CHAPTER VIII

RECENT MEASURES FOR INDUSTRIAL SAFETY AND FUTURE PROJECTIONS
Recent Measures for Industrial Safety.

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CHAPTER VIII
RECENT MEASURES FOR INDUSTRIAL SAFETY AND FUTURE PROJECTIONS

8.1. Introduction

8.1.1 In this part we will see the measures taken by the industry to tackle the problem of industrial safety and how the industry will meet its safety needs in the 21st century. What has not been done and indeed could not done is simply putting forward through a checklist of how to meet the safety needs since the issue is complex and safety needs are too diverse. The vision has been reached through an analytical process. This has involved conducting both qualitative and quantitative research and analyzing. Fayol described that one of the important activities of an industrial undertaking is security (protection of property and persons).

8.1.2. Our own constitution puts it down as a directive that we must provide safe and humane conditions of work for our industrial workers. We should do our utmost to see that conditions of life for them are adequate and they are well looked after. There must be integration between management and labour. What we must try to do is to prevent accidents as much as possible and encourage education in industrial safety. What exactly required are will, determination, effort and dedication.

8.1.3. In earlier days the accidents were said to be the outcome of workman’s carelessness, with management sharing little responsibility. Subsequently through appropriate labour legislations like Factories Act 1948, ESI Act 1948, Workman’s Compensation Act 1923, duly amended from time to time the companies set up and introduced many corrections and preventive steps. This led to a sharp decline in accident rates. Safety has been recognized as an integral part of the normal operating procedures and a definite responsibility of all supervisory personnel along with the employees.
8.1.4. Interaction between worker and the environment leads to occupational health hazards. To minimize health hazards, there is a need to monitor the worker’s health and also working environment. Personal protective equipment or safety equipment is provided to the workers in order to enable them to carry out their duties where the hazards involved in the operations cannot be eliminated.

8.1.5. Extensive statutory provisions have been made in India for prevention of industrial accidents and thus enhancing safety of industrial workers. These provisions are contained in the Central laws and have been further supplemented by the states. The government has passed a number of Legislation on the subject. However they are not being followed in letter and spirit. The anomaly needs to be rectified. A good safety program can reduce occupational injury/illness and the operating costs, which in turn contributes substantially towards increased productivity and improved profits.

8.1.6. Based on studies carried out by the management expert’s appropriate labour legislation Workman’s Compensation Act 1923, in tune with the requirement of time was adopted by industrialized nations. Other nations also adopted this Act with the aim of reducing industrial accidents. Later on further studies carried out brought out the exceptions in this Act and labour legislations like Factories Act 1948 and ESI Act 1948 were adopted. These acts covered all possible measures. These acts were constantly reviewed for further prevention of industrial accidents and thus enhancing the safety of workers. After the Bhopal gas tragedy, additional provisions to cover hazardous operations were included by legislations as a result of detailed study carried out by management and legal experts. A study was carried out on the Challenger Space Shuttle accident of 28 January 1986 in which seven people died. This revealed differences between engineers and managers, upper and lower levels managers, insufficient provision
for upward communication outside the chain of command. This led to a sharp decline in accident rates. Safety has since been recognized as an integral part of the normal operating procedures and has a definite responsibility of all supervisory personnel along with the employees.

8.2. Challenges Ahead

8.2.1. For the industry to understand safety needs we must first look at ourselves as we would look at any other commercial market and hypothesize where we will be in the next millennium. Our vision for the industrial safety needs in the 21st century centers around four key issues. We see an industry which:-

- Continues to develop by broadening its scope;
- Becomes more closely involved with industrial safety needs as research acknowledged as good business practice;
- Will be drawn into decision support outside pure research as experts achieve value added advisor status;
- Becomes part of wider defined information.

8.2.2. Broadening Scope

8.2.2.1. The industry has grown, and continues to grow, in part due to technological advancement and innovation but also, through broadening its scope of what it does. Thus, we see our industrial development as a series of concentric rings with each one representing an extension to the existing one. We would however stress that these rings only represent the extension of what we do and are not intended to illustrate respective leaps.
8.2.2.2. At the core is the gathering of primary information through interviewing which was where our industry began. Extending beyond the interview, analysis was added. With factual reporting of findings the industrial & technological development grew along with innovations to include what we have termed as factual aspects.

8.2.2.3. In 1990s, there has been pressure on experts to go further and not just report results but to provide genuine interpretation of the same, for obtaining the applied safety norms. Currently, our evidence suggests that those who want greater involvement by the state are extending industry further. We have termed this new phase the ‘Broader Remit’. Here state gets involved earlier than that it used to be, stay involved much later and through out the process adopt a more advisory one. Through our research we identified this broader remit as an area in which we foresee considerable growth and this will be a key differentiator for the industrial safety in the new millennium.

8.2.2.4. Today we have a diverse industry with a wide range of industrial equipments and process involved in some or all of these areas and the glue, which binds us all remains, the collection of primary data. Although we have represented industry as a series of concentric rings we see these as three-
dimensional. Thus within every level our offer is multi-dimensional and the industry has grown onwards and upwards by incrementally extending what it does. As this aspect of industrial safety has extended its scope we have come closer to other aspects of labour welfare and human resource management which have grown in the similar ways. As a result, we can find industries competing directly with other organizations whose roots are in another field because in these areas the skills required are held by different agencies. The onset of this overlap due to environmental aspects and social responsibility, we have termed it as the point of convergence.

8.2.3. Closer to Industrial Safety

8.2.3.1. As the scope of what our industry does has broadened, management’s concerns have grown closer to safety concerns. In future, this will be on the increase. The broad range of hazards now developing has brought us into contact with a more diverse range of safety needs. As more and more business professional has become exposed to the benefits of zero industrial accident syndromes, its use and importance throughout industries has grown. Open-minded organizations have taken industrial safety to their key result areas and they are now using it to make a difference to their productivity.

8.2.3.2. Here two examples of research conducted and impacted at the core issues of industrial safety are narrated.

8.2.3.2.1. Case Study 1. We wanted to undertake a thorough review of safety aspects in certain industries. Therefore there was a need to carry out a research exercise which would provide:
  - Findings which are actionable;
  - A process, which would create, buys in to solving the issues raised by the research.

8.2.3.2.2. It is the latter element that is particularly forward thinking and demonstrates a new way forward for safety research studies. The project began with a qualitative phase among both management and workers.
Firstly, depth interviews were conducted with all members of the management. This allowed us to both evaluate how management currently saw safety provisions and educate the workers and staff internally in a way, which would create interest, and enthusiasm in what findings might be. Next we held workers group discussions and some members of the management attended these. The quantitative questionnaire used a trade-off technique to assess how workers viewed different safety issues and how they would trade-off different levels of safety to improve existing standards. For this an interactive workshop was held.

8.2.3.2.3. Case Study2. In this a regular worker satisfaction monitoring was done. Analysis was carried out for a period of five years.

8.2.4. Valued Advisor Status
8.2.4.1. Firstly the information collected and the data added were widely used in the industry for application and in-house analysis. Secondly, it was perceived that implementation is very expensive and thirdly, the most valuable provider of information ahead of management consultants databases organizations, advertising agencies and a diverse range of other specialists. Premium position of information provider can, in our view, lead to industrial safety research suppliers achieving valued advisor status. Here the research provider becomes an important soundboard whose opinion is valued across a wider range of issues beyond productivity. Based on the level of trust and credibility established valued advisors can become involved at the heart of industrial safety strategy.

8.2.5. Wider Information Market
8.2.5.1. Among these which achieving valued advisor status we can see an overlap with many industries. Each of these industries has a core expertise. As practitioners become more involved in activities, which move away from their core, the extent of convergence with own industry increases.
8.3. Steps to Meeting Safety Needs in the Next Millennium

8.3.1. The vision of our industry in the 21st century, we must consider how the industrial safety needs will actually be met. In the past, researchers have been guilty of seeking a set format within which they can operate. They have quietly been busy pushing back the boundaries in terms of research techniques, developing improved response mechanisms, etc. However we believe that industrial management have neglected the need to think more laterally about the industrial safety concern, the way they apply the compatible safety system with the industrial and technological advancement envisaged and what differentiates them with advancement of first and second wave.

8.3.2. While it might be unfair to state that researchers have actually sought to follow exactly the same path as the management, it might not be going too far to argue that they have followed very similar routes and have actively, as one body, sought to find the direction in which ‘research should go.’ Fortunately, this has not led to a situation where the researchers are all similar; in fact, now more than ever, the research world is a plethora of many different organizations holding quite different values and visions and offering a vast range of steps to ensure ‘an accident free industrial environment.’ However, this excellent technological upgradation of industrial safety systems, its range, quality and service will not be fully recognized by the labour until the individual businesses within the industrial setup recognize the need to understand the collateral damage, seek differentiation, identify their own USP and communicate the benefits in a way that is credible and professional. This will lead to the recognition that there is not an all encompassing set of safety needs which the industry can sign up to, but that each individual organization and business enterprise must recognize the needs of their particular firm while effecting the
industrial safety aspects. They must then identify how to meet those needs within their own business philosophy and approach.

8.3.3. It is natural that, there will be a set of core needs, or hygiene factors, and the industry is technologically advanced to recognize these and realize that there is substantial effect on the productivity of the firm. Some of the aspects are:

- Assessment of collateral damage;
- Response to emergency;
- Latest know how;
- Absence of technological gap;
- Installation of quality safety equipments at work;
- Efficiency;
- Meeting deadlines;
- Monitoring; and
- Education.

8.3.4. We would argue that it is these needs that standards such as BS7911 should seek to address. It is important that we recognize this core attributes as a basic requirement and the foundation stone for ensuring a quality industrial safety system. In this chapter what we are trying to establish is how to identify the elements of safety needs for the future, which are critical to the success of the individual business. These will then enhance our industrial safety system beyond the present level. For this, we believe that there are five key steps to meeting the safety needs:

- Awareness about industrial safety hazards, individually as well as collectively.
- Corporate self-awareness.
- A truly worker-oriented approach.
- Considering expenditure on safety as an investment.
- Social audit with an offer developed to meet the need.
8.3.5. **Step 1: Awareness**

8.3.5.1. Industrialization has brought prosperity to mankind, but at the same time it has also brought in certain kinds of hazards. With the third wave of progress of mankind, the hazards faced by industrial worker have increased manifolds. Proper safety measures are a necessity in order to obviate avoidable accidents, which invariably results into injuries to persons, damage to equipment and machinery and cause financial loss to both employees and employers. The human angle for providing safety to industrial workers is important. Awareness of industrial hazards is equally important. There are new types of dangers, which are associated with the industrialization, which are in terms of danger to life and health namely mechanical, electrical, chemical and radiation hazards. When safety planning and safety measures are lacking, industrial operations may not remain under full control, schedules may get disrupted and cost may increase. Hence the importance of high awareness level for all personnel on the industrial and technological advancement cannot be relegated to a routine matter status.

8.3.6. **Step 2: Corporate self-awareness**

8.3.6.1. Before beginning to understand the safety needs as a future projection, the corporate must go through an internal process of self-awareness. A vital element of meeting safety needs is achieving a true and realistic understanding of the industrial process and the environment in which it exists and to appreciate the boundaries within which we operate. It is also important to appreciate that in order to develop, we must extent these boundaries within which we operate, but not without first ensuring we can establish within these new areas.

8.3.6.2. When we have identified the segment or segments of the future industrial safety projections commensurate with the industrial development, it will become clear what our industry should expect the danger to safety and what they need not expect in the times to come. Managing these expectations will take us a long way to meeting our industrial safety needs.
8.3.6.3. Having identified exactly the requirement of safety and its modernisation as well as investment in order to meet the basic safety norms as applicable to a particular industry, we will carry out an audit, thereafter we will immediately start to recognize the benefits of the proposed safety management and its limitations. These limitations have to be now viewed against ‘cost of accidents’. Any industry with strong self-awareness will prevent manufacturing process outside the true safety standards. We believe that this will have a more positive effect than a negative impact.

