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Introduction
CHAPTER 1
INTRODUCTION

Industrial Health and safety standards play a vital role in a better industrial relation or a positive impact on reduction of industrial accidents in the enterprises. The term employees’ satisfaction may be viewed as a total concept, as a social concept and as a relative concept. The total concept is a desirable state of existence involving the physical, mental, moral and emotional well-being. The relative concept of welfare implies that welfare is relative in time and place. It is a dynamic and flexible concept and hence its meaning and content differ from time to time, region to region, industry to industry, level of education, social custom, and degree of industrialization and general standards of socio-economic development of people. The health and safety of employees in the workplace is a major concern for employers and employees. Detailed employment laws and legislation have been created covering this area. All organisations that employ five or more people must have a written safety policy, which sets out:

- who is responsible for workplace health and safety
- Arrangements that have been made for health and safety.
- It’s an established fact that working in corporate sectors is considerably safer than working in mines and factories. The working environment is made conducive for employees and safety is ensured to avoid minor accidents like tripping or skidding inside office. Chances of short circuits and outbreak of fire are always there. So fire extinguishers are always installed. Accidents inside elevators, although not frequent, could be dangerous and to avoid this they should be always monitored for proper functioning.
- Safety at underground mines is the most important concern of a mining company. Working underground always carries potential life risks. Most workplace accidents have been reported in underground mines and therefore, there should be sufficient provisions for eliminating such mishaps. Miners are provided with helmets, goggles and other equipment to ensure safety while working. Mining trolleys and lifts are regularly monitored to avoid
transportation accidents. Food and water is provided and other requirements are taken care of. Their work zone is inspected regularly to prevent unforeseen accidents from taking place.

- Working in nuclear plants is definitely a risky job because there are chances that you might get exposed to radiation leakage. Nuclear safety systems mostly ensure that no radioactive materials are released even during accidents, while workers are given high protection while working in its vicinity. They are equipped with special radiation proof jackets, masks, goggles and caps. Exposure to radiation causes cancer, which in most cases is fatal. Thus, protecting workers' health is the primary concern of nuclear plants and companies.

1. Industrial health and safety is an important facet of industrial relations, the extra dimension, giving satisfaction to the worker in a way, which even a good wage cannot. With the growth of industrialization and mechanization, it has acquired added importance. The workers, both in industry and agriculture cannot cope with the pace of modern life with minimum sustenance amenities. He needs an added stimulus to keep body and soul together. Employees have also realized the importance of their role in providing these extra amenities, and yet, they are not always able to fulfil workers demand, however reasonable they might be.

2. Industrial health and safety standards imply the setting up of minimum desirable standards and the provision of facilities like health, clothing, housing, medical, education, insurance, job security, recreational etc. to enable the worker and to live a good working life and social life. So the role of good health and safety standards ensures the better industrial relation in reducing the industrial accidents.

1 Small and Medium Enterprises

In India, the Micro and Small Enterprises (MSEs) sector plays a pivotal role in the overall industrial economy of the country. It is estimated that in terms of value, the sector accounts for about 39% of the manufacturing output and around 33% of the total export of the country. Further, in recent years the MSE sector has consistently
registered higher growth rate compared to the overall industrial sector. The major advantage of the sector is its employment potential at low capital cost. As per available statistics, this sector employs an estimated 31 million persons spread over 12.8 million enterprises and the labour intensity in the MSE sector is estimated to be almost 4 times higher than the large enterprises.

