings yielding quite a bit of statistical data on accidents. In an investigation into the loading of coal tubs in coal mines, the results revealed that there was a slow but steady increase in the loading time as the effective temperature increased from 19 degrees to 28 degrees. This is as shown in table 7.7.1. In addition to this, it was also found that the time taken for resting also increased rapidly for temperature above 24 degrees. The working efficiency at higher temperature was about 41% less than that at lower temperature.

7.7.2. Similar studies were conducted in a weaving shed also. The average per hour output by ‘pick count’ on 44 looms fell from 7163 to 6832 when relative humidity from 77.5% to 77.9% rose to 82.5% to 84.9%. Some data on accidents in relation to temperature reveal a rather strange phenomenon. The studies conducted show an increase in accidents both with decrease and increase of temperature from an optimum of 65 o F – 69 o F, the decrease with temperature being some what greater. This has been graphically shown in table 7.7.2.

7.7.3 Effect of Temperature on Relative Frequency of Accidents. Some studies were conducted on people with different ages to investigate the relative
effect of temperature on efficiency. It was found that accidents reflected in some way, the effect of temperature on efficiency. This is illustrated in table 7.7.3.

7.7.4. Effect of Age on Accident Rates. Having noted the effects of temperature and humidity on performance and accidents, one should provide an environment conducive to the worker so that he can perform effectively and efficiently. Human beings body attempts to maintain a heat balance and constant body temperature. This can be done as long as the regulating body mechanism is working within its capacity, and heat gains or losses are not excessive. Heat may be troublesome when conditions are either warm-moist or hot dry. Warm dry conditions do not pose a problem whereas in hot-moist climate it would be impossible to survive. Work becomes difficult because of high humidity, which reduces evaporation of sweat through proper ventilation. A graphical display is table 7.7.4.

7.8. Vibration
7.8.1. During work, a worker could be subjected to vibration from various sources. The effect of vibration and movement on a worker may range from motion sickness through sight discomfort to physical damage. However it is difficult to make specific design recommendation which will ensure that effects of vibration on efficiency are minimized. The set pattern behaviour that vibration is inherent in their job and the operators are being paid, in part at least, to tolerate discomfort should be removed.

7.9. Noise
7.9.1. Noise can be frequent cause of fatigue and irritation resulting in loss of output and industrial accident. Risk damage for ear appears to be greatest from frequency of sound between 2400 to 4800 cycles per second. Some form of earplugs, or some cotton wool should provide protection against unavoidable noise, which might be a cheap and preventive remedy. To prevent industrial
accident and occupational diseases as a result of noise certain steps as given below should be taken by the management.

- Reduce noise at the source itself.
- Isolating the equipment from the surrounding structure so as to prevent noise spreading.
- Attaching suitable damping devices to parts which are likely to resonate.
- Some acoustic absorption arrangements.
- Plant trees in high noise zones.

7.10. **Job Satisfaction and Accidents.** Higher the job satisfaction with the job, lower is the rate of accidents. Though it is difficult to explain such a relationship but generally a satisfied employee would not be careless or negligent and would encounter lesser possibilities of running into an accident situation. The more favourable attitude towards job would make him more positively inclined to his job and there would be a lesser possibility of getting to an unexpected, incorrect or uncontrolled event in which either his action or the reaction of an object or person may result in personal injury.

7.11. **Workers’ participation in Safety management.**

7.11.1. The objectives of workers’ participation scheme may vary from country to country because they largely rest with their socio-economic development of a country, its political philosophy, industrial relations scene, and the attitude of the working class. Concept of workers’ participation in management is considered to be a mechanism where workers have say in the decision making process of an industry. The scope, extent, and the form it may take and its successful working depends to a great extent on the objectives as viewed by the three actors of the system industrial relations – the employee, the employer and the government. In all other aspects, the objectives viewed by these parties may be contradictory, but in the functioning of industrial safety it will be contributory to the overall aim
of the industry. There are three groups of managerial decision namely; social, personnel, and economic decisions. In the field of industrial safety, social decisions play an important part. These relate to safety, health, and sanitation and noise control. Due to continuous industrial and technological development in the industrial sector, consideration and discussions of the changes in the method of production and safety should become a necessary part of the joint committees.

7.11.2. The constitution of works committees in the industrial establishments employing 100 or more workers is a legal requirement under the provisions of the Industrial Dispute Act, 1947. In most of the manufacturing establishments a safety committee is also constituted. Workers committee, in this, matters like health, safety can effectively supplement collective bargaining, and social security should form part.

7.11.3. Another important step, which could be included, is creating empowered teams. Passing on authority and responsibility to the workers (that is called empowering) makes them feel a sense of ownership and control. Empowered individuals know that their jobs belong to them, and when this is achieved management can be sure of the safety system and efficiency in the factory.

7.12. **Total quality management** is now viewed only in terms of productivity. Principally it refers to the deep commitment of an organisation to quality products and services and every step in the company’s processes. Through the total quality management techniques the industrial sector will be able to contribute immensely for better safety standards. One of the major problems faced by the developed and developing world is the quality of work life of a vast majority of employees engaged in productive pursuits. The quality of work life is not based on a particular theory. It does not advocate a particular technique for
application. Instead it is more concerned with overall climate and impact of that work has on people as well as on organizational effectiveness.

7.13. Safety programme

7.13.1. Safety means freedom from occurrence or risk of injury or loss. Industrial safety refers to the protection of workers from the danger of industrial accidents. To effect this, an effective safety programme is required to be conceptualized. Safety programme deals with the prevention of accidents and minimizing the resulting loss and damage to persons and properties. Those root causes of a multiplicity of factors that result industrial accidents have to be traced. These are:-

- Faults in management system arising from poor leadership from the top.
- Inadequate supervision.
- Insufficient attention to the design of safety into the system.
- An unsystematic approach to the identification, analysis and elimination of hazards.
- Poor training facilities.

7.13.2. The most important function of the safety program is to pin point hazards, provide effective safety facilities and equipment to take prompt remedial action. This possible only if there are:-

- Comprehensive and effective systems for all accidents causing damage and injury.
- Adequate accident records and statistics.
- Systematic procedures for making safety checks, inspections and investigations.
- Method of ensuring that safety equipment is used.
- Proper means available for persuading managers, supervisors and workmen to pay more attention to safety rules.
7.13.3. The top management should determine the safety policies of the company and it must be continuously involved in monitoring safety performance and in ensuring that corrective action is taken when needed. The management and supervision must be made fully answerable for safety performance in the working areas they control.

7.13.4. Thorough training in safety methods of work should be given to all employees and they receive continuing education and guidance on eliminating safety hazards and prevention of accidents.

7.13.6. Elements of successful safety programme

7.13.6.1. First step. The first in this context is making strategic choices, which are:

- Determine the level of protection the organization should provide to the workers, this can be by the managers and safety committee. It has been studied after deliberation that some companies prefer a minimum level of protection, probably due to financial reasons, while others choose a maximum level of protection.

- The decision as to whether the safety programme should be formal written one or informal which can be enforced through peer pressure and good training.

- Managers can also be proactive or reactive, the former is found to be better for organizational interests.

- Managers can decide to use the safety of workers as a marketing tool for the company. This type of strategy would involve publishing what the company has done to promote safety and how safe the plant is to work with.

7.13.6.2. Second step. Safety policy – the next step is to have clear-cut safety policy specifying the company’s goals and designating the responsibility and authority for their achievements. Key issues, which should be considered in the safety policy, are:

- The safety of employee and public are of paramount importance.
• Safety will take precedence over expediency.
• Every effort will be made to involve all managers, supervisors and workers in the development and implementation of safety procedure.
• Safety legislation will be complied in the letter and spirit of the law.

**7.13.6.3. Third step.** The third step is to constitute an organization for safety by making safety committees composed of employees from across the country. They serve in advisory capacity and are responsible for tasks such as reviewing:

• Safety procedures.
• Making recommendations for eliminating specific safety and health hazards.
• Investigating accidents.
• Fielding safety related complaints from the employees.
• Monitoring and statutory compliance.

Top management’s prime responsibility is ensuring employee safety. In fact managing director of the company is held responsible for an accident and punishable under the law of the land. Risk management, which is becoming very common these days, covers risks associated with the industrial safety, process technology hazard insurance, material management and environmental degradation.

**7.13.6.4. Fourth step is** Analysis of the cause and occurrence of accident. Accidents do not happen, they are caused, hence if we want to reduce the number of accidents, then the causes of accidents must be identified and studied in detail. The various causes of accidents can be divided as follows:

**7.13.6.4.1. Physiological causes** based upon unsafe condition of work and defects of physical body of the worker.

**7.13.6.4.2. Psychological causes** based upon mental disturbance of the worker.
7.13.6.4.3. **Physical causes.** Physical causes are linked with machinery and surroundings, generally beyond the control of the worker, which are likely to cause accidents. These are in the form of:

7.13.6.4.3.1. Physical causes related to machinery and plants are:

- Unguarded and unfenced moving machine parts.
- Unbalanced, noisy and improperly adjusted moving parts.
- Less space between the machines.
- Old and worn out machines.
- Improper insulation of electric circuits and machinery.
- Un-lubricated moving parts get heated.
- Improper plant layout.

7.13.6.4.3.2. Causes related to **tools and materials** are:

- Dull and damaged tools.
- Tools without handles.
- Very sharp edged tools.
- Inflammable and hot materials.
- Poisonous and toxic materials.
- Breakable materials.

7.13.6.4.3.3. Causes related to **dress** are:

- Loose or improper dress.
- Slippery foot wears.
- Not wearing personal protective equipment.

7.13.6.4.3.4. Causes related to **working conditions.**

- Lighting not proper.
- Improper ventilation for the exit of dust and gases.
- Slippery floors and stair cases.
- Severity of work.
- Working hours too long resulting in tiredness.
- Bad discipline.
- Defective buildings and projected objects.
7.13.6.4.4. **Physiological causes.** These causes of accidents are related to physical body of the worker. Some of these are:-

- Weak eye sight.
- Poor listening power.
- Weak health.
- Any part of the body may be defective.
- Fatness and high blood pressure.
- Fatigue and exertion of work.
- Older employees.

7.13.6.4.5. **Psychological causes.** These are linked with the mental disturbance of the worker, not the external environment but the internal characteristics of the employees that the accident occurs.

- His carelessness.
- Frustration, worry or depression.
- Emotional imbalance due to mental tension.
- Improper coordination between body and mental faculties.
- Improper placement of employee that is he lacks aptitude for the work.
- Nervousness and impulsiveness.
- Over confidence.

7.13.6.4.6. **Miscellaneous causes.**

- Lack of training and experience.
- Intoxication.

7.13.6.5. **Fifth step.** Undertaking certain safety measures, which could be incorporated, are as follows: -

- **Training in safety.** Systematic training on industrial safety for the workers is imperative. This must be regardless of the stringency of recruitment and aptitude and experience they may have for the jobs to which they are assigned. Training to prevent accident is necessary but not enough, the employees must be trained on the ways of minimizing damage
in case of an accident happening. A set of instructions in the do’s and don’ts pattern should be available next to the machinery or plant.