8.3.6.4. Next, we must take a hard look at our industrial safety philosophy and approach. Do we have one? Is it embedded in our manufacturing process? Having understood what we have established, we must of course gain a perspective relation to the future projections, as it is in this context that our productivity should be judged. Consequently, this positioning will directly impact upon the extent to which we are deemed to have met our safety needs.

8.3.7. **Step 3: A truly worker-oriented approach**

8.3.7.1. Assuming that the steps 1&2 have been completed, the next issue to address is the best way to achieve a truly worker-oriented industrial safety consciousness. This will require a real understanding of our processes, their sub process within these and their intricacies across the whole range of industrial activities. In short a worker-oriented approach is required.

8.3.7.2. It is important to remember that, as we move towards a future such an upsurge of technology, our safety needs will defer dependent on the particular industry and manufacturing being undertaken and that the knowledge of what we offer may be incomplete. Furthermore we may well have a very broad range of technological development and innovation and will need to recognize the different industrial safety needs relating to each and every element of our industrial activity.
8.3.7.3. If possible, we need to know how the worker sees and understand these, what they expect from the management and how their perceptions differ with the change in the industrial structure and increased automation.

8.3.7.4. In seeking to fully adopt a worker-oriented approach, we may find that either the safety system we have, or the way we choose to implement, cannot be flexible enough to meet all the concerns of our workers possibly due to technological gap or awareness. Identifying that there are certain types of procedures with which we cannot ensure an accident free process is not an acceptance of failure but recognition of fact. To try to meet the contemplated needs of the worker will in fact cause a dilution of our overall safety system with which we have a much better fit.

8.3.8. **Step 4: Considering expenditure on safety as an investment.**

8.3.8.1. This aspect can be aptly started with a quote from Mr. RB Blake, “Accidents are expensive. Substantial savings can be achieved by preventing them.” Every year a large number of employees get injured due to accidents. Therefore there is a need to implement necessary safety measures in the industrial organizations. The safety requirements vary according to the hazard problem.

8.3.8.2. When safety planning and safety measures are lacking, industrial operations may not remain under full control, schedules may get disrupted and cost may increase. To quote Mr. Blake again “…the main driving force behind the industrial safety movement is the fact that accidents are expensive. Substantial savings can be achieved by preventing them”. Most of the management has a sincere, humanitarian interest in their employees; they emphasize on proper safety management, but also willingly allocate reasonable amount of money for safety.

8.3.8.3. The term ‘cost of accidents’ is a misnomer. Accidents have lot of related issues, and hence it cannot be assessed or computed in terms of currency. In industrial circles this term is associated with the financial loss to the
management arising out of accidents at work place. A schematic and systematic analysis of the losses due to accidents have helped in the past to project the cost- benefit relation and motivate employers to invest in safety programs. An idea of cost also helps to decide priorities for allocation of resources. The cost of accidents has two components namely, the tangible costs which can be measured in currency and the intangible costs which can be recognized but not measured.

8.3.9. **Step V: Social audit with an offer developed to meet the need.**

8.3.9.1. It follows logically that having been through a process of self-definition and industrial safety recognition, that the fifth step must be to integrate these four steps and the two pieces of information. Thus our offer be it the process, the safety organization or safety system, is developed in such a way that it meets the needs of the personnel with whom the hazardous process are applicable or with which they work. It was in this framework we developed the worker-safety relationship model for the business.

8.3.9.2. Having tailored the safety measures to meet the needs of our current and future industrial safety requirements, it is vital that we are transparent in our communication to the workers so that they clearly understand what is expected from them. This must include hard issues and soft issues. We must then ensure that we can and do meet the desired standard.

8.3.9.3. Within all of our different industries, we will have different process, and values and thus the way we meet our safety needs will be quite different. It is important that we strive for and value these differences, as it is this, which provides us with choices.

8.3.9.4. It is very important to recognize the different emphasis of safety requirements along a spectrum of need and to relate these different requirements to the safety setup we wish to develop. To meet some of our safety requirements, we will need to invest in technology or system support,
whilst to meet other safety needs the investment may be training current staff with new skills or recruiting new staff to fill skill gaps.

8.3.9.5. It is appreciated that as an industry, we tend to be more realistic in recognizing when replacing than realizing when a different skill set is required amongst the workers. Furthermore, we must recognize that whilst a researcher’s skill set can certainly be added to in order to meet workers safety needs, it is not reasonable to expect them to become a completely different person, while still continuing their current role.

8.4. WORK SHEET: COST OF ACCIDENT

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<tr>
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<th>Lost time of injured</th>
<th>Total cost</th>
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<tbody>
<tr>
<td>1</td>
<td>Lost time of injured</td>
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<td></td>
<td>Time of accident</td>
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<td>Time when left for first aid</td>
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<td></td>
<td>Date and time of return to work</td>
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<td></td>
<td>Time lost</td>
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<td></td>
<td>Average cost per hour</td>
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<td>Total cost</td>
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<td>2</td>
<td>Lost time by other employees</td>
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<td></td>
<td>No of employees of the department</td>
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<td>No of employees who came to the spot</td>
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<td></td>
<td>Average time they remained away from work</td>
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<td></td>
<td>Time lost</td>
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<td></td>
<td>Average cost per hour</td>
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<td>Total cost</td>
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<tr>
<td>3</td>
<td>Lost time by supervisors/executives</td>
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<tr>
<td></td>
<td>Average cost per hour</td>
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<td>Total cost</td>
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<td>4</td>
<td>Lost time of the machine</td>
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<td></td>
<td>Average cost</td>
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<td>Total cost</td>
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<tr>
<td>5</td>
<td>Damage to material or equipment</td>
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<tr>
<td></td>
<td></td>
<td>Total cost</td>
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</table>
8.5. Impact on the future industry

8.5.1. It is felt that the way we meet the safety needs will strongly affect the way the industry moves towards into the 21st century. In the past, many debates and initiatives have been stalled, we believe, in a search for commonality. We must all recognize that all personnel have a common interest in the industry being successful.

8.5.2. In the next millennium we must all recognize that only freedom to voice the security concern will improve the industrial safety setup. In future the projections are: -

- The need for good quality safety setup becoming greater and the scope of requirements becoming both broader and deeper.
- The information needed will be good quality.
- Boundaries becoming less discrete and a whole range of other sectors impacting upon each other’s business.
- The thrust for automation will be high and commensurate with it is the dangers if the workers are not skilled.
8.5.3. Industry has a vital role in the society to prevent collateral damage as well as to save its workers. The fact is that wherever there is an opportunity there will also be threats and, in our opinion, the greatest of these will be if we resist change, hold on to the past and close our minds to future possibilities.

8.6. New threats of the millennium

8.6.1. The present millennium has witnessed a change in the ethos of people as a result the business has become competitive and the lust to make more and more wealth has become the prime goal. This has positive and negative aspects. The positive aspect is that the ability of human being is exercised to the maximum. In this innovations and new inventions are likely to emerge. This would contribute to the overall growth and prosperity. The second aspect is that industrial accidents will be understood more seriously and safety system as a whole will elevate itself under the management’s patronage. Thereafter we have to concede to the fact that, money spend on safety will be considered as an investment and not as an expenditure. The social audit system will also be effective so as to ward off any lack of social security sense. The other side of the coin is rather bleak, the reason is an irresponsible management can always circumvent the system or corrupt the institutions which are responsible to ensure these aspects and create irreparable damage to its on factory or the industrial estate by not adhering to the safety norms.

8.6.2. The next issue at hand is the role played by the terrorists and other organizations which work for their organizational goals which are catastrophic, like, the attack on twin towers in USA. These events not only reduce the economic potential but also create loss and sufferings to millions of people. While taking into consideration the future projection for industrial safety this also plays an important role.
8.7. Future trends

8.7.1. Today concept of industrial safety and social responsibility of managers in India is a beleaguered one. They are just about tolerated by the public because they do not have the economic liberty and a secure job is a prerequisite for getting salaried job, or for getting married. There is little expectation that industry will whole-heartedly invest in industrial safety, or safety inspectors will be taken seriously as the custodians of safety legislations.

8.7.2. Industries are considered as places where a person operates with the narrow motive of profit making, but are otherwise not considered as vibrant pillars of the society. Though the workers and public in general view the management at large with disdain, there are some stellar exceptions to this rule. Yet, these industries too get tarred and feathered with the same brush by a very unappreciative public. This is primarily because all industries in India, without exception, have no time to relate to the non-specialized world outside. Consequently they do not have the public in their corner, which is why they are constantly at the whim of politicians and bureaucrats big and small.

8.7.3. Most of the Indian industries do not appreciate the importance of industrial safety and linking with the rest of the society. They stand aloof in the belief that the mountain will always come to Mohammed. In the initial years of independence, when worker safety enjoyed a certain degree prestige in the country, trade union activists did not pay any attention to the industrial safety and instead aimed for political positions. As the money power increased its hold even the status of workers got relegated further. Indeed they won early rounds, but their isolation from the public is now hurting them.

8.7.4. Politicians have intuitively sensed this and are, therefore emboldened to impose all manner of outrageous modifications on labour law. For safety system to function as true centers of labour welfare and productivity enhancement, they
have to win the public to their side. This does not mean dilution of standards, but rather an elevation of research and education programs that are then meaningfully communicated outside the portals of industry.

8.7.5. Indeed, without an appreciative audience, it is impossible to raise resources for industrial safety. This holds true for private and public investments. Industries in India should realize that the public is an important stakeholder. This would fundamentally alter the way industries are run in this country. Management must recognize that their core competence in industrial safety management is by advancing knowledge through critical research. These advances must be made available to public and others through lectures, science exhibitions, popular literary festivals, aesthetic displays and so on.

8.7.6. The community around industries would then feel a sense of belonging with the institution, which ultimately is the best guarantor for an unbiased and unprejudiced advance of safety knowledge.

8.7.7. A sense of engagement does not mean identification with partnership. In fact, this is the most tempting, and also dangerous, choice. When the public becomes an important stakeholder of the safety system, the management will also device ways of meeting public expectations, and even raising public aspirations. New safety schemes will be designed keeping in mind the changing needs of the day and special attention will give to the unorganized sectors. None of these should entail a dilution of standards. They would demand instead greater imagination, and a more profound intellectual engagement with the industrial and technological advancement.

8.7.8. Once the public is accepted as a legitimate stakeholder, workers and researchers have a solid bulwark to protect them from political predators. Further by accepting that the public has an integral role to play in the industrial safety,
there is a constant pressure to upgrade the safety system, research and awareness standards.

8.8. **Industrial safety & Hygiene Activities by Government agencies.**

8.8.1. The technological advancements and development of complex and hazardous processes, the management of Industrial Safety and Health (IH) has become a vital issue. The threat of occupational hazards, particularly in the chemical and petrochemical industries is of great concern, specially, for the people who are responsible for policy planning and designing of instruments and other interventions for protecting the large workforce in the country. The major problem faced by the policy planners is the non-availability of timely information on vital areas such as occupational injuries and diseases, infrastructure available at the unit and the state level for taking up awareness, promotional and developmental programs.

8.8.2. The Directorate General Factory Advice Service and Labour Institutes (DGFLASHI) should be tasked and sourced as they are the premier agency which is relied upon by Central and State Governments for a variety of information pertaining to occupational safety and health. At present the facilities available in our country do not allow as quick a response as is often needed. Further, substantial increase in the number of registered factories, introduction of sophisticated modern technology and complexities in plant and equipment design have brought many constraints in the area of Industrial safety and Health policy making at national level. For planning of effective strategy on control of accidents and ill health, timely and reliable information is vital.