3. Micro, Small and Medium Enterprises

4. (a) Enterprises engaged in the manufacture or production, processing or preservation of goods as specified below:

5. i) A micro enterprise is an enterprise where investment in plant and machinery (original cost excluding land and building and the items specified by the Ministry of Small Scale Industries vide its notification no. S.O. 1722 (E) dated October 5, 2006) does not exceed Rs. 25 lacs;

6. ii) A medium enterprise is an enterprise where the investment in plant and machinery (original cost excluding land and building and the items specified by the Ministry of Small Scale Industries vide its notification No. S.O. 1722 (E) dated October 5, 2006) is more than Rs. 25 lacs but does not exceed Rs. 5 crore; and

7. (b) enterprises engaged in providing or rendering of services and whose investment in equipment (original cost excluding land and building and furniture, fittings and other items not directly related to the service rendered or as maybe notified under the MSMED Act, 2006) are specified below these will include small road & water transport operators (owning a fleet of vehicles not exceeding ten vehicles), retail trade (with credit limits not exceeding Rs. 10 lacs), small business (whose original cost price of the equipment used for the purpose of business does exceed Rs. 10 lacs which not more than Rs. 2 lacs should be for working capital requirements and rural areas, the borrowing limits should not exceed Rs. 15 lacs with a sub-ceiling of Rs. 3 lacs for working capital requirements).

8. (i) A micro enterprise is an enterprise where the investment in equipment does not exceed Rs. 10 lacs.
9. (ii) A small enterprise is an enterprise where the investment in equipment is more than Rs. 10 lacs but does not exceed Rs. 2 crore; and
10. (iii) A medium enterprise is an enterprise where the investment in equipment is more than Rs. 2 crore but does not exceed Rs. 5 crore.

1.2 Constitutional Provisions Regarding Health and Safety

The Constitution of India provides detailed provisions for the rights of the citizens and also lays down the Directive Principles of State Policy which set an aim to which the activities of the state are to be guided.

These Directive Principles provide

(a) For securing the health and strength of employees, men and women;
(b) That the tender age of children are not abused;
(c) That citizens are not forced by economic necessity to enter vocations unsuited to their age or strength;
(d) Just and humane conditions of work and maternity relief are provided; and
(e) That the Government shall take steps, by suitable legislation or in any other way, to secure the participation of an employee in the management of undertakings, establishments or other organizations engaged in any industry.

On the basis of these Directive Principles as well as international instruments, Government is committed to regulate all economic activities for the management of safety and health risks at workplaces and providing measures so as to ensure safe and healthy working conditions for every working man and woman in the nation. Government recognizes that safety and health of workers have a positive impact on productivity and economic and social development. Prevention is an integral part of economic activities as high safety and health standard at work are as important as good business performance for new as well as existing industries.

1.3 Role of Government

The formulation of policy, priorities and strategies in occupational safety, health and environment at work places, is undertaken by national authorities in consultation with social partners for fulfilling such objectives. A critical role is played by the Government and the social partners, professional safety and health organizations in ensuring prevention and also in providing treatment, support and
rehabilitation services. Government of India firmly believes that without safe, clean environment as well as healthy working conditions, social justice and economic growth cannot be achieved and that safe and healthy working environment is recognized as a fundamental human right. Education, training, consultation and exchange of information and good practices are essential for prevention and promotion of such measures. The changing job patterns and working relationships, the rise in self employment, greater sub-contracting, outsourcing of work, homework and the increasing number of employees working away from their establishment, pose problems to management of occupational safety and health risks at workplaces. New safety hazards and health risks will be appearing along with the transfer and adoption of new technologies. In addition, many of the well known conventional hazards will continue to be present at the workplace till the risks arising from exposure to these hazards are brought under adequate control. While advancements in technology have minimized or eliminated some hazards at workplace, new risks can emerge in their place which needs to be addressed. Particular attention needs to be paid to the hazardous operations and of employees in risk prone conditions such as migrant employees and various vulnerable groups of employees arising out of greater mobility in the workforce with more people working for a number of employers, either consecutively or simultaneously. The increasing use of chemicals, exposure to physical, chemical and biological agents with hazard potential unknown to people; the indiscriminate use of agro-chemicals including pesticides, agricultural machineries and equipment; industries with major accident risks; effects of computer controlled technologies and alarming influence of stress at work in many modern jobs pose serious safety, health and environmental risks. The fundamental purpose of this National Policy on Safety, Health and Environment at workplace, is not only to eliminate the incidence of work related injuries, diseases, fatalities, disaster and loss of national assets and ensuring achievement of a high level of occupational safety, health and environment performance through proactive approaches but also to enhance the well-being of the employee and society, at large. The necessary changes in this area will be based on a co-ordinate national effort focused on clear national goals and objectives.
Every Ministry or Department may work out their detailed policy relevant to their working environment as per the guidelines on the National Policy.