- **Risk management team.** Establishing or creating a risk management team is a necessity. It should comprise of medical staff and safety staff. In the National Organic Chemical Industries Limited (NOCIL), there is a risk management team comprising of medical staff and safety officers for safety, health and environment protection. NOCIL’s training programmes consists of mandatory mock drills (every week) and evacuation drills (at least once in a year) to inculcate safety awareness in the employees all times.

- **Physical and mental conditions.** While planning the layout and constructing a building, safety measures should be kept in mind. Here adherence to the safety provisions of Factories Act, 1948 is of importance.

- **Role of management and unions.** The problem of safety must begin with the management as they have a commitment to safety and safety rules and merely constitution of a safety committee would serve no useful purpose. Showing concern of safety after the accident happens is not of much use. Strong trade unions can force unwilling mangers to undertake safety measures.

- **Safety posters and film shows.** Safety posters with poignant illustrations and punching slogans may be put on walls near work places to arouse safety awareness among the workers. Film shows are more effective than posters because of their tremendous audio-visual impact.

- **Safety week and award.** A safety week is observed from the 1\(^{st}\) to the 7\(^{th}\) of every March. This should be encouraged in all industries. On analysis certain industry follows this religiously benefit a lot.

**7.13.6.6. Sixth step.** This is the most important step, in which all the works, which have been recommended earlier, are implemented. For implementation, the programme must cover the following aspects:

- Procedure for reporting accidents, hazards, fire precaution and first aid.
- Arrangement for instructing employees about safe working methods and for training for workers in safety matters.
- Good house keeping requirements covering storage facilities, adequate space for machinery and plant and provision of gangways. The term house keeping is applied to the maintenance of both cleanliness and order in all kinds of business establishments. Good house keeping is essential for:
  - Ensuring a clean, neat and orderly work area and its surroundings.
  - Making work areas look pleasant, motivating, and more satisfying for the worker to work.
  - Minimising fatigues and discomfort to the workers.
  - Minimise injury and accidents.
  - Increase the life of plant, building and the facility it contains.
  - Avoid fire and other hazards.
  - Permit effective natural illumination and ventilation.

7.13.6.7. **Seventh step.** Programme evaluation. For gauging the effectiveness of the safety programme, the management makes an evaluation of the achievements of the aims of the programme and methods of evaluation is known as organic or systematic method. Organic measures seek to answer the following questions.

- Is the programme effective in changing unsafe behaviour?
- Have safety attitudes been improved?
- Have injury-producing physical conditions been corrected?
- Are regulatory provisions relating to safety complied with?

7.14. **Accident proneness**

7.14.1. Studies have revealed that a small proportion of the workers in the industry receives a large proportion of injuries, workers in this group are said to be accident-prone. To measure accident proneness one must use data from
situations presenting equivalent hazards. The mere fact that one employee has been in more accidents than others is not a sufficient justification for labeling that employee is accident prone, for the condition under which he works may be far worse than those throughout the rest of the plant. Similarly the training which has been given to him should be analyzed as the accident-prone worker may have been slighted in his training. A satisfactory solution for this proneness would be to transfer the accident-prone employee to a less hazardous activity say clerical work, stores duty or sales job.

7.14.2. There is a possibility that a random occurrence of an accident can itself create accident proneness. If a shop boy just happens to fall from the top of ladder he loses self-confidence. Whenever he climbs again the ladder and reaches to the top of the rung of the ladder, he will again become nervous and lose contact of himself and repeat the accident whereby he will be branded as an accident-prone worker. In such cases he should be asked to work on the floor itself and be transferred to some departments where work does not require the use of ladder. Some of the methods, which can be adopted to reduce accident proneness, are: -

- Selection of suitable workers for the job based on the job requirement.
- Transfer the accident-prone workers to less dangerous job situations.
- Give sufficient training to new workers before putting them on the job.
- Encourage employees and see that they do not get unnecessarily disturbed and frustrated before starting the work.

7.15. Industrial safety & health in Uttar Pradesh Region. The findings and recommendations as brought out by the study are summarized below:-

7.15.1. Findings. Indian economy adopted globalisation; as a result there is a flow of new technology, products and resources to India. Industrial development and technological development caused by the modern technology is also bringing with it associated problems. The problems are more complex when the issue of
management of safety, health and environment is concerned. This necessitates designing of newer policies and programs. For the management of occupational safety and health through various instruments such as policies and programs it becomes essential to base these instruments on sound footing. This requires an assessment of the present status of occupational safety and health in the country. A national inventory on capabilities and management of occupational safety and health will be of great help for designing and implementing various instruments to protect the safety and health of the large work force working in various sectors of the economy. In this regard as a part of this research work the state of Uttar Pradesh was chosen. As a member of International Labour Organization, India has ratified a number of ILO conventions. As a result, major part of the ILO code of practice on Recording and Notification of Occupational accidents and diseases is being followed along with the Indian Standard IS3786, which is on the similar lines of the ILO Code of Practice. However, there is a delay at all levels, may it be the unit level or at the district level, there has been a delay on the part of the industrial organizations and enforcing agencies in collection, processing and dissemination of the information. In the state of Uttar Pradesh it was found impossible to cover all areas of industrial activities, hence the analysis proceeded with aim of concentrating in special reference to industrial scenario in the State.

7.15.1.1. The western plain of UP is the most urbanised region. Agriculture is by far the most important sector of the state's economy, employing about three-fourths of the work force and accounting for nearly 60 percent of the state's total income. Uttar Pradesh is rich neither in forest resources nor in minerals. It has some deposits of gypsum, magnetite, phosphorite, and bauxite; it is the largest silica producing and the second largest limestone-producing state in the country. Uttar Pradesh does, however, have vast hydroelectric potential in the northern and southern hilly regions. Thermal generation supplies the majority of the electric-power plant capacity. A nuclear-power plant at Naraura (Naroda) also contributes a small amount of the state's power supply. Comparatively, Uttar
Pradesh is one of India's industrially backward states. Only a tiny fraction of the population is engaged in industry, most in such cottage industries as handloom weaving. Large-scale operations include paper, sugar, and textile mills, leatherworks, and engineering-equipment factories. The union government, though, has established a number of large industrial facilities in the state, which manufacture heavy electrical equipment, diesel locomotives, structural steel, aircraft, telephone equipment, electronic apparatus, antibiotics, and fertilizers. An oil refinery at Mathura and the development of coalfields in Mirzapur are also among the major projects of the central government in the state. Most of the state's roads are in poor condition, and the railway system suffers from the presence of two different gauges of track. Air service is provided between several large Uttar Pradesh towns and Delhi, and the state's transportation system also includes the three major inland waterways of the Ganges, the Yamuna, and the Ghaghara. The state of Uttar Pradesh is one of the biggest states of the country, it represents 240928 sq.km. of the total area of the country. It represents 7.3 percent of the total area of India. 16.2 percent of the total population of the country is in Uttar Pradesh. The complete state is broadly divided in four major economic regions. These regions are Eastern UP, Budelkhand, Western UP and Central UP. The western region of the state is having 622 numbers of industrial workers per thousand populations in registered factories, against the state figure of 443. In addition to this the density of population is quite high i.e. 762 against the state density of population of the state figure of 689. On the contrary it is seen that Bundelkhand region of the state is industrially backward probably due to geographical reasons.

7.15.1.2. The state has got around 10, 18,740 working in the factories registered under The Factories Act, 1948 during the year 2001. Percentage share of main workers of the state in comparison the country is about 14.5%. The share of cultivators, Agriculture workers, and workers engaged in manufacturing process and other are 19.9%, 10.5%, 11.2 %and 11.7% respectively. The per capita income of the State is Rs.5770 at 1993-94 base and Rs. 9721 at current prices.
7.15.1.3. The manufacturing sector is the second largest economic sector in the state. It comprises of manufacturing units both registered and unregistered but does not include mining, quarrying, generation of electricity and gas, water supply and construction as well as unorganized sector. The index of industrial production at base level as 1980-81, was 284.05 in 1996-97 as compared to 255.49 in 1995-96. Manufacture of machinery and equipment's other than transport equipment has the largest share in industrial production followed by paper and paper products. The State is also having the manufacture of leather & leather Products, Brassware & Lock making industries in Kanpur & Agra, Moradabad and Aligarh respectively, which is contributing a good share to the state income through export. At constant prices (1980-81 base years) in the year 1997-98 the manufacturing sector contributed Rs.10.63 billions to the state income.

7.15.1.4. The mineral resources in the states are mainly Diaspore (Metallic), Dolomite, Sulphur, limestone, silica sand and Poproflalite (Non-metallic). The state is producing about 15% of the Magnetite of the country also. The coal and Silica sand is merely 5.5% and 2.9% of the country share.

7.15.1.5. A total of 636 large and medium industrial units are established in the state of U P.

7.15.1.6. In the state Uttar Pradesh no occupational disease cases have been reported to the Directorate of Factories. The occupational diseases result in loss of hearing capacity of the workers. This loss varies according to the occupational diseases contracted by the worker. The severity of the disease may result in permanent disability to the worker. The state has large number of manufacturing units, the breakup of which according to factories registered under Section 2(m), Section 85 of The Factories Act, 1948. The provision for the preparation of Health & Safety Policy is mandatory for factories covered under section 2(cb) and section-87 of The Factories Act, 1948 and factories employing more than 50 workers. The rule in this regard has been incorporated by the Uttar Pradesh
Government in Rule-63-B of the U.P. factories Rules, 1950 vide Notification No. 3417/xxxvi-3-1- (F)-88 dated 06-10-1999 under section 7-A (3) and section 41-B (2) of The Factories Act, 1948 (Amended 1987); in section 7A & 41-B. The rules regarding the contents, as to what the policy specifically deals with have been clearly spelt in this rule. The management of such factories has been directed by the Factory Directorate to formulate their Health and Safety Policies as per statutory requirements. In order to control the major accidents in the State, factories prone to major accident hazards have been identified on the basis of the U.P. Factories (Control of Industrial Major Accident Hazard) Rules, 1996 under section 41-B of The Factories Act, 1948 and Manufacture Storage and Import of Hazardous Chemicals Rules, 1989 (amended 2000), wherein specified industrial activities are categorized as potentially hazardous and prone to major hazard, in the form of storage & use of potentially hazardous substances in five groups exceeding the threshold quantities specified for them in schedule-3 of the above said rules. On the basis of the criteria laid down in the above mentioned, so far 100 factories have been identified as Major Hazard installations in the state. All MAH installations in the State of Uttar Pradesh have formulated their Health & Safety Policy on priority basis. The appointment of the safety officers in the factories, 195 factories are required to appoint safety officers but at present only 85 factories have employed the Safety Officer. As such 110 factories are required to appoint the Safety Officer in their factories. The percentage of factories employing safety officer is nearly 43.6%. No information is available regarding requirement and establishment of Occupational Health Centers in factories.