8.8.3. At the central government level the Ministry of Labour should be deeply concerned over the non-availability of industrial safety and health information for policy planning. To overcome this deficiency the scheme “Setting up of a Data Bank-cum-Information Centre” at Central Labour Institute, Mumbai was
proposed during the 7th Five-Year Plan. The Planning Commission approved the scheme in the 7th Plan. The scheme was continued in the modified form during the 8th Plan period with the title “Development of Safety & Health Information System and Data Bank”. During this period information systems were installed at the Central Labour Institute and the three Regional Labour Institutes. Data bases in the area of Major Accident Hazard Installations, hazardous chemicals, national specialist, ship inspection, Parliament question; FAS Performa, Factories Act Amendment; Awards, etc. were developed. Information on Material Safety Data Sheets was disseminated to the industries and agencies related to occupational safety and health.

8.8.4. The DGFASI WEBSITE, which was initiated during the 9th Plan period, should be made use extensively. Here abstracts of safety and health technical reports of DGFASLI were prepared, a national directory of organization profile was compiled, and the statutes related to safety and health was computerized. Publication of INDSOSHNEWS a quarterly news bulletin of this organization was started and till date 14 issues have been published, work related to translation of International Chemical Safety Cards in three Indian languages—Hindi, Tamil and Bangla was initiated with a view to make the cards available on the website.

8.8.5. The present Plan Scheme “Development of Safety & Health Information System and Data Bank” being operated during the 10th Plan envisages creation of the National Inventory on Occupational Safety and Health Information to widen the information base and making available the information at one source to help in the activities specially those related to policy planning directed at improving the occupational safety and health of the workers. The national inventory besides having OSH information state-wise collected through respective State Inspectorate will also include the following:-

- Abstracts of I&H national literature
- I&H literature acquired from abroad
- Factory Advice Service databases
- Dock Safety related databases
- Details of MAH installations, hazardous chemicals, national specialists, etc.
- Scanner based data base on accident events, etc.

8.8.6. **Project at hand with the Government.** The projects at hand with the Government in the field of industrial safety and hygiene is to develop all the five Labour Institutes under the DGFASLI Organisation as the action resource centers for collection, processing and dissemination of Industrial Safety and Health (IH) Information with a view to create an Inventory on IH Information for the prevention of Occupational Injuries and health problems in the country.

8.8.6.1. Development of Occupational Safety and Health national inventory and connectivity between State Factory Inspectorate and DGFASLI. The inventory will cover information pertaining to manufacturing activities covered under the Factories Act 1948, Occupational injuries and diseases in the sector, management of OSH at unit and state level.

8.8.6.2. Creation of occupational safety and health information action resource centers at five labour Institutes by providing them with computer hardware and software facilities and also by involving other organizations specialized in the field of safety, health and environment to participate in the project. Dissemination of information through electronic media using the latest information technology for creating public awareness about safety, health and environment is required. Dissemination of information through conventional media to reach the large workforce including decision-makers not having access to the information technology should also be undertaken. This will include publication of newsletter, technical reports, safety cards etc.

8.8.6.3. Creation of databases containing information on handling of containers and dangerous goods, hazardous installations, inland container depots, minor
and intermediate ports, competent persons, panel of doctors in ports, etc. Dock Safety division will participate by way of providing raw data collected from the field.

8.8.6.4. Effective implementation of the 12 point Minimum Agenda for E-Governance. This includes providing computers up to the level of Section Officers, setting up of LAN, training of all staff on computers, procure and use office automation software, website updating and maintenance, developing software packages for delivery of services and information, etc. As information technology is developing very fast, the latest hardware and software available during the plan period will be acquired.

8.8.7. In order to create a national inventory of IH information, the following activities should be envisaged to be carried out in each State:-

- Identification of support information
- Location of sources of information
- Creation of suitable mechanism for information collection
- Selection and use of appropriate technology for processing and storage of information.
- Development of procedures for user friendly dissemination of information.
- Development of suitable infrastructure for achieving the above.

8.8.8. The five Labour Institutes as nodal agencies is carrying out the various activities towards this direction. The Regional Labour Institute, Faridabad, is the nodal agency for the five states viz., NCT of Delhi, Chandigarh, Haryana, Punjab, Jammu & Kashmir, and Himachal Pradesh. The National Capital Territory of Delhi was taken up for the collection of data during the year 2003. Subsequently the States of Haryana, Chandigarh, Punjab, Jammu & Kashmir, and Himachal Pradesh will be taken up for the similar type of study. The Task Force comprising of the following officers and staff of Regional Labour Institute, Faridabad and the
office of the Chief Inspector of Factories, Chennai, was constituted for carrying out the study in hand.

8.8.8.1. This report aims at studying the existing system of recording and notification of occupational accidents and diseases at unit, district and state level in the NCT of Delhi, identifying the areas for improving and establishing the system, which is in line with the systems existing in other countries. The activities of the project have been divided in the following categories:-

- Background information about National Capital Territory of Delhi.
- Economic activities.
- Activities in manufacturing sector.
- Occupational injuries and diseases - Deals with the analysis of the occupational injuries- fatal and non-fatal and cases of occupational diseases in the manufacturing sector.
- Management of occupational safety and health - Deals with the infrastructure and resources available at the unit level and at the state level for managing the crucial issue of occupational safety and health.
- Resources available and needed for the management of occupational safety and health.

8.9. Management of industrial safety, health & environment system in NCT Delhi

8.9.1. Within the scope of the present study an analysis is being conducted with an aim of assessing the capabilities available with the national capital territory of Delhi and also the emergency preparedness of the State in case of any major industrial accident or disaster. For the study different Central & State Government institutions, NGOs were surveyed. However, the institutions not working in the area of occupational safety, health & management are not covered. As the study is conducted in the National capital territory of Delhi only, institutions /organizations working for the /in the other neighbouring areas such as Noida, Faridabad, Gurgaon etc., were covered.
8.9.2. The data collected by the study team members were analyzed. The major findings are as under:

- The State of Delhi has witnessed a major shift in the industrial policies due to the directives received from Delhi High Court and Supreme Court. Most of the large, hazardous industries have been shifted to the neighbouring States such as Haryana, Punjab and U.P.
- The industries employing less than 20 workers with the use of power are growing in number and the larger industries employing more than 100 workers are reducing.
- Presently only one industry employing more than 1000 workers is working in the NCT of Delhi and no industry is left in the State of Delhi employing more than 5000 workers.
- Delhi being the capital State of the country has got number of organizations working in the field of occupational safety, health and environment under different ministries, departments of the State and Central Government.
- Off-site emergency plan for chemical disaster in the NCT of Delhi is developed by the Central Crisis Group under the chairmanship of Chief Secretary of the Govt. of NCT of Delhi.

8.9.3. Recommendations

- The State of Delhi is having a very large number of small-scale industries in the densely populated localities. Most of these industries fall under the category 2m(i) which denotes the factories employing 10 or more workers and working with the aid of power. In order to lower the cost of these machines the owners of these units may intend to ignore the safety and health aspects, which may result into an occurrence of the accident. Therefore, it is suggested that the organizations specially working in the area of small-scale sector should take up the issue of developing and suggesting basic minimum guarding in the existing and new machineries.
Organizations like National Small Industries Corporation Limited who are running hire purchase scheme for a specific group of owner/managers should ensure about the occupational safety aspect of machines and tools hired and purchased by them.

NCT of Delhi being the capital of the country is having very important organizations such as Office of the Chief Inspector of Factories, Oil Industry Safety Directorate, Centre for Occupational and Environmental Health, Department of Explosives, Pollution Control Board, National Small Industries Corporation Ltd., Delhi Productivity Council, Delhi Fire Service etc. These organizations can develop a common platform where matter of occupational safety and health can be discussed and policies at the State level may be formulated which may be followed as a model by the other States.

In order to achieve this objective a 1-2 day Seminar may be organized by Regional Labour Institute, Faridabad. During the seminar/workshop specialist and experts working for the organizations involved for improving the safety and health of the people at work.

8.10. Safety policies for accident free environment. One of the aim step forward for this thesis was to analyse the causes of accidents and recommend procedures which will facilitate an accident free environment. The analysis carried out and covered in Chapter VI revealed the areas to be concentrated upon. In this regard Tables 6.5.4., 6.5.5., 6.5.6., 6.5.7., 6.5.8., 4.4.14.3., Fig 4,5,6,,7,9,27,28, gives the clear pattern. The project began with a qualitative phase among both management and workers. Firstly, in-depth interviews were conducted with all members of the management. This allowed us to both evaluate how management currently saw safety provisions and educate the workers and staff internally in a way, which would create interest, and enthusiasm in what findings might be. Next we held workers group discussions and some members of the management attended these. The quantitative questionnaire used a trade-off technique to assess how workers
viewed different safety issues and how they would trade-off different levels of safety to improve existing standards. For this an interactive workshop was held. Simultaneously regular worker satisfaction monitoring was done. Analysis was carried out for a period of five years. Thereafter safety guide lines industry and operations wise was formulated after deliberation with MECON, Ranchi.

8.10.1. General guidelines.

1. All employees are individually and collectively responsible for safety.
2. Copy of the safety measures should be handed over and explained to the employees.
3. A nominated person should be provided to look after the safety aspects pertaining to each work and maintaining close liaison with servicing agencies.
4. Safety posters and notices should be displayed to caution workers against possible hazards.
5. Adequate number of portable and heavy fire extinguishers shall be kept at site to fight any outbreak of fire.
6. Periodic inspection by safety engineering department, labour officer, engineer-in-charge of the department or the representatives.
7. No workmen should be permitted to meddle with any plant equipment. Employees should be forbidden to walk through or across any operating unit unless their duties require them to do so or they are authorised to do so.
8. In gas hazard areas, necessary gas safety precautions should be followed.
9. Smoking or use of naked fire should be prohibited within the area where inflammable liquids are stored handled or used, or loading/unloading operations are performed.
10. No employee should come to work while they are under the influence of intoxicants.
11. Wearing loose clothing should be prohibited, e.g., dhotis, lungis.
12. Stick to roads and regular passages, use over bridges.
13. Compressed air should not be used for removing dust from the cloths. Also compressed air should not be blown on any one as it may result in severe injuries.

14. Nobody should take rest below any dumped slag boulder, excavated earth, and gas hazard areas.

15. Trade certificates for specialized jobs are to be ensured for workmen performing such jobs.

16. Good housekeeping. Loose materials, scraps, tools should not be allowed in work areas. Wooden scrap yards should be kept well away from any gas cutting and welding operations. All combustible scrap should be disposed off safely. Adequate lighting should be provided in and around all work areas.

8.10.2. Personal safety appliances. It is obligatory on the part of all workers to wear proper personal appliances to protect themselves against the anticipated hazards.

1. Workers involved in mixing ashaltic materials, cements and lime motars shall be provided with protective footwear and goggles.

2. Protective goggles and dust respirators should be provided to workers engaged in whitewashing, stacking of cement bags etc.,

3. Those engaged in welding should be provided with welder’s protective eye-shields.

4. For chipping work, chipper’s goggles should be used.

5. Manhole covers are opened and ventilated for an hour before workers are allowed to go in. safety belts should be provided.

6. Workers going into the inspection chamber shall have gas masks, gumboots, and rubber gloves while working inside.

7. All PPE should be made available at the work area.

8. Safety boots and helmets must be used by the employees working inside the works.
9. Safety goggles must be worn while grinding whether by means of portable electrical grinder or working on a table with grinding machine.