1.4 Joint ILO/WHO Committee on Occupational Health

The comprehensive definition adopted by the Joint ILO/WHO Committee on Occupational Health at its First Session (1950) and revised at its Twelfth Session (1995), occupational health should “aim at the promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations”. For the International Occupational Hygiene Association (IOHA),

“Occupational hygiene is the science of the anticipation, recognition, evaluation and control of hazards arising in or from the workplace, and which could impair the health and well-being of workers, also taking into account the possible impact on the surrounding communities and the general environment”.

The existing OSH standards apply in principle to small and medium-sized enterprises (SMEs). However, practical experience clearly shows that the application of the standards is limited in this area. Primary reasons are the limited awareness among SMEs of the existence of OSH standards and, where there is awareness, the limited experience and knowledge of how to comply with the standards without jeopardizing business performance.

Furthermore, there are often no support services available to these enterprises to assist them in complying. Local institutional capacity is often limited both in the institutions that are traditionally responsible for OSH as well as in the institutions providing business development services to SMEs, and it is not able to address their specific needs and demands in terms of compliance. Standards become relevant to SMEs only when a “win-win” situation can be created and practical guidelines, which fully recognize and accommodate their specific needs, are made available to them. The ILO InFocus Programme on Skills, Knowledge and Employability (IFP/SKILLS) and the ILO InFocus Programme on Boosting Employment through Small Enterprise Development (IFP/SEED) both include occupational health and safety in their small enterprise development activities and address those needs to a significant extent by promoting safe work practices within a business context.
Health and Safety of the employees are important aspects of an organization's smooth and effective functioning. Good health and safety performance ensures an accident free industrial environment. Awareness of occupational health and safety (OH&S) still needs improvements in India considerably. Organizations have not yet started attaching the same importance to achieve high OH&S performance as they do to other key aspects of their business activities. This demands adoption of a structured approach for the identification of hazards. A properly documented OH&S management manual enables an organization to formulate policies and objectives, taking into account statutory requirements and information about significant hazards and risks, which the organization can control and over which it can be expected to have an influence, to protect its employees and others, whose health and safety may be affected by the activities of the organization.

Occupational health and safety is a cross-disciplinary area concerned with protecting the safety, health and welfare of people engaged in work or employment. The goal of all occupational health and safety programs is to foster a safe work environment. As a secondary effect, it may also protect co-workers, family members, employers, customers, suppliers, nearby communities, and other members of the public who are impacted by the workplace environment. It may involve interactions among many subject areas, including occupational medicine, occupational (or industrial) hygiene, public health, safety engineering, chemistry, health physics, ergonomics, toxicology, epidemiology, environmental health, industrial relations, public policy, industrial sociology, medical sociology, social law, labour law and occupational health psychology. Stricter labour standards and their meticulous implementation in regard to occupational safety may in fact be the contributing factor in bringing about higher efficiency, productivity and growth. In the last fifty years, Indian Industry has grown rapidly and more so in the last two decades. This has resulted in increased manufacturing activities, technological advancements and change in work practices. Such a change in business environment would have affected the health of working population which would call for application of stricter and refined regime of occupational safety at workplaces so that the productivity of workers continues to rise in the competitive market economy. However, there are
several instances available which believe such an expectation. Rather such instances are a pointer to the fact that working conditions have become more hazardous. In 1984, Ponds set up a thermometer factory in Kodaikanal by transporting a dismantled plant from the US. The plant was taken over in 1997 by Hindustan lever limited. In 2001, a case of dumping by the plant was uncovered. The factory had not only exposed its workers to the hazardous mercury, but also released tons of mercury waste into its surroundings. Mercury is a neurotoxin and it can damage the brain, heart, kidney, and liver. Workers were not informed about the hazardous nature of mercury, nor were they given any protective gear. This has led to at least 19 deaths till date and the workers have been pushed into destitution because of huge medical bills. The company has disowned any liability and is delaying clean up to international Standards. This is surely not an isolated case of exposing workers to hazardous Working conditions. Stone-quarrying companies in the National Capital Region had Imperiled the lives of thousands of quarry workers by exposing them to silica Poisoning causing irreversible lung diseases. In the same vein, more than 1, 00,000 Workers are working in asbestos industry under the pretence of a doctored study.