7.15.1.7. The identified MAH installations are required to comply with specific provisions of the above mentioned rules, such as submission of Notification of Site/Safety Report; Preparation of On-Site Emergency Plan; Material safety Data Sheet; Notification of Major Accidents; and carrying out Safety Audit etc, in the respective schedules specified in the above rules. The on site emergency plans received in the Factory Directorate are subject to scrutiny by a multidisciplinary
cell constituted at the head quarter of the Factory Directorate. There after these on site plans are sent; back to the Occupiers of the concerned factories with directions for further; improvement and; rehearsal. In the said rules, the rehearsal of such developed On-Site Emergency Plan has also been made essential for the factories to rehearse the plan once in every six months, so that state of preparedness; is ascertained; in terms of men and machines when a disaster strikes. Practical exercises are, therefore, carried out by creating situations, as close as possible to actual conditions. The occupiers are directed to plug the weaknesses and vulnerabilities which surface during such simulation drills. The standard of performance is judged against a set of criteria fixed for this purpose through a check list assessment by the regional officers.

- **On-site emergency plans.** As per the provisions of the Rule 13 of U.P. Factories (Control of Industrial Major Accident Hazard) Rules, 1996 an occupier who has control of the Industrial activity as described under the Rule shall prepare an on-site emergency plan detailing how major accidents will be dealt with on the site on which industrial activity is carried on. Earlier to come into force of these rules the guidelines for On-Site Emergency Plan was developed by the Uttar Pradesh Factory Directorate in consultation with the occupiers of the Factories in the year 1990. The guidelines are into two parts along with 20 annexes attached therewith for more detailed and clear information. These plans are being regularly monitored and updated as per the guidelines, which have been circulated to the occupiers so that the plans prepared have a similarity and in the event of emergency these could be easily referred for retrieval of necessary information. In order to control the major accidents and mitigate the effects of any major consequence, out of 100 MAH Installations, the occupiers of the 98 factories have submitted there on site emergency plans to the Factory Directorate.

7.15.1.8. It is advisable that all the units after the commencement of the Industrial activity shall carry out an independent Safety Audit of the respective industrial activities with the help of an expert not associated with such industrial
activities. This will help the management to know the weak points in their system and to take suitable timely remedial measures. As per the information available 44 units were required to prepare Safety Reports. However, 42 units have prepared the Safety Report and submitted to the Director of Factories. The **Scope of the audit** is to verify whether the planned and documented activities are performed in accordance with written procedures and to verify by examination and evaluation of objective evidence that appropriate elements of a safety management systems have been developed, documented and implemented by units covered under the Manufacture, Storage and Import of Hazardous Chemicals Rules 1989 (Amended 2000), under the EP Act 1986 and the U.P. (Control of Industrial Major Accident Hazard) Rules, 1996 under the Factories Act, 1948. During the year 2002, out of 46 MAH installations more than 50% units had conducted the safety audit. The reports of such audits are being sent to Directorate of Factories. The recommendations pointed out by the auditor are being complied with from Directorate by issuing the directions/guidelines from time to time within stipulated period.

7.15.1.9. The U.P (Control of Industrial Major Accident Hazards) Rules, 1996 under The Factories Act, 1948, clearly indicates that The District Magistrate or the District Emergency Authority shall provide the occupier with information from the off-site emergency plan which relates to his duties under Rule 13 or sub-rule (2) of this rule {14(3)}. Constitution of State Crisis Group: The State Government shall constitute a State Crisis Group for management of chemical accidents within thirty days from the date of the commencement of these rules 6(1) under Chemical Accidents (Emergency Planning, Preparedness, and Response) Rules, 1996). This group is required to deliberate on planning, preparedness and to provide guidance for handling of chemical accidents, with a view to reducing the extent of loss of life, property and ill health. The State Crisis Group will review all the Off-site Emergency Plans for chemical disasters for their adequacy. Out of 71 districts of the State 36 districts, where inventory of hazardous chemicals are high in MAH installation, are required to develop Off-Site Emergency Plans for
chemical emergencies. Nine districts have constituted their District Crisis Groups and are in process of developing their Off-Site Emergency Plans. 27 districts are under process of constitution of District crisis Groups. So far toxic and hazardous substances like ammonia, chlorine, hydrogen sulfide, carbon monoxide, leather dust, asbestos, pesticides, silica dust, solvents, dyes and pigment dusts, which are present in the work environment, were monitored and analyzed to estimate the concentration in the work environment. The factory management’s having the above contaminants in their work environment have been recommended, where the concentration is above the threshold concentration, to adopt specific control measures to restrict the concentration of such toxic and hazardous substances below the threshold concentration stipulated; in Schedule-2 under section 41-F of The Factories Act, 1948.

7.15.1.10. Apart from the Factories Act, 1948, there are other legislations for providing a better work environment, safety, and health and welfare facilities. These legislations are enforced by various state/ Central government agencies such as Directorate of Factories /, Labour commissioner of the State and Chief Labour Commissioner Central, etc. Education and training plays an important role in management of safety and health at state level and thus cannot be neglected. Non-government organizations (NGOs), voluntary organization’s, institutions and agencies engaged in safety and health are contributing in their own way towards the objective for giving the workers a safe and healthy work environment.

7.15.1.11. The Labour department enforces all the labour related Acts and rules made there under for the welfare of workers engaged in various occupations. During the last four years a total of 5,45,227 of inspections were made under each Act and number of prosecutions for violation of various provisions of the Act for the last four years was 1, 22,169.

7.15.1.12. In the State of Uttar Pradesh factories were registered as on employing about workers. To secure the compliance of the provisions of
Factories Act, 1948, relating to industrial safety & health and other welfare measures one Director of Factories, seven Deputy Director of Factories and two Deputy Director of Factories (Medical) along with forty posts of Asstt. Director of Factories, U.P (Factory Inspectors) is sanctioned in the Factory Inspectorate of Uttar Pradesh. At present there are only twenty nine Asstt. Directors of Factories (Factory Inspectors) in a position to take up the entire load of inspection of registered factories in the state of Uttar Pradesh. Inspection of processing factories, identification of unregistered factories, investigation of accidents, approval of plans, attending to complaints are some of the activities undertaken for effective implementation of statutory provisions.

7.15.1.13. It was also seen that the number of inspections has reduced considerably due to changed policies of the state government. Such reduction in the inspection poses long term problems to the health and safety of the workers. As per the existing order issued by government of Uttar Pradesh, the Inspector of Factories is required to seek prior permission for inspection from District Magistrate. The procedure of taking prior permission from the District Magistrate is also resulting into reduction in the number of inspection due to procedural delay. This seems to be unreasonable at least in respect of factories wherein hazardous substances are being used, stored and handled during the industrial activity. Hazardous units should not be subjected to any permission from District Magistrate, so that an effective enforcement programme is available to these units/ factories. Reduction in inspections has also resulted in reduction in submission of annual returns required under the Factories Act, 1947. The situation does not provide an effective enforcement programme, which shall include prohibition against giving advance notice of any inspection and sanction/permission of any individual. An element of surprise in inspection is an effective tool for effective enforcement programmes.

7.15.1.14. There were 23 convictions of the factories registered under section 85 and fines of Rs.1, 68,250/- were collected. There was no penalty such as
imprisonment under section 92 or section 96(A). The directorate also issued prohibition notices under section 40(2) section 87A to 3 factories registered under section 2(m) and 2 factories registered under section 85. Improvement notices under section 40(1) were issued to 4 factories registered under section 2(m) and 3 factories registered under section 85. Orders calling for test reports were issued under section 39 to 9 factories registered under section 2(m) and 1 factory registered under section 85. It is seen from the table below that during the period 1992-2001 total number of inspections were 43652. Based on the inspections 4727 prosecution were launched due to violation of Factories Act 1948 and U P Factories rule, which resulted in to 1410 convictions. Thus the government has earned Rs. 42.55 lakh. It may also be seen from the table that during the year the 1998 success rate was highest in comparison to the previous years and this works out to be nearly 38.5%.

7.15.1.15. Development of Computerized Information Center. While collecting the information and data relating to the Safety Health and Welfare of the workers, number of factories, number of employees etc. it was felt that there are lot of scope to effectively update the data and other information with the help of computerization in the Directorate of Factories Uttar Pradesh as well the whole organization of the Labour Commissioner. The rapid growth in information technology has given new dimensions to the management of organization. The functions and importance of the management information system has increased considerably. It is the requirement of the day that in the present time of the liberalism, privatisation and globalisation it is extremely essential to have updated information relating to the safety, health and welfare of the workers working in the factories and other information about the environmental aspect directly and indirectly affecting the employees. Uttar Pradesh is a big state and the responsibilities of the factory directorate are equally big. The enforcement of laws and related rules in such a big state with the help of limited inspectors posted in scattered areas has put the directorate far behind the approach of new technology and its benefits. The only reason observed behind it is lack of
computerization and its related utilities to the Factory Directorate. It was also observed that Factory Directorate initiated the proposal for computerization several times but somehow no outcome was seen from state government. It is strongly recommended that the Factory Directorate of state of Uttar Pradesh must be equipped with IT update for effective data collection and data analysis in respect of health and safety.

7.15.1.16. In the state of Uttar Pradesh there are 2110 number of boilers installed in the different type of industry and every year about 50 numbers of boilers are added. In addition to the above activities the Inspection of the boilers are carried out by the office of the directorate during construction stage of the boiler and components such as valve, super heaters, tubes, economizers etc. The directorate has achieved Zero accident record and completion of 100% target.

7.15.1.17. During the study, it was necessary for me to visit departments and organizations dealing with industrial safety and health in the manufacturing sector with a view to establish inventory of industrial safety and health information in the state of Uttar Pradesh. The activities of these departments, resources available at their disposal were examined to determine the problems faced by the organizations in the matters of safety and health and further resources needed in order to effectively manage occupational safety and health at the state level. Safety and health management at the unit level in the factories covered under The Factories Act, 1948 was limited only to the information available in the annual returns and accident forms available at Directorate of factories Uttar Pradesh. Detailed analysis in the areas related to functioning of Occupational health centre, crèches, rest rooms etc. as per the provisions of The Factories Act, 1948 in each of the units was not undertaken as it was outside the defined scope of this study.