10. Gloves must not be worn while working on moving machinery particularly on grinding wheels.

11. Safety belts must be worn when working at heights. The minimum diameter of lifeline should be 3 / 4 "for manila rope and 1 ½" for nylon rope.

### 8.10.3. Safety in civil works.

Construction activities do constitute several processes; hazards mainly due to the reason that construction activities start in areas which are not only new to the workmen, but also non-conventional. Any two construction activity sites are never identical to each other. Certain safety measures are listed below:-

1. **Excavation – earths and rocks.** Excavation work presents its own peculiar problems; the serious hazards being falls and falling objects. Excavation should be planned taking into account soil condition, water table and underground communication facilities. The underground electrical cables should be suitably marked, so also the position of sewers, water supply lines, gas pipe lines, and telephone cables etc., Sides of every excavation should be securely supported by adequately braced timber of suitable quality or other materials unless the sides of excavation are slopped to a safe angle. The slope shall not increase the angle of repose of the particular soil. Excavation work below the foundation should not commence unless adequate steps are taken to prevent danger to any person employed from the collapse of the structure or fall of any part thereof. Along slopping ground sides of slopes of excavation shall be maintained in a safe condition by scaling, benching or barricading. Trench excavation is hazardous because of constricted workspace. Excavation if over 1220-mm depth shall be shored, sheeted or braced. Materials used for bracing shall be of good condition. Excavated or other material shall not be stored within 1500mm or half the depth of excavation. In all trenches, 1500mm or more in depth, ladders
extending from the floor or trench excavation to at least 1000mm above top of excavation shall be provided and so located as to provide means of exit without more than 15m of lateral interval. Excavation areas shall be adequately lighted for night-work. Sub-soil accumulation should be pumped out from the excavated area. Excavation pits should be so cleared that the adjoining structures are not endangered. Warning signals should be placed at all approaches and exits of excavation sites. Every accessible part of an excavation pit or opening in the ground into which a person is liable to fall should have a suitable barrier of 1m. No material or load shall be placed, stacked or removed near the edge of any excavation. Adequate measures shall be taken to prevent workers and spectators from approaching dangerous areas.

2. Back filling around tunnels and basements should be uniformly on all sides. Materials dumped against walls should not endanger stability. While withdrawing piled materials, no over hanging should be allowed.

3. All demolition work should be carried out under the supervision of a competent person experienced in demolition work. During demolition work all electric cable, gas, water and steam pipes shall be disconnected. Steps should be taken to prevent collapse of any structure. Prevent danger to person employed from the risk of fire, or explosion due to gas, vapour and flooding water from water mains, sewers and culverts. All the roads and open areas adjacent to the work site shall be closed or suitably protected. Before commencing demolition, adequate shoring to prevent accidental collapse of any part of the structure should be taken. Use warning signs and red lights, when there is danger to public. Debris should be removed at the earliest.

4. **Scaffoldings.** Scaffoldings of adequate types to be provided for work that cannot be done from the ground or from part of a permanent structure. It should be ensured that there is safe means of access to every place at work. There are various types of scaffolds namely; independent, put-log
type, rolling scaffolds, outrigger scaffolds, swinging scaffolds. Scaffolds including supports shall be of good construction and materials. Every scaffold to be securely supported and suspended. Use of rose braces or framework, as a means of access shall be prevented. All scaffolds shall be securely fastened to building or structure, if independent shall be braced or guyed to prevent sway. Ropes and chains used shall have a factor of safety of 8. Condition of soil on which scaffolding is supported is important. In case supported on intermediate floor various loads on the floor to be considered. Steel scaffolding should not be erected close to any overhead electrical transmission. Mobile scaffolding should rest on firm ground and its height should not exceed four times the base dimension and wheels should be blocked. All rolling scaffolds shall be equipped with a positive locking device. Suspended scaffolds to be tested as frequently as necessary to ensure minimum safety factor. Trestle scaffolds shall not be more than three times and working platform shall not be more than 5” above ground or floor or other surface. Nobody shall be allowed to work from scaffolds during storms or high wind. If scaffolds are to be used to a great extent or for long period of time, regularly paint stairway wide enough to allow two people to pass shall be erected. Overhead covering should be provided for scaffolds. Use of wooden ballies should ensure that there are no joints but only strapped. For tall structures steel scaffolding to be used. Screen to prevent falling materials and slide scaffolds of passageway should be erected. On high scaffolds netting or equivalent guards should be provided.

5. **Platforms.** Minimum uniformly distributed design load of platform shall be 245 kg/sqm. Scaffold platform plank shall not project beyond its end supports to a distance exceeding four times the thickness of planks unless it is effectively secured. Cantilever of scaffold platforms shall be avoided. Where the planks are butt jointed, two parallel logs must be used. Minimum width of platforms for various types of scaffolds are; where platform is less than 2000mm above ground or solid floor, then 300mm for painters and
500mm decorative workers, if platform is more than 2000mm then 1200mm for painters and 1500mm for others. For railings and toe boards; in the case of standard railings 1000mm from the upper surface, must have posts not more than 2m, intermediate rail half way, for wood top railings and posts should be 50 X 100 mm and others 50 X 50 mm, for pipe 32 mm and 25mm respectively, and for structural metal railings 38 X 38 X 5 mm. In case of ladders, portable ladder is risky, but for fixed ladder access to fixed platform is important.

8.10.4. Safety in structural erection.

1. Erection of steel structures requires special skills and involves some risks. Heavy members must be maneuvered into places, but the short time required to make the erection joint at any connection does not ordinarily justify the erection of a rigid scaffold.

2. All the employees working in places where they are exposed to falling hazards should use safety belts.

3. Falling hazards is impracticable to be protected by temporary floors or scaffolds, a safety net or nets should be suspended below the place where men are working. Each net shall be of 100mm mesh and at least 20mm dia.

4. Employees should wear hard hats with chinstrap fastened.

5. Gloves of suitable types should be worn by all employees while handling steel wire etc,

6. Goggles should be worn while grinding, chipping, scrapping, cabling, cutting or heating of rivets.

7. Good footwear and soles free of grease and mud should be worn.

8. Stand clear when derrick is sorting or shifting steel beams. All clearance procedure should be adopted.

9. Workmen shall not stand, walk or work beneath the suspended loads.

10. When guiding a beam, it should be so held that the hands do not get jammed against other objects.
11. When lifting, legs should be bent; body kept straight and leg muscles used for the lift.

8.10.5. Safety in welding and cutting.

1. All welding and cutting shall be done by workmen who are thoroughly trained in the work or by trainers under competent supervision. Shields shall be placed around the work to protect persons from glare.
2. Welding and cutting shall not be done in the immediate proximity of flammable materials.
3. Welders and helpers shall combustible helmets and gloves during welding operation, they should be careful to keep out of the line of sparks and hot materials, and they should wear clothing free from grease, gasoline, oil and other inflammable material.
4. Oxygen and acetylene cylinders or containers shall never be permitted in small spaces of compartments where welding operations are in progress.
5. A helper shall always be at hand to shut off gas in case of an accident when the welder is working in a space from where escape is difficult.
6. All welding operations should be carried out in a well-ventilated space where considerable amount of welding is to be done; an exhaust system for carrying away the fumes should be installed. If brass, bronze or zinc is to be welded suitable respirator should be worn if exhaust system is not installed.
7. All torches, regulators, cylinders and other such equipments shall be of approved make and regularly inspected and kept in good condition.
8. Welders and helpers shall wear suitable eye, ear, and body protective devices during welding and cutting operations.
9. To avoid fire hazards the following additional precautions should be observed on all oxy-acetylene cutting and welding:-
   - Keep hose and cylinder valves free from grease, oil, dust and dirt.
   - Keep cylinders away from stoves, fire, and other sources of heat.
   - Only gas lighter shall be used to light a torch.
• Avoid use of oxy-acetylene flame in confined spaces.
• Clean thoroughly with steam all containers that have been used for storage of inflammable liquids or wash with hot water and ventilate thoroughly before welding and cutting.
• Do not gas cut dirty plates or plates contaminated with combustible materials.
• Maintain a safe work place.
• Provide fire barriers when necessary.
• Be alert for cracks or explosions.
• Provide fire-extinguishing equipment.
• Consider the need for a fire-watcher.
• Do not release fuel gas where it might cause a fire or explosion.
• Inspect work area after completing operation.

10. **Gas cylinders.** They should be kept in safe places where they cannot be knocked over and well separated from radiators, furnaces and combustible materials. Acetylene cylinders should be always is stored upright. Oxygen cylinders can be stacked horizontally not more than four feet high. Oxygen cylinders shall not be stored in close proximity to Acetylene cylinders or other fuel gas inside the building and in no circumstances either oxygen or acetylene cylinders shall be stored under direct rays of sun or in places where excessive rise in temperature is likely to occur. Storerooms should be fire proof. Cylinders found to be having leaky valves or fittings shall be taken into the open away from any source of ignition and slowly drain the gas. Electric magnets or direct slings shall not be used for handling cylinders. Special cradles shall be used. Oxygen and acetylene cylinders shall never be placed where they can be contacted by electric wires or with ground wires of electrical equipment. If electric arc welding is being done in the same vicinity, such precautions, as necessary must be observed to make sure that the oxygen-acetylene gas equipment does not come in contact with electric arc welding equipment. Lighting for
cylinder stores should be of the flameproof type. Electric switches should be flame proof or placed outside the storeroom. Full and empty cylinders should be kept apart. Never strike an arc or tap an electrode on a gas cylinder whether full or empty. Closed tanks or containers should be welded until they are thoroughly cleaned, dried out and ventilated and it has been determined that they contain no explosive or harmful fumes. The workman, while handling gas cylinders shall permit no smoking. Gas cylinders should not be allowed to drop or come into violent contact with one another. Do not lubricate any valve or fitting and do not use any red lead or any other joining compound. Always open the cylinder valve slowly. Never transport cylinders with regulator and hose attached unless a proper trolley or carrier is used. When transporting by a trolley cylinder valve must be shut before the cylinder is moved from place to place. Take care to avoid leakages. Test with soapy water and never with natural flame. Do not attempt to repair damaged cylinder locally. Mark the cylinder and send back to the supplier. After a cylinder has been emptied of gas, always shut the valve. Do not attempt to fill one cylinder from another. If an acetylene cylinder becomes hot or fires internally due to external fire or use of faulty equipment close the valve, disconnect the regulator, remove the cylinder into the open space and then open the valve fully to allow gas to escape freely, meantime apply water to the cylinder body or immerse the cylinder in a tank of water and close the cylinder valve sufficiently to shut off the gas. Do not use excessive force. Oxygen cylinder valve outlets are screwed with right hand threads. Acetylene cylinder valves are screwed with left-hand threads. Oxygen cylinders are painted black for identification, the cylinders when full normally contain oxygen at the designated pressure and oxygen is colourless, odourless, supports and promotes combustion. Acetylene cylinders are painted maroon for identification; the gas is identified by its pungent smell. The dissolved acetylene pressure to which the cylinders are charged is 17.57 kg/sq.cm. At the base of the cylinder and on the cylinder valve a bursting
disc safety plug device is fitted to guard against excessive build up of pressure within the cylinder and the user should under no circumstances tamper with these fittings. It is important that the cylinder should not be allowed to discharge at a rate exceeding 20% of its capacity per hour. In cases where the volume of acetylene required per hour is in excess of these figures, it is necessary to couple required number of acetylene cylinders together so that the draw of each individual cylinder is within the specified rate. Not more than three cylinders should be coupled, and copper pipe should not be used. Before attaching a regulator to a cylinder it is necessary to shift the valve in order to remove foreign particles or moisture from the valve seat. Gauges for oxygen should be marked as such and should not be tested with oil. Before putting a regulator on to a full cylinder always releases the adjusting screw for regulating the pressure of output otherwise there is a risk of damage to the regulator. Frequent accidents occur due to leakages or due to supply hoses becoming loose or being blown off; hence hose connection should be examined frequently.