There are many such instances of increased hazards for workers in various sectors including in the expanding health sector where the workers are exposed to an array Of unknown hazards. It is expected that those in authority who advocate labour reforms for higher economic growth should be aware of their constitutional responsibilities as mandated under Articles 39(e), 41, 43, 48A “to make the life of the workman meaningful and purposeful with dignity of person”. The State shall direct its policy towards securing:

a) The health and strength of workers, men and women;
b) That the tender age of children is not abused;
c) The citizens are not forced by economic necessity to enter vocations unsuited To their age or strength; and
d) Just and humane conditions of work and maternity relief.
1.5 Supreme Court Views Regarding Health and Safety Provisions

Besides, various judgments of Supreme Court have under Article 21—right to life—upheld the right of employees' health. The Court has noted that “occupational accidents and diseases remain the most appalling human tragedy of modern industry and one of its most serious forms of economic waste.” Though for argument’s sake, the Directive Principles may not be enforceable, any acquiescence, by the State towards negating the directive principle would be hard to justify legally; however such acquiescence may be economically rewarding.

On behalf of corporate and business it is in vogue to talk about Corporate Governance and Corporate Social Responsibility. Surely, good business practices include sound labour practices which provide for healthy and safe working environment for workers and the community at large. An enlightened management would so orient their procurement policies to exclude such establishments which fall short of safety standards.

1.6 In Post Liberalization Period and Developments of Health and Safety Provision

Since the beginning of liberalization in 1991, many regulations have been brought. About to facilitate economic growth and development but hardly any initiative has been taken to ameliorate the working conditions of laborers even from health and safety angle. Despite the increasing manufacturing and mining activities, regulatory authorities ensuring occupational safety have been limited to 1,400 safety officers, 1,154 factory inspectors and 27 medical inspectors. These numbers are grossly inadequate even for the inspection of formal units that only employs 10% of India’s total workforce (around 26 million); let alone the millions who work in the informal sector with absolutely no safeguards. It is estimated that unsafe work conditions is one of the leading causes of death and disability among India’s working population. These deaths are needless and preventable. Unlike growth rates and GDP figures that are flaunted every quarter, the figures of dying and ailing workers who are participants in India’s growth story are never recorded or spoken about. The only way to get an idea of the scale of the problem is from data released by the ILO, which estimates that around 4, 03,000 people in India die every year due to work related
problems, that is, about 46 every hour. Legislation on occupational health and safety has existed in India for several decades. The principal health and safety laws are based on the British Factories Act. The Factories Act, 1948 has been amended in 1954, 1990, 1976 and 1987. The amendments demanded a shift from dealing with disaster or disease to prevention of its occurrence. The Act, however, is applicable only to factories that employ 10 or more workers; it covers only a small proportion of workers. Other key legislations dealing with occupational safety and health (OSH) are: Mines Act, 1952; Dock Workers (Safety, Health and Welfare) Act, 1986; Plantation Labour Act, 1951; Explosives Act, 1884; Petroleum Act, 1934; Insecticide Act, 1968; Indian Boilers Act, 1923; Dangerous Machines (Regulations) Act, 1923; Indian Atomic Energy Act, 1962; Radiological Protection Rules, 1971; Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989; Electricity Act, 2002.

The Health and Safety at Work Act, 1974 is the most important Act in this area but it has recently been updated by a number of European Union Directives. In 1992 Health and Safety Regulations were set out in a set of measures, termed the 'six pack' - setting out rules and obligations for employers and employees. The Control of Substances Hazardous to Health Regulations, 1994 set out clear rules for the handling, storage and recording of the use of dangerous chemicals. The Health and Safety (Display Screen Equipment) Regulations, 1992 set out clear directions and requirements for the use of display screens on word processors, as a measure to prevent illnesses and headaches resulting from the use of such equipment.