7.15.2. Recommendations.

7.15.2.1. During 2001, there were 13645 factories registered under The Factories Act, 1948 (Amended 1987). Out of which 2174 factories are covered
under section 2(cb) of the Factories Act 1948 and 100 factories are Major hazard installation as per the Manufacture Storage and Import of Hazardous Chemicals Rule 1989(Amended 2000) under Environmental Protection Act 1986. As per The Labour Laws (Exemption from furnishing returns and maintaining registers by certain establishment) Act, 1988, certain notified factories mostly defence industries are exempted from submitting annual returns. However, only 20% of the total industries have submitted annual returns for the year. The Annual Returns contains basic information such as employment, man hour employed, accidents, man-hours lost due to accidents, provision of welfare facilities, appointment of welfare officers and safety officers, occupational health facilities, etc. which are essential for compilation of state level data on occupational safety and health. It is desirable that submission of Annual Returns should be insisted upon from all the factories. It is recommended that efforts should be made to ensure compliance with the requirement of submission of annual returns in prescribed format by registered factories at the time of issue /renewal of license under Factories Act 1948. It is also recommended that the occupier/manager of the factories should be made to submit complete details in the annual returns. The inspecting officials can bring noncompliance with such provisions to the notice of the occupier by issuing notice. In case of further noncompliance a legal action may be followed.

7.15.2.2. There are 2174 factories covered under section 2(cb). It was informed that it is very difficult to segregate factories as coming under Section 2(cb) or Section 87 merely on the basis of information given in annual return form or license form or Registration form. Therefore, it is suggested that the annual return form prescribed under U.P. state Factories Rules should be amended to include following additional information: -

(i) The description of the factory as per NIC classification
(ii) NIC Code
(iii) Whether covered under Section 2(cb)
(iv) Whether notified as factory carrying on dangerous operations under section 87

(v) Whether covered under MSIHC Rules as MAH installations.

7.15.2.3. Manufacture of food, cotton textile, and jute industry has contributed maximum number of accidents during the year 2000. It is therefore recommended that management may be asked to study the problem seriously and minimize the number of accidents by improving the work environment and creating safe working conditions.

7.15.2.4. During the year 2000, 56 fatal accidents occurred in the factories situated in Uttar Pradesh. Investigation and cause wise analysis indicate that about 55% of the total accidents were such wherein workers of age group of 18-36 got the fatal injuries due to lack of experience in the particular work. Almost 52.4% of non-fatal accidents occurred to the workers in the age group of 36-40 years of age. All the fatal accidents are not invariably investigated; accidents of serious nature are only investigated. This may be due to overconfidence amongst more experienced worker in factories. Another reason for this could be the change of job of these workers without proper training/retraining to complete the work safety. It is recommended that the need for training and retraining of workers at unit level in safety and health aspect at regular intervals must be conducted specially for employees at the time of induction in service followed by rigorous retraining at regular intervals. It is also recommended that when there is a change in their job it should be brought to the notice of occupiers or managers. Further, occupiers can also be directed to introduce an extensive training scheme and other motivational tools for promoting safety and health at their workplace.

7.15.2.5. Almost 37% of nonfatal accidents are caused due to by falling objects and about 19% are due to fall of person and 16% caught in between objects. This indicates that proper work procedure, safe system of work; safe operating procedures are not being followed in the factories. It is recommended that the occupiers or the managers of the factories should be told about their statutory
duties for designing and developing safe operating procedures (SOP's), permit to work system should be established and followed by strict implementation at workplace. A strong monitoring system should be established at the unit level by the management to ensure the implementation of the above systems. Safety committee of the unit should also be involved in implementing these procedures.

7.15.2.6. The analysis of accidents with respect to the location of injuries reveal that head, hands and foot are the body parts which are frequently injured in accidents. This indicates that proper protection of these body parts is not ensured at workplace. Therefore, the occupiers should be advised to give appropriate personal protective equipment to their workers and make sure that workers while working in factories use them.

7.15.2.7. About 3.6% of fatal accidents are caused due to contact with electrocution. The severity rate of electrical accident is very high. This indicates inadequacy of attention paid to safety while working with electrical energy. This could be because of low level of awareness, lack of education and training, employment of non-qualified personnel for the works connected with electricity, etc. Since these aspects are coming under the scope of activities of Electrical Inspectorates, it is suggested that Directorate of Factories could formulate a programme in collaboration with DGFASLI to improve the status of electrical safety in factories. In this programme specific electrical hazards while working in the factories could be identified and the precautions to be taken could be disseminated through various modes such as training programmes, leaflets, booklets, lectures, etc. The factory inspector should also be specifically trained in this area to identify the noncompliance with the provisions and issue necessary directives/guidelines to the occupiers/managers.

7.15.2.8. As regards to preparation of safety policy and constitution of safety committees, the level of compliance with these provisions is very low due to late induction of rules related to these issues in 1999. The statistics regarding number of factories required to prepare safety policy and those required to constitute safety committees is not readily available. Therefore, it is
recommended that on the basis of the provisions of The Factories Act, 1948 and the criteria laid down in Factories Rules, all units requiring preparation of safety policy and constitution of safety committee should be clearly identified. Thereafter, the compliance with these provisions should be strengthened through strict enforcement and inspection.

7.15.2.9. The level of compliance as far as the appointment of safety officer in factories is concerned is not satisfactory. It is therefore strongly recommended that the placement of the safety officer must be done by the occupier and the person who are not qualified as safety officer must be sent to recognized institute to acquire qualification as per the state rules. The reports of accidents in Form 24, furnishing details of the accidents, causes of accidents and agencies involved therein, non use of personal protective equipment etc. indicate that the safety officers have not been effective in discharging their duties. It is therefore suggested that safety officers in all the factories should be trained and retrained through refresher courses on:-

(i) Technique of safety audit
(ii) Establishment of safety management system
(iii) Costing of accidents, and
(iv) Leadership for safety and health
(v) Techniques of designing and implementing effective awareness programme at work place.

7.15.2.11.1. This may lead to better status of safety and health management in factories. It is also recommended that there should be better interaction between Factory Inspectors and Safety Officers through discussions on the ways and means for improving the safety, health and working conditions in their factories and latest technological development in industry safety.

7.15.2.12. As per the requirement under Rule of U P Factories Rules, 1950, 93 factories submitted returns on occupational health centers. Information regarding the number of factories requiring establishment of occupational health centers is not readily available. Therefore, it is suggested that on the basis of the
recommendation at Serial No.2, the factories requiring (a) ambulance room (b) occupational health centers and (c) appointment of factory medical officer on retainership/part-time/full-time basis may be identified. Thereafter, efforts should be made by prevailing upon the management of such factories to establish occupational health centre as per the provisions of The Factories Act, 1948 (Amended 1987) and the Rules.

7.15.2.13. As against suggested norm of 150 factories per inspector this figure of 508 is quite high, leaving scope for compromises on quality of inspection. Therefore efforts should be made to bring down this ratio to a more reasonable level. This can be achieved through:-

1. Prioritisation of inspection
2. Strengthening of inspectorate

7.15.2.14. A number of factories in the state are employing labour on contract for undertaking various activities. As per the definition of "worker" under Section 2(l) of The Factories Act, 1948, even the contract worker is to be provided adequate safety and health in the factory premises. It is often observed that the occupier/manager of the factory tend to ignore this responsibility. It is recommended that casual/contract workers should be given proper induction training through awareness campaign on safety, welfare and health for their benefit in the factory. Directorate of Factories should undertake it in collaboration with DGFASLI.

7.15.2.15. At directorate level for clearing industrial projects from environmental angle, there is a provision of Site Appraisal Committee under the Chair of Directorate of Factories constituted under Section 41-A of The Factories Act, 1948. Similarly another committee is also working for environmental clearance through Ministry of Environment of Forest, Govt of India/ state pollution controls board. It is therefore suggested that these committees should work in close coordination with each other in order to avoid duplication of efforts to facilitate faster clearance of industrial projects and to reduce the inconvenience to the industries and promote economic growth. In fact, as per the recommendation of
the High Level Committee, constituted by Ministry of Labour to study the overlapping provisions, the Site Appraisal Committee, constituted under The Factories Act, 1948 should be empowered to give environment clearance to the initial location of industrial projects likely to be covered under The Factories Act, 1948.

7.15.2.16. As per the data of the department of industries there are about 4 lakh small-scale industrial units in the state. These units are registered with Department of Industries and Commerce and only very few of the industries look to be covered /registered under Factories Act, 1948. The department of industries is looking after the licensing, development, training, marketing and financial aspects in respect of these units. However, this department is not looking after the safety, health and welfare of workers. For educating the owner-managers as well as the workers of small-scale units in the field of safety, health and productivity, a collaborative programme can be devised and implemented by the Directorate of Factories and the Department of Industries & Commerce in collaboration with DGFASLI. For this purpose, the training module developed by Central Labour Institute in collaboration with ILO could be used. If required, Central Labour Institute/ Regional Labour Institute can also be associated extensively in these efforts.

7.15.2.17. The Department of Health Services in the State has 4964 numbers of hospitals and dispensaries. The medical practitioners appointed in these hospitals/ dispensaries are mainly concentrating on diagnosis, prevention, control and treatment of the common diseases such as leprosy, tuberculosis, etc. It is suggested that all medical practitioners in these hospitals should also be exposed/trained in occupational health. Their extensive training in the field of occupational health will improve their skills in early detection or diagnosis of occupational diseases and will help them in recommending suitable action to the workers and employers. By this way, the status of occupational health of the workers employed in factories could be improved.
7.15.2.18. The Insurance Medical Services Department in the State provides the medical services to the workers covered under ESI Act, 1948. The workers are referred to the hospitals for diagnosis and treatment. The suspected as well as confirmed cases of occupational diseases are not brought to the notice of Directorate of Factories. As a result, no case of occupational disease is reported under Section 89 of The Factories Act, 1948, which is contrary to the fact. It is suggested that a programme for close coordination between ESIC, ESI Hospitals (The Insurance Medical Services Department) and Directorate of Factories should be prepared for early detection, diagnosis and prevention of occupational diseases. This will facilitate taking appropriate preventive measures by the inspectors of factories in order to eliminate or control the causative working conditions in various factories. This will improve the status of occupational health of the working class in the long run.

7.15.2.19. In view of the fire incidence in a shoe factory at Agra during the year 2002 which resulted in to 42 fatal injuries an effective awareness programme on control of fire incidents could be prepared in collaboration with Fire Brigade Department, Industries Association and Directorate of Factories for the occupiers/managers and workers of the factory. This programme should include formulation of mutual aid scheme and establishments of emergency response centers in various industrial pockets of the states.

7.15.2.20. The extensive involvement of non-governmental organisation such as Loss Prevention Association of India, National Safety Council of India, Indian society of Industrial Hygiene, etc. should also encourage taking up the activities in the field of safety and health on a large scale. This should include three tier-training programmes, workshops/seminars and awareness programme wherein executives, supervisors and workers are separately trained. The need based training programme for each target group may be designed. The Ministry of Labour, Govt. of India and other international agencies like International Labour Organization may centrally fund these training programmes.
7.15.2.21. In view of the technological advancement and use of new manufacture techniques and advance machines, the law, for ensuring safety and health of the persons working in the factories is becoming more and more stringent and it is required that the effective implementation of safety measures is to be ensured at site. This situation demands for a very specific training programmes/workshops for the officers of factory inspectorate, so that the real spirit of law is translated into action and thereby not only the work environment is protected but also the safety of workmen and material are ensured. Therefore it is recommended that specific course for environmental protection, safety at workplace and management of hazardous substances etc. should be designed and training to be given to the officers of factory directorate.