11. **Electric arc welding.** Electric welding introduces the hazards of electric shock and flash. Since the flash from electric arc welding is much more severe than from oxy-acetylene welding the welder should have adequate eye protection and all persons working in the immediate vicinity should wear suitable coloured goggles unless the work is completely shielded. Welding shall not be done in the presence of any person not amply protected from the flash. Person should never look at an electric arc with the naked eye to avoid any serious injury. Only heavy-duty electric cable with unbroken insulation shall be used, and all connections shall be waterproof, checked frequently. When it is necessary to couple several lengths of cable as a welding circuit and occasional coupling and uncoupling is necessary, insulated cable connectors shall be used. Frames of electric welding machines operated from power circuit shall be effectively grounded. When the operator has occasion to leave his work or stop work for any appreciable
time, the power supply switch in the equipment should be opened and the unit shut down.

12. **Hazards in chipping, cleaning & grinding of weldments.** The chips flying from the cleaning and chipping hammer while cleaning the weldments are dangerous to the eyes. So proper eye protection should be taken. Gloves should be worn to protect the hands and wrists. Train the workmen to chip away from the face. Face should be shielded with arc welding shields. The following personal protective equipments should be used while carrying out arc welding:-

- Flame resistant gloves.
- Flame resistant apron of leather or asbestos.
- Clothing should be free from oil or grease.
- Collars and cuffs should be buttoned and turned up inside. Pockets should be eliminated from fronts of vests, shirts and aprons.
- For heavy work leather leg guard should be used.
- Fire resistant caps or shoulder covers should be worn during overhead welding operations.
- Ear protection device should be used for overhead welding.
- Proper eye protection appliances should be used as per the process.
- Combination of safety helmets and welding screen should be used in situation exposing welders to the hazards of falling objects from overhead.

**8.10.7. Safety in electrical works.**

1. **General guidelines.** Because of special nature of electrical work, employees working on electrical equipment must be cautious and alert at all times, recognizing the seriousness or consequences, which might result from the mishap. All electrical equipment should be considered potentially dangerous.
2. All voltages should be handled properly and safely. It must be realised that relatively low voltage viz. 240 V and 110V have caused more fatalities. Special care should be taken while working at elevations.
3. A moment of neglect can result in lifetime of regret.
4. Avoid working on live equipment as far as practicable. When it is absolutely necessary to work on or near live circuits it is important to work on only one wire at a time and to insulate all conductors which may come in contact with the body.
5. Clearances with respect to live conductors, earthlings, and safety precautions shall be in accordance to the requirements of Indian Electricity Rules.
6. Electrical workmen should use only non-conductive ladders.
7. Insulation's to electric conductors alone does not give protection to shock. One should take all precautions with conditions at hand.
8. Keep the area around electrical equipment as dry as possible to minimize shock. Use of dry boards/rubber mats should be followed.
9. Work shall not be performed on electrical equipment having moving parts while in operation. The power supply shall be switched off before removing guards from motor driven equipment.
10. When it is necessary to work on an electrical circuit or other electrical equipment or to dismantle or remove machinery driven by electrical motors, the proper switches must be opened and tagged. As an additional precaution, fuses must also be pulled where provided. A board indicating 'MEN AT WORK' shall also be put on the switch.
11. Never bridge a fuse or use a fuse, which is heavier than the capacity of the circuits. Replaced fuses should be of the same capacity as those removed.
12. Finger rings, bracelets, and metal wrist watch bends should not be worn by the persons working with electrical equipment.
13. Tags shall be used on switches when these are opened to permit works on electrical equipment. Whenever possible the terminals that carry power to electrical cables shall be earthed.

14. Never close a switch without having full knowledge concerning the circuit and the reason why the switch was tagged open previously.

15. Do not operate any oil-immersed switch with the oil pan in the lowered position.

16. In the opening disconnector shield the eyes shall be protected from a possible flash. In opening disconnectors of any kind, rubber gloves of the approved type should be used.

17. It shall be ensured that the circuit breaker is open before attempting to remove draw out type circuit breaker from their enclosures.

18. Cover plates shall be replaced on lighting and power cabinets and other electrical enclosures after repair.

19. Safety belts shall be a part of a line's man equipment and shall be used whenever climbing hooks at an elevation support the lineman, their safety belts should be checked.

20. Climbing hooks should not be worn while working or walking on the ground.

21. When serving linemen, ground men should not stand at the foot of pole but at one side.

22. One must consider a line live/charged unless it is grounded.

23. Ground and short-circuit any line as close to the work as possible. Grounds should be clamped to ground wires or an over ground wire.

24. In working hot lines 415V or over, two men should always work at the pole together except while changing fuses. One must keep himself clear and in a position to his pole mate if necessary.

25. Temporary installation shall also confirm to all safety precautions laid in I.E Rules. It is particularly important that all electrical installations be
properly grounded, sufficient clearance is provided over rail and roadways and proper equipment be installed in gaseous areas.

26. Suitable barricades must be installed around exposed temporary high voltage electrical equipment such as field transformers.

27. Avoid wrapping cords around any part of the body.

28. Portable hand pumps should not be of more than 24-volt supply.

29. Ground all electrical power tools. Examine electrical extension cables for light of portable tools for defects before using.

8.10.8. Lifting tackles. As per the Factories Act for the purposes of the provision of section 29, a lifting machine, chain, rope and lifting tackle shall be deemed to have been thoroughly examined. A visual examination supplemented if necessary by other means and by dismantling of parts of the gear has been carried out as carefully as the conditions permit in order to arrive at a reliable conclusion as to the safety of parts examined. All lifting machines shall be examined at least once in every 12 months. Chains, slings, ropes, and lifting tackles shall be thoroughly cleaned for the purpose of examinations. For examination of chains, links, hooks, swivels, shackle etc. use of whiting after cleaning with kerosene oil and drying out, will easily show any visible cracks through oil marks on tapping with hammer. In case of doubt, ultrasonic test, radiographic test, etc may supplement this.

1. As per statutory obligation, on receipt of a new lifting chain or wire or rope sling at the construction site, the certificate and other documents received with the supply should be carefully kept and identification number to the individual chain/wire rope should be allotted. These numbers should be stamped in case of a sling, hook/ring/shackle. In case of wire rope sling, this will be stamped on thimbles. When the chains are purchased, the manufacturers indicate on the hook/ ring shackle the safe working load and the number of test certificate for proper identification at all times. As a further precaution to ensure that the identification of the chains is
maintained at all times, an MS plate with the identification number punched on it shall be attached.

2. Chain slings shall be withdrawn from use whenever the chain has become unsafe through overloading or chain has stretched more than 5% of its length or the inner link wear exceeds 1/4th thickness of the original link stock. No chain shall be used which has been broken and mended with a bolt. Chains shall never be knotted or shortened by twisting the chain. Before any strain is put on the chain, it shall be inspected to see that all links are lined up so that the pull is through the long diameter of the link. All chains shall be returned to the manufacturer for annealing.

3. Wire ropes have almost superseded fibre rope and chain for hoisting and haulage purposes. They should be inspected at the time of installation and there after once a week. The length of the rope shall be recorded. The rope shall be lubricated after the examination before being put to use. Wire ropes removed from use shall be marked and identified as unfit for use. No wire rope shall be used in hoisting or lowering if any length of 8 dia the total number of visible broken wire exceeds 10% of the total number of wire or the rope shows deterioration. Prevent kinking of wires.

4. All precautions regarding use of wires are applicable for slings also.

5. All lifting tools, tackles, slings and ropes must be thoroughly checked before putting them to use. Defective or worn-out tools, tackles, ropes, or slings shall be never used. While hooking, slinging or unhooking any load hands should be kept out of the pinch point. Before lifting the load, it must be ensured that the crane hook is properly centered and the load balanced so as to avoid undue swerving of the load while lifting. Slings should never be overloaded. For this it is important to have a correct assessment of the load being lifted. Only one person should signal the crane operator and only standard signals should be used. No person should walk or stand below any swinging load. Slings should be released only after ensuring that they are completely free from load. While using jack, care should be taken to provide
wooden block both at the top and base of the jack. If hydraulic jack is used, the load lifting should rest on wooden block or temporary support to prevent mishap due to failure of jack.

6. Packages containing paints, varnishes, lacquers or other volatile painting materials shall be kept tightly closed when not in actual use and shall be kept where they are not exposed to excessive heat, spark, flame or direct rays of sun. All precautions to eliminate danger from fire should be taken. No attempt should be made to heat paint materials. Effective scaffolds should be used by workmen engaged in painting and shall wear proper safety appliances viz. Safety belt, apron, hand gloves etc.

8.10.9. Gas hazards. The most commonly used gases viz. blast furnace gas and coke oven gas contains many harmful ingredients. The most dangerous component is carbon monoxide. This in excess of 0.03 mg per liter can cause death on prolonged exposure. With moderate exposure gas may make one feel dizzy or give a headache or suffocating feeling. One should go to fresh air when these symptoms appear, also coke oven and blast furnace gases in admixture with air in certain proportion form explosive mixture. These mixtures may cause explosion when gets ignited by any source of fire, welding spark or electric spark etc. coke oven gas and air, blast furnace gas and air mixtures are dangerous within the limits of gas concentration 5.5% to 36% and 35% to 74% respectively. For safety, the formation of explosive gas mixtures should be avoided by purging the main or receptacles with inert steam or by avoiding sucking in the air. Gas protection apparatus should always be worn when working in gas contaminated areas. Breathing apparatus should be normally used in such areas.

1. No one should make fire, smoke or take rest near gas valves or receptacles. Gas burner should be under supervision when being used. Where gas pipes are taken the area should be well ventilated. While a furnace is being taken away for repair, the gas pipes to furnaces should be
disconnected. Workers in gas hazardous area should work in pairs. Gas equipment should be inspected daily. Every branch line from the main gas line should have a proper valve.

2. For undertaking jobs on gas lines, the schedule of operations should be given a day prior. Fire brigade must be kept ready on stand by duty. Near gas leakage point’s workmen working on platform should also use protecting apparatus. All fire jobs, which might be a source of ignition, should be stopped within 40m radius. If lighting is necessary, portable electric lamps at low voltage or torchlight should be used. When gas line or gas equipment is under repair proper ventilation should be ensured.

3. For charging of coke oven gas or mixed gas lines the pipes must be steamed by opening the end bleeders. In case of blast furnace gas, air can be replaced by gas by operating the end bleeders. Gas line upto furnace main valve should be charged with gas. Gas should be bled before igniting in the furnace. Fire should be placed before the burner. Blast furnace gas must never be taken in cold furnace.

4. A CO concentration of 0.16% in air if exposed for 20 minutes will result in collapse, and unconsciousness. Four times of this concentration will result in death in 15 minutes and eight times the effect is instantaneous death. Age, physical condition, obesity, and alcoholism lower the body’s resistance to gas.