The Directorate General of Factory Advice Service and Labour Institutes in the ministry of Labour provide inputs for national policies on occupational safety and health in factories and docks, and enforcing them through inspectorates of factories and inspectorates of dock safety. Directorate General of Mines Safety, Ministry of Labour, oversees the health and safety of mine workers and implementation of Mines Act, 1952. Worker's Compensation, sometimes referred to as 'Workman's Compensation' or 'Worker's Comp', is the name given to a system of laws meant to protect injured workers. The goal is to make sure that somebody who is injured at work receives appropriate medical care, lost wages relating to the on-the-job injury,
and, if necessary, retraining and rehabilitation, so as to be able to return to the workforce.

1.7 Conferences on Occupational Safety and Health

When workers are killed on the job, members of the workers' families are ordinarily eligible for benefits. Besides this, there is the Employees' State Insurance Act which protects the workers in case of sickness, maternity and disabilities caused by injuries and resultant loss of wages. There are at least 18 ILO conventions that are targeted at addressing the issue of Occupational Safety and Health (OSH). So far, India has ratified only three such conventions. India is yet to ratify important conventions like Convention 155 on occupational safety and health and the working environment, Convention 161 on occupational health services, Convention 167 on safety and health in construction, Convention 176 on safety and health in mines, Convention 184 on safety and health in agriculture, Convention 187, the promotional framework for occupational safety and health. Legal framework for the protection of workers in the formal units which employ only 10% of the workforce, has been in existence for long but the implementation has been lax. Number of safety officers, factory inspectors and medical inspectors has remained below optimal level. According to a recent assessment, there are twenty one institutions across the country capable of training 460 specialists. This number is obviously inadequate considering the population of India's working class. There are around 1,000 qualified occupational health professionals in India and only around 100 qualified hygienists. At present, the need for occupational health specialists in the country is much higher and there is a significant gap in the demand and supply of this specialist service. Accidents, despite being visible, are grossly underreported in the Indian context. The reporting of insidious occupational diseases therefore stands little chance. If an analysis is made of the workers who die because of their work environment, most of them succumb to occupational cancers and other work-related illnesses. This is contrary to the common belief that most work-related deaths are caused by accidents. In most places, occupational safety and health invariably means prevention of accidents, very little attention is paid to occupational diseases. An accident free workplace by no means implies a safe workplace. Occupational diseases—including

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cancers caused by various materials in the workplace, including asbestos, carcinogenic chemicals, silica, cotton, dust, and radiation, job stress and work shifts—usually take a long time to develop (sometimes more than 10 years). Given the changing work practices, most of the establishments tend to hire workers on short-term contract. By the time they develop a disease, it becomes impossible to link the same to their working environment. Non-communicable diseases result in more deaths than communicable diseases. Overall, people are more likely to die during work-related diseases than childhood or infectious diseases.

Not many doctors are able to correctly diagnose an occupational disease. In fact, certain occupational diseases like byssinosis and silicosis are often wrongly diagnosed as tuberculosis. In a community where having a doctor is a privilege an OSH specialist is simply out of question. Most workers in India (90%) work in the vast informal sector. The variable and insecure nature of the work means that more and more workers are pushed into taking up hazardous and precarious employment both in the informal economy as well as informal work in the formal sector. For these workers, employment not only fails to bring about a successful escape from poverty, it may contribute to existing vulnerabilities. There is very little awareness about workplace hazards due to lack of access to information, or even any kind of formal education. Informal workers give low priority to OSH, as having work is more important than the quality of the job.