7.15.2.22. Central Board for Workers Education under Ministry of Labour, Govt. of India should conduct their awareness programme in collaboration with Directorate of Factories and Regional Labour Institute should design and conduct specialized training programmes on safety and health for the workers. The programmes should also be organized for state level trade union leaders for disseminating the information about safety and health awareness culture downstream.

7.15.2.23. In order to review the status of safety, health and welfare in the factories and formulate action plan on the basis of findings from time to time, a tripartite state level committee on occupational safety and health should be constituted under the chairmanship of Labour Minister.

7.15.2.24. It is strongly recommended that the Factory Directorate of State of Uttar Pradesh must be equipped with IT update for effective data collection and data analysis in respect of health and safety

7.15.2.25. The directives issued by the respective government in respect of Inspector of Factories, that he has to take prior permission before inspection of any factory from the District Magistrate and other competent authorities need to be reviewed considering the spirit of the Factories Act, 1948 for the safety, health and welfare of the workers working in the factories. It may not be forgotten that
an element of surprise in inspection is an effective tool for effective enforcement programmes.

**7.16. Industrial safety & health in National Capital Territory of Delhi Region.** The findings and recommendations as brought out by the study are summarized below.

**7.16.1. Findings.**

7.16.1.1. The city of Delhi, with a population of more than 70 lakhs, being the capital of the largest democracy i.e. India, is gaining importance among the largest metropolitan cities of the world and the day is not far when it shall be viewed as a symbol of respect for which every Indian shall feel proud of. Presently, growing at unprecedented pace, the city must be equipped to face the contemporary challenges. The inhabitants of this city should be able to live in safe convenient and lively surroundings. They should be able to improve their economic capabilities and share the fruits of modernisation. All this demands purposeful transformation of its socio-economic, natural and built environment. Three local bodies i.e. Delhi Municipal Corporation, New Delhi Municipal Council and Delhi Cantonment Board are the broad divisions of the national capital territory of Delhi. The area of Municipal Corporation has been divided into Rural and Urban while the other two local bodies are entirely urban. The NCT of Delhi is having 231 villages, 27 census towns, 9 districts, 3 municipal bodies/corporations, 2 tehsils. More than 90% population (9024954) of NCT of Delhi is in the Delhi Municipal Corporation area. However, the density of the population is higher in the New Delhi Municipal Corporation (7050) as compared to Delhi Municipal Corporation (6459) and Delhi Cantonment Board (2197).

7.16.1.2. As per the census report (1991) the working population of the NCT of Delhi is 2968377. The data is given in table 6.10.1.5. About the male-female breakup of the workers by industrial classification indicate that in NCT of Delhi out of 2695513 workers only 286872 (less than 12%) are female. As per the Directorate of Economics & Statistics Report (June 2002) on Employment &
Unemployment situation in Delhi, it is found that there are 5.59 lakhs unemployed persons against an estimated total population of 132.98 lakhs persons in Delhi during 1999-2000. The unemployed persons (all age groups) constituted about 4.20% of Delhi population and it is less than the national level average of unemployed, which stands at 5.2% of country’s population. It is evident from the details given below that 3.69% of total males and 4.82% of total females were unemployed. It is further revealed that 2.83% of rural and 4.36% of the urban population are found to be unemployed.


7.16.1.5. Manufacturing sector.

7.16.1.5.1. In 1981, there were about 46,000 industrial units; 77 percent with less than 10 workers, and 16 per cent with workers 10 to 20. By 2001 the number of industrial units has increased to 93,000. The percentage of work force in the industrial sector has been constantly increasing. There has been considerable change in the industrial structure of the city in the past three decades and more so after 1975. The Electrical and Electronics, Rubber, Plastic and Petroleum products are the two types of industries, which have grown very rapidly. As per the Delhi Master Plan the hazardous and noxious industrial units are not permitted in Delhi. Therefore, most of the hazardous and noxious
industrial units have moved out of Delhi. Further, it has also decided that no new heavy and large industrial units shall be permitted in the NCT of Delhi. No new extensive industrial unit is permitted except in existing identified extensive industrial areas.

7.16.1.5.2. Working Factories in the NCT of Delhi. During the year 2000 there were 1239 factories manufacturing of woven apparels, followed by 584 manufacturer of fabricated metal products (except machinery), 569- manufacturer of basic metals, 467- manufacturer of Rubber, 458-manufacturer of machinery, 419-manufacturer of motor vehicles). The highest number of workers (56178) are employed manufacturer of woven apparels, followed by approximately 15000 workers are employed in the publishing, printing; manufacturer of motor vehicles; manufacturer of fabricated metal products, and sale, maintenance and repair of motor cycle. In total there are approximately 221050 workers working in the 6496 different factories working in the city of Delhi.

7.16.1.5.3. Analysis of occupational diseases in manufacturing activities. ILO Code of Practice on Recording and Notification of Occupational Accidents and Diseases defines occupational diseases as “a disease contracted as a result of an exposure of risk factors arising from work activity.” Under Section 89 of the Factories Act, 1948 where any worker in a factory contracts any of the diseases specified in the Third Schedule (Annexure-1), the manager of the factory shall send a notice thereof to such authorities and in such form and within such time as may be prescribed. Also any medical practitioner attending on a person who is or has been employed in a factory and is suffering from diseases specified in the Third Schedule shall without delay send a report in writing to the office of the Chief Inspector of Factories. In the NCT of Delhi there was no reporting of occupational disease during the last 3 years. The Inspector of Factories (medical) visited 94 factories and examined 1035 workers. However, no pathological investigations and x-rays were carried out because of the lack of facilities.

7.16.1.6. Management of industrial safety and health. At the manufacturing unit level management of occupational safety and health,
involves; Safety Policy, Appointment of Safety Officers, Safety Committee, Occupational Health Centers (FMO, Ambulance), Welfare Measures (WO, Canteen, crèche, lunch room, Shelter etc.), On-Site Emergency Plans, Safety Reports, Safety Audits, HAZOP studies. As on date there are 16 Major Accident Hazard Installations in the national capital territory of Delhi out of these 16 installations so far 5 installations have not conducted the safety audit which is mandatory as per the Factories Act. As far as the on-site emergency plan and mock drill is concerned all the factories have evolved and practiced it.

7.16.1.7. **At state level.** At unit level the problems are relatively simple and unit specific depending upon the type of industry. However at the state level the management of safety and health is not unit or industry specific and the instruments such as policies, legislation, etc. are required to be more comprehensive to take care of safety and health issues in all type of occupations. Apart from the Factories Act, 1948, there are other legislation's for providing a better work environment, safety, and health and welfare facilities. Various state government authorities such as the Chief Inspector of Factories, the State Labour Commissioner, etc enforce these legislations. There are different departments under various ministries of Central and State Government, NGOs and institutions working for the safety and health of the people at work.

7.16.1.8. The Inspectorate of Factories, Labour Department, Government of National Capital Territory of Delhi, enforces legislation's pertaining to occupational safety, health, welfare, working hours etc. of workers working in factories covered under the Factories Act, 1948 and located within the N.C.T. of Delhi. This legislation is being enforced by technical officers i.e. Inspectors of Factories, Dy. Chief Inspectors of Factories who work under the control of the Chief Inspector of Factories and the Labour Commissioner. Medical examination of workers engaged in dangerous/hazardous processes examination and certification of young persons by the Certifying Surgeon, in accordance with the provisions of this Act with a view to monitor occupational health of workers. The enforcement of this legislation is being carried out on district basis by the district
Inspectors of Factories. After inspection, improvement notices are issued to the defaulting management and ultimately legal action is taken against the defaulting management. The Dy. Chief Inspector of Factories supervises the work of Inspectors of Factories on district basis. The detail of Inspections/prosecutions during last 2 years is as given in Table 6.10.3.1. The Act provides for a maximum punishment up to two years and or a fine of Rs. one lakh or both. Most of the challans are being contested with the result that the Inspector of Factories are most of the time busy in the Courts in filing, conducting and defending challans filed by them.

7.16.1.10. Besides the aforesaid statutory functions, the Inspectorate also implements Plan Scheme titled "Delhi Safety Awards" and "Delhi Shramik Sujhao Puraskar" Schemes and hold meetings of Awards Committee and Awards Distribution function every year. These schemes aim at arousing Safety consciousness amongst management’s and workers of Factories. The Inspectorate is headed by Chief Inspector of Factories, who works under the administrative control of the Labour Commissioner-cum-Secretary (Labour), Government of N.C.T. of Delhi. At present, he is assisted by following technical officers besides supporting staff:--

1. Deputy Chief Inspector of Factories - 2
2. Certifying Surgeon - 1
3. Inspectors of Factories - 6

7.16.1.11. Inspection of hazardous factories, and assisting the managements of factories in preparation of On-Site Emergency Plan and assisting the District Administration in preparation of Off-Site Emergency Plan, in accordance with the duties and functions assigned under the Manufacture Storage and import of Hazardous Chemical Rules, 1989 and the Chemical Accidents (Emergency Planning Preparedness and Response) Rules, 1996. The Inspector of Factories is ex-officio Member-Secretary of the Distinct Crisis Group. This Group is required
to hold periodical meetings at least once in 45 days. The District Crisis Group is the Apex body in the District to deal with major chemical accidents and provide expert guidance for handling accidents. The Chief Secretary of the Government of Delhi is the ex-officio Chairperson and the Secretary (Labour) of Delhi is Member-Secretary, with Chief Inspector of Factories as member of the State Crisis Group besides other members. This Group is required to meet periodically at least once in three months. The State Crisis Group is the Apex body in the NCT of Delhi to deal with the major chemical accidents and to provide expert guidance. The functions of these Groups are given in the Chemical Accidents (Emergency Planning, Preparedness & Response) Rules 1996.

7.16.1.12. The Department of Explosives with it’s headquartering at Nagpur is the nodal agency to look after safety requirements of the Explosives and Petroleum Sectors. Department of Explosives is headed by Chief Controller of Explosives. It has five circles Offices at Kolkata, Agra, and Faridabad, Mumbai and Chennai and 18 Sub-circle offices at various places in the country. The Faridabad Circle covers the NCT of Delhi. With the overall objective of ensuring safety and security of public and property from fire and explosive, the Department as a statutory authority is entrusted with the administration of Explosives Act, 1884, Petroleum Act, 1934, Inflammable substances Act, 1952.