8.10.10. Explosives. Explosive means gun powder, Nitro glycerin, dynamite, gun cotton, blasting powders, fulminate of mercury or of other metals, coloured fires and every other substances, where similar to those above mentioned or not, used or manufactured with a view to produce a practical effect by explosion or a pyrotechnic effect, and includes fog signals, fire works, fuses, rockets, percussion caps, detonators, cartridges, ammunition of all descriptions and every adaptation or preparation of an explosive. Liquid oxygen forms an explosive when combustible absorbent materials such as wood pulp, carbon black, metal powder,
coal dust etc. paper or cloth bags containing one or more of the combustible absorbent materials soaked in liquid oxygen are highly explosive and are known as liquid oxygen explosive. Special license under the Explosive rules is necessary for the manufacture and use of liquid oxygen explosives. Liquid oxygen by itself is non-explosive and does not come under the purview of the above Act. Picric acid, picrates, mixture of picric acid, di-nitro-phenol and acetylene when liquid has been declared as explosives. All operations involved in the transportation, handling, storage and use of explosive shall be done according to the provisions of Indian Explosives Act and shall be carried out under the supervision of competent person. Explosives shall not be transported on the site except in suitable containers which are so made as to prevent any escape of explosives and any danger of sparks or other sources of ignition during conveyance. Detonators and other explosives for blasting should be taken to the site in original containers. No explosive shall be carried in mechanically propelled vehicle unless they are modified for this purpose. Detonators and igniters should not be carried in the same vehicle with the explosive. Storage of explosives shall be done in accordance with the requirements of explosive Act and the magazine shall be approved by CCE. All electrical fittings, lightning arrestors and safety devices shall be approved by CCE.

8.10.11. Pressure vessels. As per Factories rules every pressure vessel shall be thoroughly examined by a competent person, externally once in six months and internally once in twelve months to ensure that condition of the walls seams and ties both inside and outside the vessel, soundness of the parts of the vessel and the effect of corrosion. Suitable records of examinations and repair shall be maintained in a register.

8.10.12. Occupational noise exposure. Various construction activities involve use of mechanical equipment which during operation produces high noise level. Some of these equipment’s are as follows:-

- Air compressors.
• Vibrators, scrapers, graders and compactors.
• Rock drills and pile drivers.
• Dumpers, bull dozers, shovels and backhoes.
• Concrete mixers.
• Power generators.

1. Permissible noise exposure.

<table>
<thead>
<tr>
<th>Duration per day in hours</th>
<th>Sound level dB(A) slow meter response</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>90</td>
</tr>
<tr>
<td>6</td>
<td>92</td>
</tr>
<tr>
<td>4</td>
<td>95</td>
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<tr>
<td>3</td>
<td>97</td>
</tr>
<tr>
<td>2</td>
<td>100</td>
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<tr>
<td>1.5</td>
<td>105</td>
</tr>
<tr>
<td>0.5</td>
<td>110</td>
</tr>
<tr>
<td>0.25</td>
<td>115</td>
</tr>
</tbody>
</table>

2. Where the workmen are subjected to noise exposure exceeding those listed above, they must use personal protective appliances, to reduce the effect. Silencer should be maintained in all exhaust systems of the equipment. Whenever possible sound barriers should be provided around non-mobile equipment.

8.10.13. Protection against dangerous radiation.

1. The duration of exposure of infra-red-radiation should be limited in relation to the intensity of the radiation and the nature of its source. All sources of intense infra-red-radiation shall as far as practicable, be shielded as near the source as possible, by heat absorbing screens, water screens or
other suitable devices to prevent such radiation entering the eyes of the workers necessarily exposed at frequent intervals or continuously, to sources of intense infra-red-radiation. Goggles or eye shields confirming to the absorption standards approved by competent authority shall be worn by the workers necessarily exposed at frequent intervals or continuously, to sources of infra-red-radiation. In work-rooms where such goggles or eye-shields are used, the partial loss of light occasioned by the use of goggles or screens should be offset by appropriately increasing the general and local lighting. Saline drinks or salt tablets should be provided for workers liable to heat-stroke, heat cramp or heat colics resulting from continued or frequent exposure to sources of intense infra-red-radiation.

2. In industrial establishments where operations, other than welding, are carried on that entail dangerous emission of ultra-violet-radiation precaution shall be taken with the view of preventing the diffusion of these radiation, specially reaching the eyes of the workers by placing protective cabinets or screen around the sources of emission or interposing a screen of ultra-violet absorbing glass of other material between the source of radiation and any person employed in the work-room. The area of ultra-violet radiation should be limited to the minimum necessary.

3. The term ionising radiation means electro-magnetic or corpuscular radiation capable of producing ions directly or indirectly in its passage through matter, it includes radiation emitted by X-ray tubes and particle accelerators, radiations emitted by radio active substances and Neutrons. An occupationally exposed person may accumulate the maximum permissible dose at the rate not in excess of 3 rems during 13 consecutive weeks. If unavoidable, 3 rems may be received as single dose, but this should be avoided as far as possible.
8.11. Future Challenges for Industrial Safety

8.11.1. Although safety management experts have brought about progress which perhaps was undreamed of, a few decades ago, there is every indication that the accumulation of knowledge is still not fully developed. The management profession must note that the industrial safety management problems present some of the most challenging frontiers of development. The future scenario for industrial safety calls for a major reorientation of philosophy, policy and practices. Some of them are reflected in the new emphasis and thrust being given to the role of HRD managers. Changes in almost every aspect of human life are rapid, pervasive and profound. Change is engulfing technologies, products, process, materials and above all management.

8.11.2. The need of the hour is a proactive approach, strategy which helps personnel mangers to foresee events and take appropriate actions before the events occur. Proactive strategies call for awareness about likely challenges the HR managers will face in the days lying ahead. The major challenges are:-

- Globalisation.
- Corporate re-organisations.
- Global terrorism.
- Changed demographics of workforce.
- Changed expectations of industrialists.
- Renewed focus on people.
- Media expansion.
- Managing managers.
- Interests of society.

8.11.3. Gloalisation.

8.11.3.1. In the present scenario, the vast information network instantly link nations, companies, people, and market capitalism guides every country on the globe making the flow of goods and services across borders more freely in other
words we can see that several companies view the scenario as a growth strategy and this is globalisation. Statistics show that the standard of safety in industrial environment is not uniformly developed all over the world; hence this aspect will have to be dovetailed in the globalisation principle. Expanding internationalisation of business has its impact on Industrial safety and the HR managers are required to listen the echo that international operations:

- Have more functions.
- The functions of coordination of multiple layers of technical and industrial development vis-à-vis status of the nation.
- Have more involvement in the problems of having health, education and safety of workers.

8.11.3.2. The HR managers are now required to grapple with the globalisation of business with the problems of

- Unfamiliar laws.
- Unfamiliar languages and work ethics.
- New practices.
- Fierce competitions.
- Unknown attitudes.
- Changed management styles.

8.11.4. Corporate re-organisations. In the past half decade, there have been corporate mergers, takeovers and the re-organisations and the changed circumstances have posed a great challenge to HRM when employees experience anxiety and uncertainty about their places in the new organisation. As a result, it is likely to cause some agonising moments for the workers. This may result in more industrial accidents, which has to be taken care of. Some of the ways of doing this is:

- Introducing a comprehensive social security bill to cover all sections of society.
- Bringing speedy justice in industrial disputes.
- Cater for more transparency.
• Ensure that workload is not increased as a consequence of layers being trimmed.
• Increase safety training and audit.
• Inspections.

8.11.5. **Global terrorism.** This is a new phenomenon and the effect has become more pronounced after the 9/11 incident. As more and more developed countries are being targeted, this will be an aspect which assumes important. A rough estimate shows that almost 42% of loss of life due to various accidents which are either confirmed or suspected terrorist acts. Take for example the Bhopal Gas Tragedy, it cannot be written off as a normal industrial accident. Though evidence to this effect is not available, there is a suspicion that it can be act of terrorism. So the industrialists will now in addition to concentrating on balance sheets will have to look towards this aspect with greater sincerity.

8.11.6. **Changed demographics of workforce.** The increasing number of dual-career professionals limits individual flexibility, as a result stress related problems accumulate in industrial organisations. These may either result in increasing industrial accidents or a number of times the firms stand to lose the services of talented people. Another change in the workforce demographics is the growing number of employees who are young. These people tend to be rather rash and net result will be more industrial accidents.

8.11.7. **Changed expectations of industrialists.** Modern era of competition has lead to rivalry for existence. In the industrial world there is no place for humane considerations. This has lead to reduction in staff, giving less importance to industrial safety. With the changes in workforce demographics, employer’s expectations have also shifted from traditional matters to much more materialistic ones. Instances like an MD not instituting a waste elimination programme but buying an expensive car have become common. The
industrialists have started comparing themselves globally without giving adequate importance to improve the industrial safety environment.

8.11.8. **Renewed focus on people.** The structure, strategy and system approach during the post-war era will not be accepted in this era of globalisation. Today’s economic environment is characterised by over-capacities and intense competition. Hence to reduce accidents in industrial organisations, what is need is people’s approach - a focus on human resource. Under this approach it does not mean stripping the organisation of all its formal systems, policies and procedures, but to redefine them. The top management must therefore:

- Reduce its reliance on strategic planning systems by influencing the organisation’s direction through development and deployment of key people.
- Lighten the burden of control systems by developing personal values and interpersonal relationships that encourage self-monitoring.
- Replace much of its dependence of information system by developing personal communications with those who have access to vital intelligence and expertise.

8.11.9. **Media expansion.** There has been a spiraling effect on media expansion. The awareness of people as well as responsible reporting has improved in the positive direction. As a result the media can be used for spreading the training, latest techniques and equipments for industrial safety.

8.11.10. **Managing managers.** A dangerous trend is emerging in the post-globalisation era when the freedom given to the managers are grossly misused to get rid off the talented and hard working juniors in case the juniors turn out to be better performers. Often firing takes place without the knowledge of the real employers. This will have substantial effect on true reporting on imperfections of safety breeches.
8.11.11. **Interests of society.** In the present age there is nothing separately known as industrial society. Any society is an industrial society albeit the aboriginal society. In the name of globalisation and productivity, safety, health and hygiene should not be sacrificed. With gradual decline in the role of government in economic activities, society feels helpless and insecure. It is the responsibility of every manager to ensure that safety health and hygiene in industrial society is not compromised.

8.12. **Control of Substances Hazardous to Health Regulations 2002 (UK).**

8.12.1. In this part an attempt is made to understand the changes being brought about in developed nations towards industrial safety. The previous set of Regulations (the 1999 Regulations) has been replaced and this is a brief resume of the content of the latest set of Regulations. The Approved Code of Practice, L5, has also been updated to provide that all-important detailed guidance that we all need, and if formal action is being contemplated then ensure that the ACOP is used in all deliberations. These regulations have come into force on 21st November 2002. **The new Regulations require** all the things that the old Regulations required, with some extra bits added on.

**Regulation 2** – This has the definitions in it. There have been some new ones added including the definition of **control measures** (things done to reduce exposure) and **risk** (likelihood of harm being caused by exposure to the substance in question). **Hazard** is defined (intrinsic property of a substance that may cause harm) and **PPE** (equipment used to protect persons against risks to health). There is a wide definition of **workplace** (any place used in connection with work – presumably my dining room where I am currently preparing this resume).
The list of substances to which the Regulations apply has not changed – these are:

a) Substances that is very toxic, harmful, corrosive or irritant under the CHIP Regulations,
b) Substances that have OEL’s
c) Biological agents
d) Dust above certain limits and
e) Anything else that creates a risk to health because of the way it is used.

The interesting thing is that the extent of the definitions list has increased considerably and this leads to the assumption that there were too many ‘holes’ in the previous Regulations.

**Regulation 3** – The Regulations apply to the self-employed in the same way as employers (except for Regulations 10 and 11) and an employer is under an obligation to ensure that they apply the requirements of the Regulations to any persons who are affected by their work activities in the same way that they apply them to employees (with the exception of Regulations 10, 11, 12 and 13). Seagoing ships are exempt - as is often the case.

**Regulations 4** – Certain substances are banned from import from other than specified countries and in Schedule 2 there is a list of substances that are prohibited from use in specified circumstances. We are unlikely to come across either circumstance in our health and safety work.