Many workers argue that they may die of work, but if they do not work their families would die of hunger. In any case, family members of those active in the informal sector also get exposed to work-related risks. Diagnosis of occupational diseases is difficult even in the formal sector; in the informal sector it is almost impossible. The impact of OSH hazard on women and children would be much harder. In addition to paid work, women also do other demanding jobs like cooking, cleaning and bearing and taking care of children. The extended work hours puts tremendous pressure on women's bodies and minds. Because of uncomfortable positions at workplaces and that too for long hours, women develop muscular-skeletal disorders. Pregnant women working with chemicals like solvents in the fields are exposed to chemical poisoning; in the process, their foetuses are also exposed to the
toxins in workplaces. As a result, their children’s developing bodies are susceptible to harm. Over the years, the proportion of female working population particularly in the farm and rural sectors is on the rise. OSH issues among female workers are thus becoming alarming due to certain diseases and stress which can cause irreversible harm to newborns.

Thus, the occupational health scenario has undergone a paradigm shift due to rapid Industrialization. Inadequate attention to the developing shift from leaders in the Society bespeaks of indifference to the very basic human resource which contributes to growth. Productivity at work is directly influenced by the health status of workers. An unhealthy workforce is a drag on workplace productivity; affecting overall national productivity. Poor occupational health and reduced working capacity of the workers may cause an economic loss of up to 10–20% of GNP. WHO estimates that only 10–15% of workers have access to basic occupational health services. The burden of disease attributed to occupational diseases is high and it is estimated to be about million cases annually, with about 7,00,000 deaths. According to a World Bank estimate, two-thirds of the occupationally determined loss of disability adjusted life years could be prevented by occupational health and safety programmes. With over 40 million belonging to the working population, India has a very large population base engaged in industrial activity. The health needs of these populations also differ according to the industry of work. The knowledge and orientation for diagnosing such occupation-specific conditions are evolving globally in the form of specialty health care. However, for changing the mindset of the leaders in different sectors, it would be necessary to integrate various tasks involved into a single multi-disciplinary authority that would be capable of multi-tasking across all the sectors. Presently, existing fragmented approach of relying on sector specific legislation, administered by fragmented agencies will not do. Structural changes have been brought about in the UK, way back in 1974 when that country enacted the Health and Safety at Work etc. Act 1974 (HSWA 1974). Through this Act, an attempt was made to rationalize the then existing complex and confused system of legislation in this area. The broad objectives of the Act were stated as follows:
- Securing the health, safety and welfare of persons at work.
- Protecting persons, other than persons at work, against risks to health or safety arising out of or in connection with the activities of persons at work.
- Controlling the keeping and use of explosive or highly inflammable or Otherwise dangerous substances and generally preventing the unlawful Acquisition, possession and use of such substances.
- As originally enacted, there was a fourth objective: Controlling the emission into the atmosphere of noxious or offensive substances.

This provision was repealed when control of emissions was brought under a uniform scheme of legislation by the Environmental Protection Act 1990. Thus, the Act of 1974 became the Principle Act to govern the health and safety at work across the sectors. The Act has since created statutory instruments in the form of codes of practices for specific areas. Such examples are: Control of Substances Hazardous to Health Regulations 2002; Management of Health and Safety at Work Regulations 1999; Personal Protective Equipment at Work Regulations 1992 and the Health and Safety (First Aid) Regulations 1981. Such statutory instruments have laid down detailed requirements in fulfillment of the objective of rationalizing the existing complex and confused system of legislation. The Act at one place defined general duties of employers, employees and contractors and suppliers of goods and services, persons in control of work premises, and those who maintain and manage them, and persons in general.

Regulatory activities related to industrial safety

1.8 Safety Review Committee

In June 1987, DAE-SRC was renamed as Safety Review Committee for Operating Plants (SARCOP) and AERB designated four major divisions which included Industrial Safety Division (ISD) led by D.K. Dave and was entrusted with the responsibility for ensuring industrial safety in DAE units. From 1990 this division was headed by P.K. Ghosh. Through this division AERB started issuing formal licenses to operating personnel of HWPs after reviewing their qualification, experience and training. AERB started issuing approval to Competent Persons under the Factories Act and issuing of licenses to the industrial units of DAE under the
Factories Act. AERB also designated Competent Persons under the relevant sections of the Factories Act for civil construction and structural works, operation of dangerous machines, lifts and hoists, lifting machinery, lifting tackles, pressure plant, dangerous fumes, supervision of handling of hazardous substances and ventilation system.