7.16.1.13. **Centre for industrial & environmental health.** A center for industrial & environment health is existing in NCT of Delhi and is located at LNJP hospital, New Delhi. The Occupational & Environmental Health at Lok Nayak Hospital has been set up by the Government of National Capital Territory of Delhi as a lead agency for, clinical management of occupational and environmental illness, watching over occupational and environmental health concerns, assessment of working conditions and environment to make work safer and for enhancing productivity, training and education, research on occupational and environmental issues impacting health outcomes, informing and advising the government, industry, workers, and the community. It is a nodal agency for providing training on Biochemical waste management, training and physicians
and nurses, conducting short course on occupational and environmental medicine and occupational medicine and industrial hygiene, research on hazards of Emerging Technologies, Chemicals, metals and solvent related health risks, vehicular pollution, health and safety of health care workers, biomedical waste management and handling, unemployment and health, nutrition in workplace, work related Musculo-skeletal disorder, mental health and stress at work, injury prevention and control. Centre can advise stakeholders, NGOs and individuals both in community and work setting on occupational and environmental health risks. The centre is finalizing modalities for the publication of an International Journal. A dedicated team of experts is directly involved in the launching of inaugural issue.

7.16.1.14. Oil Industry Safety Directorate is situated at New Delhi, is a technical directorate under the Ministry of Petroleum and Natural Gas that formulates and coordinates the implementation of a series of self regulatory measures aimed at enhancing the safety in the oil & gas industry in India. To ensure proper implementation of various aspects of safety in the oil industry, Government of India decided to set up a “Safety Council” at the apex in January, 1986 under the administrative control of the Ministry of Petroleum and Natural Gas as a special self regulatory industry agency for safety matters and procedures in respect of hydrocarbon sector. Safety Council headed by the Secretary of the Ministry of Petroleum & Natural Gas as Chairman and includes the Addl. Secretary, Joint Secretaries, Advisers in the Ministry of Petroleum & Natural Gas, the Chief executives of all the Public Sector Undertakings, oil industry, Statutory bodies such as the Chief Controller of Explosives, Director General of Mines safety, and Adviser (Fire) to the Government of India, Secretary, Central Electricity Board and Director General of Factory Advice Service & Labour Institutes as members. Oil Industry Safety Directorate is headed by Executive Director who also acts as the Member Secretary of Safety Council assists the Safety Council. OISD is manned by a group of technical experts in the area of design, operations, maintenance, inspection, safety, environment, etc. drawn from oil industry.
Standardization is one of the major activities of OISD. It is required to keep abreast of the latest design and operating practices in the areas of safety and fire fighting in the hydrocarbon processing industry in the development countries, so as to develop standards and codes that would be suitable for the conditions in India. OISD standards are generally reviewed every 4 years or earlier after first publication to incorporate the latest technological changes and experience gained in their implementation so as to update them in line with the current international practices. The External Safety Audits (ESAs) are conducted regularly to check compliance with respect to implementation of safety standards. It also includes critical examination of all the components of the safety management system viz. Management Policy, management attitude towards safety, safety training, review of plant layouts, operating/inspection/maintenance procedures, emergency preparedness plans, usage of personal protective equipment, fire/accident records, fire protection systems, etc. Safety performance of the organization in the oil industry is being regularly evaluated through a Safety Award Scheme instituted by Ministry of Petroleum and Natural Gas. Evaluation of performance is done by specially developed system base on total loss concept. Technical workshops covering entire oil industry are organized to discuss latest developments, sharing of experiences, etc. Case studies on major incidents are presented/discussed to prevent recurrence of similar incidents. The case studies, accident analysis and other information related to safety improvement are published and distributed to industry through OISD’s journals "PETROSAGE" and "Monthly NEWSLETTER". OISD maintains a database of accidents taking place in oil industry. The analysis of these incidents is shared with industry to avoid recurrence. OISD also investigates the major incidents.

7.16.1.15. Delhi fire service. The total number of fire stations as on date has come to 34 with 2001 fire service personnel working round the clock. Three fire stations are in various stages of construction. The administrative control of Delhi Fire Service, which was previously with Municipal Corporation of Delhi, rests with
the Govt. of National Capital Territory of Delhi since 10th Nov. 1994. The fire service continues to make sincere endeavor by responding to 15000 fire/rescue calls per annum on an average to serve the people of the National Capital Territory of Delhi. The Delhi Fire Service works on a Centralised Mobilising Scheme. All the emergency calls made on telephone no.101 are received by 10 telephones having parallel lines provided in the control room at Head quarters which is manned round the clock. As soon as the call is received, the same is transmitted to the nearest fire station from the place of incident and pre-determined number of units is dispatched immediately. The wireless communication is available in all the fire stations, as well as on mobile units, which helps in quick transmission of messages to the fire stations concerned. Delhi Fire Services issues fire Safety guidelines to the various agencies for which the cases are to be referred to Chief Fire Officer, Delhi Fire Service through the building authorities concerned or licensing authorities in line with the bldg. of laws/relevant code of practices. In case of high-rise buildings i.e. 15 meters or more in height, a questionnaire has to be filled and submitted by the architect along with the plans. In order to avoid inconvenience all the information required in the questionnaire should be properly indicated. The fire safety guidelines are generally issued within two weeks from the date of receipt of request if the relevant information is correctly provided. The owners/builders are further advised to ensure the compliance of fire safety guidelines before they approach the Chief Fire Officer for No Objection Certificate. No inspection fee is levied by the fire service for such inspections or issue of NOC. In case of difficulty the matter should be reported to the Dy. Chief Fire Officer or the Chief Fire Officer. The Chief Fire Officer or Deputy Fire Officer may also be contacted in case there is any delay in carrying out the inspection or issue of fire issue of NOC after the inspection has been carried out etc. The dept. does not levy any charges for this job for the time being.

- Certain fire prevention measures which can minimize industrial accidents due to fire which can be implemented at unit level are:-
• Store flammable liquids, gases, solvents, chemicals in stable racks, correctly labeled.
• Keep chemicals in cool and dry place away from heat.
• Where hazardous chemicals are used / stored, ensure adequate ventilation and prohibit smoking.
• Maintain good house keeping. Ensure cigarettes are extinguished before disposal.
• Use fuses and circuit breakers of correct capacity.
• Before welding operation, all traces of flammable are removed to a safe distance.
• Welding/Hot work should be carried out under proper fire watch
• Keep all machinery clean and lubricate it to avoid friction and overheating.
• Regular fire drills should be carried out.
• Don’t smoke in prohibited areas.
• Don’t place obstruction in means of escape.
• Don’t use damaged cords and avoid temporary connections
• Don’t plug too many electrical appliances in one socket

7.16.1.18. Crisis group. Chemicals are a vital component of every day life and occupy an important position in our economy. There has been a rapid increase in recent times in their use in industry and household. Many of these chemicals are toxic, highly reactive, explosive or flammable, or have combination of these characteristics. Due to these properties, they have potential to cause damage to human beings, other living creatures, plant, property and the general environment. It is therefore, necessary to take utmost care, while handling such chemicals at all stages of manufacture, processing, treatment, storage, transportation, use, or sale. The potential for major accidents caused by the increasing production, storage and use of hazardous substances implies that a well-defined systematic approach is required if major disasters are to be avoided. Although such an emergency may be caused by a number of factors e.g., plant
failure, human error, earth quake, vehicle crash or sabotage, it will normally manifest itself in any of three basic forms viz. fire, explosion or toxic release. Unlike natural disasters which can not be prevented proper planning and preparedness can minimize the occurrence of emergencies caused through chemical accidents. Such a planning can be successful, only if those responsible for handling hazardous substances are aware about hazards and have a concern about it. This has to be supported by the local authorities, State Government and the Central Government. The Government of India has enacted legislations for safe handling, storage, use and transportation of hazardous and toxic chemicals. These rules are enforced by various agencies at Central and State Government levels. These agencies include Controller of Explosives (Government of India), Central Pollution Control Board (Government of India), and Delhi Pollution Control Committee, Factories Inspectorate, transport authorities and local health authorities. Environment (Protection) Act, 1986 has been supplemented by the "Manufacture Storage and Import of Hazardous Chemical Rules, 1989." These Rules, have been enacted by the Central Government for managing chemical accidents. The "Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996"compliment the Manufacture Storage and Import of Hazardous Chemical Rules, 1989. It provides for a four-tier crisis management system to be setup at Local, District, State and Central level. The rules were notified on 2nd August, 1996 by the Ministry of Environment and Forests, Government of India, under the Environment Protection Act, 1986. These Rules provide for a statutory back up for setting up of Crisis Groups at Local, District, State and Central Level, which have Major Accident Hazard (MAH) installations. As per the provisions of these Rules, the Government of India has constituted a Central Crisis Group; to deal with major chemical accidents and provide expert guidance for handling major chemical accidents in the country besides other functions mentioned in Office Order No. 3-15/91-HSMD dated 27.09.1996. The Rules provide for keeping public informed on chemical accidents, prevention, preparedness and mitigation. These Rules will enable preparation of Off-site
Emergency Plan, updating, and conduct of mock-drill. It will further enhance the implementation of Public Liability Insurance Act, 1991, for providing relief to the victims. The Government of National Capital Territory of Delhi vide Order dated 12.10.1998 of the Secretary (Revenue), Government of Delhi has constituted the State Crisis Group, nine District Crisis Groups and District Emergency Authorities. "Central Crisis Group" is the apex body in the country to deal with and provide expert guidance for planning and handling of chemical accidents in the country. The Central Crisis Group continuously monitors the post-accident situation and suggests measures for prevention of re-occurrence of such accidents. It is required to meet once in six months and respond to queries from State Crisis Groups and District Crisis Groups and to deliberate on planning, preparedness and to provide guidance for handling of chemical accidents, with a view to reducing the extent of loss of life, property and ill-health. The State Crisis Group reviews all the Off-site Emergency Plans for chemical disaster for its adequacy. This group is required to meet once in three months and is required to review all On-site emergency plans prepared by the occupiers of the Major Accident Hazards (MAH) installations for preparation of the District offsite Emergency plan which shall also include hazards due to transportation of hazardous chemicals by road and by pipelines. The District Crisis Group is required to meet once in a 45 days and conduct one full scale mock-drill of the District Offsite Emergency Plan, on a site every year. That is the key to success in overcoming the crisis. By an order number 3-15/91-HSMD dated 27th September, 1996, the Central Crisis Group (CCG) has been set up by Ministry of Environment and Forests, Government of India. This is an apex body comprising senior officials of the Government and technical experts, to deal with major chemical accidents and provide expert guidance for handling major chemical accidents in the country. Continuously monitor the post-accident situation arising out of a major chemical accident and suggest measures for prevention and to check recurrence of such accidents. Conduct post-accident analysis of such major chemical accidents and evaluate responses. Review District Off-site Emergency Plans with a view to
examining its adequacy in accordance with, the Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989 and suggest measures to reduce risks in the industrial pockets. Review the progress reports submitted by the State Crisis Group. Respond to queries addressed to it by the State Crisis Group and District Crisis Group. Publish a State-wise list of experts and officials who are concerned with the handling of chemical accidents. Render in the event of a chemical accident in a State, all financial and infrastructure help as may be necessary. The CCG shall meet once in every six months in the Ministry of Environment and Forests, Paryavaran Bhawan, New Delhi. The Group may co-opt any person whose assistance or advice is considered useful in performing any of its functions. The CCG deals only with major chemical accidents in the country where State Governments require marshalling of resources from other States as well as from the Central Government. The Chief Secretary, the District Magistrates of the concerned State/Districts should immediately inform the CCG about the accidents. It will meet as soon as possible after the accidents. It will meet as soon as possible after the receipt of information about the accident in carrying out its task; it shall consult experts, coordinate activities of the State Governments and the Central Ministries Departments/Agencies and keep the Cabinet Secretariat and appropriate authorities in the Government of India constantly informed about development. By the order No. F-36(401)/98/CA/Estt./2682-2704 dated 12.10.98 the Government of National Capital Territory of Delhi has constituted State Crisis Group (SCG) which shall be the apex body to deal with the Major Chemical Accidents and provide guidance for handling such accidents in the National Capital Territory of Delhi for reviewing all district off-site emergency plans in the National Capital Territory of Delhi with a view to examine their adequacy in accordance with the Manufacture, Storage and Import of Hazardous Chemical Rules, 1989 and forwards a report to the CCG once in three months, assist the Government of National Capital Territory of Delhi in the planning, preparedness and mitigation of major chemical accidents at a site in the National Capital Territory of Delhi, assisting the Government of
National Capital Territory of Delhi in managing chemical accidents at a site, monitoring the post accident situation arising out of a major chemical accident in the National Capital Territory of Delhi and forward a report to the Central Crisis Group, and also to review the progress reports submitted by District Crisis Groups.