**Regulation 5** – This one says that the rest of the Regulations are to protect persons against a risk to their health, whether immediate or delayed, from exposure to substances hazardous to health. There are exemptions for medical treatments.
**Regulation 6** – This is the one that requires an assessment to be done if a substance that is hazardous to health is being used. The Regulation has been substantially expanded over the 1999 one and includes the issues that the assessment must consider. These are,

a) The hazard,

b) Information provided in the data sheets or from the supplier,

c) Type of exposure,

d) Circumstances of the work activity,

e) Any activities where there is possible high exposure – e.g. maintenance,

f) Any OEL’s

g) The effect of control measures.

h) The results of health surveillance and monitoring,

i) The effects of exposure to more than one substance, if applicable (the combined risk)

j) Any other information needed to do the assessment.

There is the usual need for review when it is no longer valid, there have been significant changes in work or monitoring suggests the need for change. There is now a requirement to document the assessment, but only where there are 5 or more employees. This was not in the 1999 Regulations.

**Regulation 7** – This Regulation requires the employer to prevent exposure to substances hazardous to health or if this is not reasonably practicable then exposure must be controlled. The Regulations have a hierarchy of control as
follows,

a) Substitution then,
b) Work, system or engineering controls then,
c) Control at source by ventilation then
d) As last resort - the provision of PPE.

The Regulations go on to discuss dealing with waste, maintenance procedures, number of employees exposed, ventilation and washing facilities. There are extra precautions required for handling carcinogens and a whole new subsection on the precautions required for premises handling biological agents, including signage, decontamination procedures, confinement, hygiene standards and provision of vaccines. Again it is unlikely that we will encounter the latter two situations in our routine work.

**Regulation 8** – This regulation states that the employer must ensure that any control measure provided is properly used. The employees’ part of the bargain is that they must use it correctly, return it after use and report any defect.

**Regulation 9** – Control measures have to be maintained in working order, repair and clean. If ventilation is used as a control it has to be examined at a defined frequency for certain substances (schedule 4) or for other cases at suitable intervals. PPE also has to be checked and examined and records kept of examination for 5 years. PPE must be stored in a defined place, checked at regular intervals and replaced when defective. Any contaminated PPE must be kept apart from clean PPE, and decontaminated or destroyed.

**Regulation 10** – If the risk assessment identified the need for monitoring then this Regulation states that it must be undertaken – which seems like a sensible requirement to me. It must be done at regular intervals, but for some
substances there are specified frequencies (Schedule 5). Personal records have
to be kept for 40 years – others for 5 years. Interestingly if a business ceases to
trade then all personal monitoring records have to be forwarded to the HSE for
safe keeping.

**Regulation 11** – Surveillance is required where it is ‘appropriate for the
protection of health’. This is defined as situations where substances in Schedule
6 are used, or where an identified health effect or disease is related to exposure
to a substance, or there is a reasonable likelihood of the disease or effect
occurring. There must be techniques for detecting the disease or effect though
(i.e. the impossible is not being asked for).

- There are some additional requirements that relate to the
certain substances. Surveillance for these must include surveillance by a
doctor. This may have to be continued after employment has ceased and
the doctor can stop an employee working or set conditions for continued
work. There are rules that must be followed if a disease is contracted as a
result of such exposure and a right of appeal is available to any employee
aggrieved by the decision of a doctor.

**Regulation 12** – This states that employers who use substances hazardous to
health must provide information, training and instruction to employees. This
must include the names of the substances in question, any safety levels (OEL’s),
access to data sheets, the risk assessment, and the results of any health
surveillance or monitoring.

**Regulation 13** – The last one – the employer must ensure that there are
procedures to deal with incidents involving dangerous substances. The
procedures must include information on the specific hazards that will be faced,
warning and communication systems, and be made available to emergency
services when needed. There are also requirements on steps and precautions to
be taken to mitigate the effects of the event and restoring situation back to normal.


8.13.1. In the ongoing process for improvement of industrial safety a new and interesting control has been put forward on controlling hazards during working with asbestos. There has been an ongoing debate for some years about the increase in the number of deaths caused by asbestos. There are regular changes to the legislation that each time incrementally increases standards of control. The latest regulations are aimed principally at preventing accidental exposure to asbestos. The opportunity has also been taken to make a few other alterations. There is a new Regulation 4 that requires asbestos in buildings to be managed. The risk from it has to be assessed in all non domestic premises. It is not a duty to carry out a survey (although it is difficult to see how risk can be assessed if location and type of asbestos is unknown), nor a requirement to remove asbestos in good condition. However this does not come into force until 21 May 2004. Regulation 14 is also new and requires the provision of emergency procedures for case of incidents involving dangers from release of asbestos fibers. They are not required, however, if because the amount of asbestos is minor, the health risk to the health of employees is slight, and there control measures shall be in force. The standard for air monitoring has changed and from 21 November 2004, asbestos laboratories will have to be accredited to ISO 17025. Regulation 27 amends the Enforcing Authority Regulations. Any type of asbestos removal is now enforced by the enforcing authority for the premises where the removal is taking place. Under previous legislation only lagging from pipes and boilers was enforced by Local Authorities. Local Authorities are now responsible for the removal of asbestos boarding as well. The ACOP’s L27 and L28 have been updated and there is a new one L127 on managing asbestos in non-domestic premises. There is also a new HSG 227 on a similar theme.
**Regulation 1** – They came into force on 21st November 2002.

**Regulation 2** – This is where the definitions are found. The *action and control levels* are the same. There is now a definition of *control measure* (things done to prevent or reduce exposure to asbestos) and *ISO 17025* (retesting and calibration of laboratories).

**Regulation 3** – The Regulations apply to the self-employed in the same way as employers and an employer is under an obligation to ensure that they apply the requirements of the Regulations to any persons who are affected by their work activities in the same way that they apply them to employees (with the exception of Regulations 9 and 21)

**Regulation 4** – There is a definition of duty-holders in this part. They are essentially any person who has an obligation in relation to maintenance or repair of non-domestic premises. This is important as duty-holders have an obligation to carry out an assessment as to whether asbestos is, or is liable to be, present in a premises. The Regulations state that in making the assessment, reasonable steps must be taken, the condition of asbestos shall be considered, account is taken of plans and building age, and readily accessible parts are inspected. If asbestos is, or is liable to be, present then,

a) A determination of risk must be made,

b) A plan identifying location is needed and

c) Measures for managing the risk written into the plan/assessment.

The latter measures must include the provision for monitoring the condition of the asbestos, ensuring that it is properly maintained or removed and that details of its location is provided to any person liable to disturb it.

**Regulation 5** – Work cannot be carried out on asbestos unless its type has been identified or an assumption made that it is chrysotile.
Regulation 6 – An employer cannot carry out work on asbestos unless the risk of exposure has been assessed and documented. The assessment must include type of asbestos, degree of exposure, any control measures in place, any monitoring results and it must set out the steps to be taken to reduce exposure to the lowest reasonably practicable level. The risk assessment has to be changed if it is no longer valid or there is a significant change to the work being undertaken.

Regulation 7 – There must be a written plan detailing how the work will be done. The Regulation specifies what must be in the plan.

Regulation 8 – Work that exceeds the action level must be notified to the enforcing authority in writing, giving at least 14 days notice. Schedule 1 specifies what must be in the notice.

Regulation 9 – Every employer must ensure adequate information, instruction and training to all employees. They must know about the risk assessment, the risks to their health, precautions to be observed and the control and action levels. This must be at regular intervals.

Regulation 10 – There is a general duty to prevent exposure to asbestos as far as is reasonably practicable. If exposure cannot be prevented then measures other than PPE must be used and the number of employees exposed maintained as low as practicable. There is the usual hierarchy of control as follows,

a) Substitution then,

b) Work, system or engineering controls then,

c) Control at source by ventilation.

If the above do not reduce exposure to below control limits, then respiratory PPE must be provided.
**Regulation 11** – This regulation states that the employer must ensure that any control measure that is provided is properly used. The employees’ part of the bargain is that they must use it correctly, return it after use and report any defect.

**Regulation 12** - Control measures have to be maintained in working order, repair and clean. Ventilation or respiratory PPE has to be examined by a competent person at suitable intervals. Records must be kept of examination for 5 years.

**Regulation 13** – This regulation specifies the precautions for protective clothing used when employees are exposed to asbestos. It specifies disposal practices, cleaning systems where reusable and packaging during transit from contaminated sites.

**Regulation 14** - The employer must ensure that there are procedures to deal with incidents involving asbestos. The procedures must include information on the specific hazards that will be faced, warning and communication systems, and be made available to emergency services when needed. There are also requirements on steps and precautions to be taken to mitigate the effects of the event and restoring situation back to normal. There are some exemptions from parts of the Regulation, if, because the amount of asbestos is minor, the health risk to the health of employees is slight, and there control measures in force.

**Regulation 15** – Every employer shall prevent the spread of asbestos from any place of work under their control. If spread cannot be prevented then reduction to lowest level reasonably practicable will suffice.

**Regulation 16** - This requires areas and plant where asbestos is handled to be kept clean, and when work is completed thoroughly cleaned.

**Regulation 17** – Any area where asbestos exposure would be in excess of the action level must be designated an asbestos area, and if control limits are
exceeded, designated a respirator zone. Notices must identify these. Only employees who need to enter must be allowed to enter the zones and eating, smoking etc is not permitted in these areas.

**Regulation 18** – Air monitoring is necessary to check exposure to asbestos. It must be done at regular intervals, but is not necessary if exposure does not exceed the action level. Personal monitoring records have to be kept for 40 years – others for 5 years. If a business ceases to trade then all personal monitoring records have to be forwarded to the HSE for safe keeping.

**Regulation 19** – Any person doing air testing must meet ISO 17025

**Regulation 20** – Any person undertaking analysis of material for asbestos must meet ISO 17025 from 21 November 2004

**Regulation 21** – If an employees’ exposure exceeds the action level then health records must be made and kept for 40 years. A doctor must carry out a medical examination within 2 years of exposure and then repeated at 2 yearly intervals. Certificates have to be provided by the doctor and employers must keep these for 40 years. If surveillance identifies a disease then the employee must be given information and advice and further surveillance. The employer must consider stopping an employee working and changing to a role where there will be no further exposure, review the risk assessment and check all other staff that may have been similarly exposed.

**Regulation 22** - Washing and changing facilities must be provided, as a must for storage of respiratory protective equipment and protective clothing. Storage facilities must be separate for different types of PPE.

**Regulation 23** – These are the rules for storage and transit of asbestos and asbestos waste.

**Regulation 27** – This has amended the Enforcing Authority Regulations 1998. Asbestos removal enforcement is now quite simple, it is enforced by the
enforcing authority for the premises in question irrespective of the type of asbestos being removed.

8.14. Work related Stress Survey. A study on work related survey was carried out in UK this year. Given below are certain details regarding the same.

8.14.1. A total of 142 questionnaires were returned from the approx. three hundred that were given out. The returns from the specific events were as follows:-

- Forum Seminar: 71 returns.
- Forster Square Railway Station exercise: 22 returns.
- Caravan in Bradford, Keighley and Shipley: 49 returns.

These have been inputted onto an Access database and analysed. The completed questionnaires represented a mixed population in terms of:

- Type of employment,
- Size of Company,
- Hours worked,
- Satisfaction with the job.

87% of the people completing the questionnaires thought the company facilities for their health and safety were either good or excellent. Approx half the questionnaires were completed by Senior or Line Managers.

8.15. Well Being Assessment. This is based on a recently conducted survey carried out in UK.

8.15.1. Analysis of the questionnaires revealed 9 individuals (6% of the sample); indicating Occupational Stress could be putting their Well Being at risk. For
these 9 individuals there was no significant correlation between their stress and any other factors recorded. They were a mixed population of Line Managers, Secretarial and Shop Floor workers’ all working between 30 – 50 hours a week range. While the survey did not reveal any significant pattern on stress in the population concerned, for the 9 with indicative symptoms they should be talking to their employer regarding workplace stress.

8.16. A Case Study on Working Hours. This is another recent development in industrial safety.

8.16.1. Britain has been told by the European Union to limit workers to a 48 hour week or face legal action. The European Commission has upheld a complaint by Amicus, Britain’s largest private sector union, finding the government has failed to implement fully the Working Time Directive. Infringement procedures initiated by the EU at the end of April gave the Government two months to comply with the European-wide rules. The CBI urged the government ‘to mount a robust defence’ of the current law. British workers currently work the longest hours in Europe.

8.16.2. In April 2002, Brian Dean, former owner of Brian Dean Demolition and Civil Engineers, was convicted of the manslaughter of two of his employees, Michael Redgate (46) and his son Carl (18) who died in July 2000 when a kiln collapsed on top of them. Stoke on Trent Crown Court heard that the two men were sent to demolish the disused kiln without proper instruction and with no previous experience of kiln demolition. In addition Brian Dean had told the two men to cut vital steel supports. Brian Dean received an 18 months prison sentence. For many years’ health and safety campaign groups have been campaigning for greater use of manslaughter charges in prosecutions relating to work related death and for the introduction of ‘Corporate Manslaughter’. Mick Williams representing the National Hazards Campaign presented a ‘Corporate Manslaughter’ Seminar to the Bradford Forum in September 1996. Mick, now the Forum Secretary, gives a brief update on the current state of affairs with
reference to work related deaths. Research by the Centre for Corporate Accountability (CCA) shows that the number of company directors and business owners prosecuted for manslaughter concerning a work-related death has significantly increased in recent years. It indicates that new investigation and prosecution procedures, which were adopted in April 1998 by the Police, the Health and Safety Executive (HSE) and the Crown Prosecution Service (CPS), have had a significant impact upon the way the criminal justice systems deal with work related deaths. The CCA’s research compared the number of manslaughter prosecutions concerning deaths occurring before and after April 1998. In the fifty years period prior to 1998, only nine manslaughter prosecutions involving directors or business owners – three of them involving disasters- have been identified. However, in the last four years, there have been at least eleven completed prosecutions as well as five ongoing cases that will come to trial this year. These figures represent a significant increase in the prosecution rate. The research however also shows that most cases result in acquittals. Only three of the 11 completed cases since April 1998 have resulted in convictions. In total, the research shows that six company directors, two farm owners and one sole trader have been convicted of manslaughter. In addition, three companies have been convicted. All the convictions so far concern people who ran relatively small companies or businesses. The TUC believes that all workplace fatalities should be treated as possible manslaughter cases but stresses that enforcers should follow risk management principles and look for failings in the safety system rather than seeking scapegoats. The TUC has called for better training for the Police, CPS and HSE in how to handle work-related deaths, and for the establishment of a specialist panel of counsel with the appropriate knowledge, skill and training to advise the three agencies and then to take forward any resulting prosecution. In the longer term, and when corporate killing is introduced, The TUC also believes that special investigation units will be needed, bringing together the expertise of each of the three agencies, appropriately resourced.
8.16.3. Despite a new law of ‘Corporate Killing’ being a manifesto commitment of the Labour Party in 2001 campaigners still wait for the UK Government to bring forward its proposal to enact a new offence of ‘corporate killing’. The new law would allow a company, or any other ‘employing’ organisation, to be prosecuted without the need to prosecute an individual director or senior manager. An organisation would commit the offence of ‘corporate killing’ if it could be shown that:-

- there was a ‘management failure’ on the part of the organisation;
- the management failure ‘fell far below’ what could be expected;
- the management failure was ‘a cause’ of the death.

An organisation has a management failure if ‘the way in which its activities are managed or organised fails to ensure the health and safety of persons employed in or affected by those activities’. The Government is proposing not to apply the new offence to ‘crown bodies’ or to British companies that commit the offence abroad. The Centre for Corporate Accountability produces a newsletter on law enforcement and corporate accountability issues. The latest newsletter is a special issue on Corporate Manslaughter and outlines the HSE’s New Enforcement Guidance; the offence of manslaughter; the proposed offence of corporate killing; manslaughter prosecutions against company directors and business owners including current cases, successful convictions and acquittals.

8.16.4. Today the Health and Safety Executive (HSE) launched the Small Firms Assistance Scheme (SFAS), a pilot grant scheme designed to help small firms improve their health and safety performance. The scheme will run until May 2003 and will be operated on behalf of HSE by the Small Business Service and Business Links. It will operate in three regions – West Yorkshire, Essex, and Devon and Cornwall, which together represent the full range of industrial and rural small firms in Britain. The scheme will operate on a matched-funding basis.
Health and safety law requires employers to have a health and safety policy, conduct a risk assessment, take all reasonable measures to control the risks associated with their work activities, and have access to competent health and safety advice. For firms with more than five employees, the safety policy and risk assessment must be documented. Research commissioned by HSE has shown that generally small firms struggle with applying health and safety law effectively, but are reluctant to approach HSE directly for advice. The pilot scheme aims to plug this gap by providing the kind of help they need through intermediary organisations.

Judith Donovan, CBE, Health and Safety Commissioner for small firms said:

"All employers in Britain have legal responsibilities under health and safety law – and there is no reason why compliance should be expensive, time-consuming, or complicated. But for many small firms, health and safety is seen as a black hole. They know it's important, but they are unsure where to start.

"This scheme is designed to take the mystery out of health and safety by improving small firms' awareness and understanding of the issues. It is intended to generate sustained benefits by providing mentoring and training to encourage good practice and compliance with the law."

8.17. Proposal to Amend the Management of Health and Safety at Work Regulations 1999 and the Fire Precautions (Workplace) Regulations 1997. It is proposed to change the regulations to allow employees to claim damages from their employer where they have suffered injury or illness as a result of their employer breaching the Regulations. The Employment NTO is working with the HSE and the Institute of Conflict Management to develop National Occupational Standards in managing work-related violence. Employment NTO are anxious that the standards they are developing are clear and
understandable, reflect best practice and cover all aspects of the roles described. Advice Regarding Call Centre Practices would be useful for health and safety representatives and employers in Call Centers. It identifies potential Physical and Psychological health risks and highlights examples of good and poor working practice.


8.18.1. In this part we saw what measures industry has taken to tackle the problem of industrial safety and how the industry will meet its safety needs in the 21st century. What we must try to do is to prevent accidents as much as possible and encourage education in industrial safety. Interaction between worker and the environment leads to occupational health hazards. To minimize health hazards, there is a need to monitor the worker’s health and also working environment. Extensive statutory provisions have been made in India for prevention of industrial accidents and thus enhancing safety of industrial workers. Other nations also adopted this Act with the aim of reducing industrial accidents.

8.18.2. Our vision for the industrial safety needs in the 21st century centers around four key issues. As the scope of what our industry does has broadened, management’s concerns have grown closer to safety concerns. Hence two examples of research conducted and impacted at the core issues of industrial safety are narrated.

8.18.3. Consider expenditure on safety as an investment. The human angle for providing safety to industrial workers is equally important. Awareness of industrial hazards is equally important. When safety planning and safety measures are lacking, industrial operations may not remain under full control, schedules may get disrupted and cost may increase. When we have identified
the segment or segments of the future industrial safety projections commensurate with the industrial development, it will become clear what our industry should expect the danger to safety and what they need not expect in the times to come. Managing these expectations will take us a long way to meeting our industrial safety needs.

8.18.4. Any industry with strong self-awareness will prevent manufacturing process outside the true safety standards. Next, we must take a hard look at our industrial safety philosophy and approach. The next issue to address is the best way to achieve a truly worker-oriented industrial safety consciousness. When safety planning and safety measures are lacking, industrial operations may not remain under full control, schedules may get disrupted and cost may increase. The main driving force behind the industrial safety movement is the fact that accidents are expensive. Most of the management has a sincere, humanitarian interest in their employees; they emphasize on proper safety management, but also willingly allocate reasonable amount of money for safety. Cost of accident in industrial circles is associated with the financial loss to the management arising out of accidents at work place.

8.18.5. Today concept of industrial safety and social responsibility of managers in India is a beleaguered one. There is little expectation that industry will wholeheartedly invest in industrial safety, or safety inspectors will be taken seriously as the custodians of safety legislations. Most of the Indian industries do not appreciate the importance of industrial safety and linking with the rest of the society. In the initial years of independence, when worker safety enjoyed a certain degree prestige in the country, trade union activists did not pay any attention to the industrial safety and instead aimed for political positions. Indeed, without an appreciative audience, it is impossible to raise resources for industrial safety. Management must recognize that their core competence in industrial safety management is by advancing knowledge through critical research. Further
by accepting that the public has an integral role to play in the industrial safety, there is a constant pressure to upgrade the safety system, research and awareness standards.

8.18.6. The technological advancements and development of complex and hazardous processes, the management of Industrial Safety and Health (IH) has become a vital issue. The Directorate General Factory Advice Service and Labour Institutes (DGFASLI) should be tasked and sourced as they are the premier agency which is relied upon by Central and State Governments for a variety of information pertaining to occupational safety and health. Further, substantial increase in the number of registered factories, introduction of sophisticated modern technology and complexities in plant and equipment design have brought many constraints in the area of Industrial safety and Health policy making at national level. At the central government level the Ministry of Labour should be deeply concerned over the non-availability of industrial safety and health information for policy planning. Data bases in the area of Major Accident Hazard Installations, hazardous chemicals, national specialist, ship inspection, Parliament question; FAS Performa, Factories Act Amendment; Awards, etc. were developed. Information on Material Safety Data Sheets was disseminated to the industries and agencies related to occupational safety and health. The present Plan Scheme “Development of Safety & Health Information System and Data Bank” being operated during the 10th Plan envisages creation of the National Inventory on Occupational Safety and Health Information to widen the information base and making available the information at one source to help in the activities specially those related to policy planning directed at improving the occupational safety and health of the workers. The inventory will cover information pertaining to manufacturing activities covered under the Factories Act 1948, Occupational injuries and diseases in the sector, management of OSH at unit and state level. Delhi being the capital State of the country has got number of organizations working in the field of occupational safety, health and
environment under different ministries, departments of the State and Central Government. These organizations can develop a common platform where matter of occupational safety and health can be discussed and policies at the State level may be formulated which may be followed as a model by the other States.

8.18.7. All employees are individually and collectively responsible for safety. Safety posters and notices should be displayed to caution workers against possible hazards. Periodic inspection by safety engineering department, labour officer, and engineer-in-charge of the department or the representatives is required. In gas hazard areas, necessary gas safety precautions should be followed. Workers going into the inspection chamber shall have gas masks, gumboots, and rubber gloves while working inside. Safety boots and helmets must be used by the employees working inside the works. Safety goggles must be worn while grinding whether by means of portable electrical grinder or working on a table with grinding machine. Safety belts must be worn when working at heights. Suspended scaffolds should be tested as frequently as necessary to ensure at least minimum safety factor. All the employees working in places where they are exposed to falling hazards should use safety belts. Avoid working on live equipment as far as practicable. Temporary installation shall also confirm to all safety precautions laid in I.E Rules. Safety belt, apron, hand gloves etc. Gas protection apparatus should always be worn when working in gas contaminated areas. Workers in gas hazardous area should work in pairs.

8.18.8. The management profession must note that the industrial safety management problems present some of the most challenging frontiers of development. The future scenario for industrial safety calls for a major reorientation of philosophy, policy and practices. It is the responsibility of every manager to ensure that safety health and hygiene in industrial society is not compromised.