7.16.1.19. **Delhi Pollution Control Committee.** NCT of Delhi has a pollution control committee for investigating accidents in isolated storage’s, industries not covered under the Factories Act, 1948, pipelines and hazardous substances under transportation by Road/Railway and suggest remedial measures.

7.16.1.20. Chief Inspector of Factories, Labour Department investigates cause of accident in a factory licensed/covered under the provisions of the Factories Act, 1948, and suggest remedial measures.

### 7.16.2. Recommendations.

7.16.2.1. In 2001, there were 6496 factories registered under The Factories Act, 1948. Out of which 1214 factories are covered under section 2(cb) of the Factories Act 1948 and 16 factories are Major hazard installation as per the Manufacture Storage and Import of Hazardous Chemicals Rule 1989(Amended 2000) under Environmental Protection Act 1986. The Labour Laws (Exemption from furnishing returns and maintaining registers by certain establishment) Act, 1988, mentions that certain notified factories mostly defence industries are exempted from submitting annual returns. However, only 60% of the total industries have submitted annual returns for the year. It is recommended that efforts should be made to ensure compliance with the requirement of submission of annual returns in prescribed format by registered factories at the time of issue /renewal of license under Factories Act 1948. It is also recommended that the occupier/manager of the factories should be made to submit complete details in the annual returns. The inspecting officials can bring noncompliance with such
provisions to the notice of the occupier by issuing notice. In case of further noncompliance a legal action may be followed.

7.16.2.2. 1214 factories are covered under section 2(cb). It was informed that it is very difficult to segregate factories as coming under Section 2(cb) or Section 87 merely on the basis of information given in annual return form or license form or Registration form. Therefore, it is suggested that the annual return form prescribed under state Factories Rules should be amended to include following additional information

(i) The description of the factory as per NIC classification
(ii) NIC Code
(iii) Whether covered under Section 2(cb)
(iv) Whether notified as factory carrying on dangerous operations under section 87
(v) Whether covered under MSIHC Rules as MAH installations.

7.16.2.3. Amongst the manufacturing industries manufacture of woven apparels has contributed maximum number of accidents during the year 2000. The management may be attempting to solve the problem, but it is recommended that management may be asked to study the problem seriously and minimize the number of accidents by improving the work environment and creating safe working conditions.

7.16.2.4. During the year 2000, 33 fatal accidents occurred in the factories situated in NCT of Delhi. Investigation and cause wise analysis indicate that about 43% of the total accidents were such wherein workers of age group of 18-36 got the fatal injuries due to lack of experience in the particular work. Almost 52.4% of non-fatal accidents occurred to the workers in the age group of 36-40 years of age. All the fatal accidents are not invariably investigated; accidents of serious nature are only investigated. It is recommended that for training and retraining of workers at unit level in safety and health aspect at regular intervals must be conducted specially for employees at the time of induction in service followed by rigorous retraining at regular intervals. It is also recommended that
when there is a change in their job it should be brought to the notice of occupiers or managers. Further, occupiers can also be directed to introduce an extensive training scheme and other motivational tools for promoting safety and health at their workplace.

7.16.2.5. The analysis of accidents with respect to the location of injuries reveal that head, hands and foot are the body parts which are frequently injured in accidents. This indicates that proper protection of these body parts is not being ensured at workplace. Therefore the occupiers should be advised to give appropriate personal protective equipment to their workers and make sure that workers while working in factories use them.

7.16.2.6. Electrocution is a cause of concern; about 11.26% of fatal accidents are caused due to contact with electrocution. The severity rate of electrical accident is very high. It is indicative of the inadequacy of attention paid to safety while working with electrical energy. This could be because of low level of awareness, lack of education and training, employment of non-qualified personnel for the works connected with electricity, etc. Since these aspects are coming under the scope of activities of Electrical Inspectorates, it is suggested that Directorate of Factories could formulate a programme tailor made to suit industries which are electrocution accident prone, in collaboration with DGFASLI to improve the status of electrical safety in factories. In this programme specific electrical hazards while working in the factories could be identified and the precautions to be taken could be disseminated through various modes such as training programmes, leaflets, booklets, lectures, etc. The factory inspector should also be specifically trained in this area to identify the noncompliance with the provisions and issue necessary directives/guidelines to the occupiers/managers.

7.16.2.7. It is a very disturbing trend to find that, while going through the accident reports received in inspectorate from the management it reveals that some of the accident reports are incomplete. It is recommended that all occupiers must be advised to send the reports duly filled and mention the NIC
Code of the industry. It is therefore recommended that complete data must be obtained before issuing/renewing license to the factory.

7.16.2.8. As regards the preparation of safety policy and constitution of safety committees, the level of compliance with these provisions is reasonably at an acceptable level. The statistics regarding number of factories required to prepare safety policy and those required to constitute safety committees is not readily available. Therefore, it is recommended that on the basis of the provisions of The Factories Act, 1948 and the criteria laid down in Factories Rules, all units requiring preparation of safety policy and constitution of safety committee should be clearly identified. Thereafter, the compliance with these provisions should be strengthened through strict enforcement and inspection.

7.16.2.9. Safety officer as per the statutory provisions is a necessity and a statutory requirement, and at present compliance is not satisfactory. It is therefore strongly recommended that the placement of the safety officer must be done by the occupier and the person who are not qualified as safety officer must be sent to recognized institute to acquire qualification as per the state rules. The reports of accidents, furnishing details of the accidents, causes of accidents and agencies involved therein, non use of personal protective equipment etc.; indicate that the safety officers have not been effective in discharging their duties. It is therefore suggested that safety officers in all the factories should be trained and retrained through refresher courses on the following subjects in order to better status of safety and health management in factories.

7.16.2.10. As per the requirement on factories submitting returns on occupational health centers, the details have not been encouraging. Information regarding the number of factories requiring establishment of occupational health centers is not readily available. Efforts should be made by prevailing upon the management of such factories to establish occupational health centre as per the provisions of The Factories Act, 1948 (Amended 1987) and the Rules.

7.16.2.11. As against suggested norm of 150 factories per inspector this ratio of factory inspector to No of factories is quite high, leaving scope for compromises
on quality of inspection. Therefore efforts should be made to bring down this ratio to a more reasonable level. A point to be noted at this stage is that the effectiveness of factory inspector is of more importance in a state like Delhi.

7.16.2.12. NCT of Delhi is typical with large number of factories in the state employing labour on contract for undertaking various activities. In a country like India where unemployment and poverty is on the rise, this system will continue for some more time. Therefore it is recommended that casual/contractor workers should be given proper induction training through awareness campaign on safety, welfare and health for their benefit in the factory. Directorate of Factories should undertake it in collaboration with DGFASLI.

7.16.2.13. At directorate level for clearing industrial projects from environmental angle, there is a provision of Site Appraisal Committee under the Chair of Directorate of Factories constituted under Section 41-A of The Factories Act, 1948. Similarly another committee also working for environmental clearance through Ministry of Environment of Forest, Govt of India/ state pollution controls board. It is therefore suggested that these committees should work in close coordination with each other in order to avoid duplication of efforts to facilitate faster clearance of industrial projects and to reduce the inconvenience to the industries and promote economic growth. In fact, as per the recommendation of the High Level Committee, constituted by Ministry of Labour to study the overlapping provisions, the Site Appraisal Committee, constituted under The Factories Act, 1948 should be empowered to give environment clearance to the initial location of industrial projects likely to be covered under The Factories Act, 1948.

7.16.2.14. As per the data of the department of industries there are about 93,000 small-scale industrial units in the state. These units are registered with Department of Industries and Commerce and only very few of the industries are covered/registered under Factories Act, 1948. The department of industries is looking after the licensing, development, training, marketing and financial aspects in respect of these units.
7.16.2.15. The Department of Health Services in the State has 8964 hospitals and dispensaries. The medical practitioners appointed in these hospitals/ dispensaries are mainly concentrating on diagnosis, prevention, control and treatment of the common diseases such as leprosy, tuberculosis, etc. It is suggested that all medical practitioners in these hospitals should also be exposed/trained in occupational health. Their extensive training in the field of occupational health will improve their skills in early detection or diagnosis of occupational diseases and will help them in recommending suitable action to the workers and employers. By this way, the status of occupational health of the workers employed in factories could be improved.

7.16.2.16. The Insurance Medical Services Department in the State provides the medical services to the workers covered under ESIC Act, 1948. The workers are referred to the hospitals for diagnosis and treatment. The suspected as well as confirmed cases of occupational diseases are not brought to the notice of Directorate of Factories. As a result, no case of occupational disease is reported under Section 89 of The Factories Act, 1948 (Amended 1987), which is contrary to the fact. It is suggested that a programme for close coordination between ESIC, ESI Hospitals (The Insurance Medical Services Department) and Directorate of Factories should be prepared for early detection, diagnosis and prevention of occupational diseases. This will facilitate taking appropriate preventive measures by the inspectors of factories in order to eliminate or control the causative working conditions in various factories. This will improve the status of occupational health of the working class in the long run.

7.16.2.17. In view of the frequent fire incidence in plastic industries during 2002 which resulted in fatal injuries an effective awareness programme on control of fire incidents could be prepared in collaboration with Fire Brigade Department, Industries Association and Directorate of Factories for the occupiers/managers and workers of the factory. This programme should include formulation of mutual aid scheme and establishments of emergency response centers in various industrial pockets of the states.
7.16.2.18. The extensive involvement of non-governmental organization such as Loss Prevention Association of India, National Safety Council of India, Indian society of Industrial Hygiene, etc. should also encourage taking up the activities in the field of safety and health on a large scale. The training should be three tiered: workshops/seminars and awareness programme wherein executives, supervisors and workers are separately trained. The need based training programme for each target group may be designed. The Ministry of Labour, Govt. of India and other international agencies like International Labour Organization may centrally fund these training programmes.

7.16.2.19. In view of the technological advancement and use of new manufacture techniques and advance machines, the law, for ensuring safety and health of the persons working in the factories is becoming more and more stringent and it is required that the effective implementation of safety measures is to be ensured at site. This situation demands a very specific training programmes/workshops for the officers of factory inspectorate, so that the real spirit of law is translated into action and thereby not only the work environment is protected but also the safety of workmen and material are ensured. Therefore it is recommended that specific course for environmental protection, safety at workplace and management of hazardous substances etc. should be designed and training to be given to the officers of factory directorate.

7.16.2.20. Awareness programme can be initiated by Central Board for Workers Education under Ministry of Labour, Govt. of India should conduct their awareness programme in collaboration with Directorate of Factories and Regional Labour Institute should design and conduct specialised training programmes on safety and health for the workers. The programmes should also be organized for state level trade union leaders for disseminating the information about safety and health awareness culture downstream. In order to review the status of safety, health and welfare in the factories and formulate action plan on the basis of findings from time to time, a tripartite state level committee on occupational
safety and health should be constituted under the chairmanship of Labour Minister.

7.16.2.21. It is strongly recommended that the Factory Directorate of NCT of Delhi region must be equipped with IT update of unorganised sector for effective data collection and data analysis in respect of health and safety, as it is a city which is host to maximum unorganised sector factories and cheap labour which can be exploited.

7.17. Industrial safety at ITM, Nashik.

7.17.1. Findings.

7.17.1.1. I, devoted most of my time to observe in detail, all aspects of safety management in ITM, Nashik. Safety of the employees is one of the major concerns of the company. Consequently it is paying adequate attention to the aspect of industrial safety and hygiene. As brought out earlier, it has formulated a well-defined safety policy, has constituted a safety committee and implements measures for prevention of accidents and fire. All statutory provisions are being implemented, possibly as a result of which the accidents have reduced considerably. The company has a comparatively higher percentage of educated and skilled workers, and by implementing an up-dated industrial safety programme, there have been no major accidents in the factory during the last seven years.

7.17.1.2. Some of the points observed from the point of view of safety and hygiene are enumerated below:-

- There is room for improvement in handling of raw material. The process can be made mechanical.
- The gradual rise in production, led to installation of additional machines on the floor. This has given rise to congestion and machine to machine ratio has reduced.
- Noise reduction and vibration requires to be reduced, as these are inherent in the manufacturing process.
• There is a need to have a medical care room, considering the mechanical nature of job in the company. The first-aid boxes may not be adequate to render the adequate aid. There is no ambulance vehicle or medical attendant or doctor in the factory premises. The arrangement of shifting a casualty to near by nominated doctor or to the ESI hospital by means of any available vehicle or medical attendant is not a neat one.

• The company has displayed adequate number of safety slogans and warnings, but they should be displayed where they catch the attention automatically.

• The company management organizes safety programmes in the month of May every year; it observes May 5th as safety day.

• Even though no major accident have taken place in the factory during the last five years, the management of ITM, Nashik is very alert and has kept all options of improving industrial safety in place.

7.17.2. **Recommendations.** It would be presumptuous to offer any suggestions to a company led by managing experts, but my analysis has given rise to some of them as listed below:-

• An appropriate expansion plan may be looked into, in order to spread out the machines so that the workers can make free movement in their work place. This will avert accidents caused due to diversion of attention or enhanced noise pollution.

• The noise being inherent in the manufacturing process cannot be removed, but its effect can be reduced by providing earplugs, lining can be given to reduce enhancement of noise.

• Persons involved in handling raw material and lubricants may be issued with safety goggles and hand gloves of good quality.

• The tools and equipment should be kept well maintained to reduce undesirable noise and vibration.
• Face shields of transparent plastic should be used while carrying out hazardous jobs, where face and eyes are exposed to such jobs as the grinding work.
• When the machine is cleaned, free of tools, rags and scrap, it is necessary to remove chips from a moving machine to reduce damage to the machine and prevent accidents.
• All workers should be trained to handle fire fighting apparatus.
• It is also required that the equipment inventory is updated, as the liberalised industrial policy has brought about the availability of latest machinery at competitive prices.
• On analysing some of the accidents with the safety committee, it was found that, whenever safety guards or devices are removed for repair or adjustments or to service the equipment, that particular machine should be marked by placard as “OUT OF BOUNDS or OUT OF ACTION” or “SAFETY GUARD UNDER REPAIR” in order to prevent accidental switching on.
• The safety procedure should be updated from time to time, at least once in six months.
• In order to encourage achieving “Total accident free atmosphere” the units with minimum accident or safety violation should be suitably rewarded financially.
• Reporting of accidents should be properly maintained and should be analysed and preventive steps taken.

7.18. Summary.
7.18.1. In the present industrial scenario, the managements of industrial organisation have realised the importance of safety and are paying much more attention to industrial safety than ever before. The statutory provisions made by the government, awareness of the workers and the employers about the advantages of a good safety programme have improved the safety of the employees of industrial organisations. Safety is a joint responsibility in which
employers and the employees both have their respective roles to play. Unsafe conditions should be removed and unsafe act avoided. This would prevent accidents and ensure safety of the employees and that of the plant and machinery.

7.18.2. Involving public in industrial safety will be a right step to address this aspect in the correct direction. It is necessary to recognize the role of safety management in bringing about organizational effectiveness. Safety management is only a tool to assist the organization with its primary objectives. It is also necessary to maintain the safety department’s contribution at a level appropriate to the organisation’s needs. While taking on industrial safety, human resource safety must be efficient if workers are to be maintained, retained and motivated.

7.18.3. In respect of industrial safety the principle for any company should be “It is the intention of the company to provide safe plant and a healthy working environment.” The safety policy of the company should be “Our policy is to institute every practical method for engineering safety into our processes and equipment and to provide protective clothing where necessary, to train employees in safe operating procedures and to vigorously enforce established safety rules”.

7.18.4. For industrial safety there is a great and pressing demand for training and awareness for workers, managers and the public. The goal of these quality circles is not only to provide a safe environment but also to see that the worker is involved in the industrial safety system. Industrial engineers employed a machine theory of man to study and design work, concentrating primarily on the technological side of work resulting in a highly standardised, economically efficient form of work. The efforts of any industrial unit should be concentrated to raise productivity and reduce industrial accident and loss through it. When considering about work design, it is a combination of man, machine and the
factory environment. Work problems usually originate within the individual workstation. As productivity and profitability are key issues in industrial circles, work system design is in fact the key element of industrial safety.

7.18.5. In the field of industrial safety social decisions play an important part. These relate to safety, health, and sanitation and noise control. There is a legal requirement for constituting works committees in the industrial establishments employing 100 or more workers, under the provisions of the Industrial Dispute Act, 1947. In most of the manufacturing establishments a safety committee is also constituted. Workers committee, in this, matters like health, safety can effectively supplement collective bargaining, and social security should form part. Through the total quality management techniques the industrial sector will be able to contribute immensely for better safety standards.

7.18.6. Safety means freedom from occurrence or risk of injury or loss. Industrial safety refers to the protection of workers from the danger of industrial accidents. For this, an effective safety programme is required to be conceptualized. Safety programme deals with the prevention of accidents and minimizing the resulting loss and damage to persons and properties. The most important function of the safety program is to pin point hazards, provide effective safety facilities and equipment to take prompt remedial action. Systematic procedures for making safety checks, inspections and investigations are absolutely necessary.

7.18.7. The top management should determine the safety policies of the company and it must be continuously involved in monitoring safety performance and in ensuring that corrective action is taken when needed. The management and supervision must be made fully answerable for safety performance in the working areas they control. Thorough training in safety methods of work should be given to all employees and they receive continuing education and guidance on eliminating safety hazards and prevention of accidents.
7.18.8. Managers can decide to use the safety of workers as a marketing tool for the company. Safety policy – the next step is to have clear-cut safety policy specifying the company’s goals and designating the responsibility and authority for their achievements. Key issues, which should be considered in the safety policy, is that, the safety of employee and public are of paramount importance, safety will take precedence over expediency, and every effort will be made to involve all managers, supervisors and workers in the development and implementation of safety procedure. It is also necessary to constitute an organization for safety by making safety committees composed of employees from across the country. This can make recommendations for eliminating specific safety and health hazards.

7.18.9. Top management’s prime responsibility is ensuring employee safety. Risk management, which is becoming very common these days, covers risks associated with the industrial safety, process technology hazard insurance, material management and environmental degradation.

7.18.10. Causes related to working conditions are, severity of work, working hours too long resulting in tiredness, weak health, fatigue and exertion of work. 7.18.11. Systematic training on industrial safety for the workers is imperative. Risk management team should be established in industrial areas/zones, it should comprise of medical staff and safety staff. Here adherence to the safety provisions of Factories Act, 1948 is of importance. The problem of safety must begin with the management as they have a commitment to safety and safety rules and merely constitution of a safety committee would serve no useful purpose. Showing concern of safety after the accident happens is not of much use. Strong trade unions can force unwilling mangers to undertake safety measures.
7.18.12. Safety posters with poignant illustrations and punching slogans may be put on walls near work places to arouse safety awareness among the workers. Arrangement for instructing employees about safe working methods and for training for workers in safety matters is necessary. It is also important to make work areas look pleasant, motivating, and more satisfying for the worker to work.

7.18.13. Studies have revealed that a small proportion of the workers in the industry receives a large proportion of injuries, workers in this group are said to be accident-prone. Transfer the accident-prone workers to less dangerous job situations.

7.18.14. A national inventory on capabilities and management of occupational safety and health will be of great help for designing and implementing various instruments to protect the safety and health of the large work force working in various sectors of the economy.

7.18.15. In the present industrial scenario, the management of industrial organization have realised the importance of safety and are paying much more attention to industrial safety than ever before. The statutory provisions made by the government, awareness of the workers and the employers about the advantages of a good safety programme have improved the safety of the employees of industrial organisations.
WORKER-SAFETY REALTIONSHP MODEL

Table 7.2.5: Findings and Suggestions
EFFECT OF TEMPERATURE ON LOADING TIME

Table 7.7.1: Findings and Suggestions
EFFECT OF TEMPERATURE ON DURATION OF REST

Table 7.7.2: Findings and Suggestions
EFFECT OF TEMPERATURE ON RELATIVE FREQUENCY OF ACCIDENTS

Table 7.7.3: Findings and Suggestions
EFFECT OF AGE ON ACCIDENT RATES

Table 7.2.4: Findings and Suggestions