In January 1994, ISD was reconstituted as industrial and Radiation Safety Division (IRSD) as a part of the Directorate of Regulatory Inspection and Enforcement (DRI & E). This division now handled the operating industrial units of DAE and their projects as well as the non-DAE activities involving radioactive sources and radiation generating equipment. In 1994, the responsibility for regulatory inspection and enforcement of Factories Act and the Atomic Energy (Factories) Rules, 1984 in DAE units was also transferred from Inspection Section (Factories Act) of BARC to IRSD and subsequently this section was merged with IRSD of AERB.

The Factories Act, 1948 lays down the provisions of industrial safety requirements in factories. The responsibility for implementation of this Act lies with the State Government. However, by virtue of the Atomic Energy Act, 1962, the responsibility for administration of the Factories Act in DAE units has been vested in the Central Government. Prior to formation of AERB, industrial safety aspects of DAE facilities were looked after by Industrial Hygiene and Safety Section (IHSS) of Health Physics Division, BARC. IHSS advised various plants on industrial hygiene and safety aspects of the design and operations. It also carried out measurement of toxic pollutant. It investigated industrial accidents and brought out periodic reports on industrial safety aspects DAE facilities. The inspection Section (Factories Act) of BARC used to enforce the provisions of the Factories Act, 1948 in the unit of DAE. These sections provided the inputs of the safety Review Committee of DAE (DAE-SRC) which had the responsibility for overseeing the safety of DAE units. Atomic Energy (Factories) Rules were first published in 1984 based on the Factories Act.

Within few years of its formation, AERB constituted a committee in 1985 for review of Industrial Safety Status in Department of Atomic Energy Units (RISSDAEU Committee) with M.S.R. Sharma, the then Director, and Nuclear and
Industrial Safety Division, AERB as Chairman. The committee held meetings with DAE organizations and visited some of them. The recommendations of the committee were categorized as 'General', which were applicable to all units and 'Specific', which related to the facility concerned. The 'General' recommendations pertained to safety management which included safety policy, safety organization, cadre of safety, awareness and understanding statutory requirements, development of safety culture, safety training requirements, emergency plans, etc. The 'specific' recommendations related to issues specific to plants such as augmentation of ventilation (NFC & IRE), correction of certain design deficiencies (HWPK, NFC, NAPP), management of H₂S problems (HWPK), etc.

In 1988, AERB constituted another Committee to Review the Industrial Safety Status in R & D units of DAE with H.N. Kaul, the then Executive Director, and HWB as Chairman. The recommendations mainly pertained to applicability and compliance with provisions of statutory acts & rules like Factories Act, 1948, Atomic Energy (Factories) Rules, 1984 to R & D units. The major recommendations were related to safety policy, safety organizations, assurance of safety, emergency planning, accident investigation & analysis, occupational health etc.

Fire safety study committee for Fire Safety study was appointed by Chairman, AEC in February 1991 under the Chairmanship of G.R. Balasubramanian consisting of experts in this field from AERB/DAE and non-DAE units. The committee was appointed to identify major fire hazards; requirement or availability of fire protection committee visited all the twenty three nuclear installations and made recommendations for improvement of fire safety for each unit. This committee was later renamed and reconstituted by Chairman, AERB as Advisory Committee on Fire Safety (ACFS) with S. Sen and later N.K. Aggarwal as chairman.

Review of the atomic energy (factories Rules, 1984): Amendments were made in 1987 to the Factories Act, 1948 as a sequel to Bhopal gas disaster. AERB had also received significant feedback from the operational experience of implementation of Atomic Energy (Factories) Rules, 1984 in DAE units. In the light of these as well as recommendations made earlier by RISSDAEU Committee, it was felt necessary to amend the existing Atomic Energy (Factories) Rules. A committee consisting of
experts from BARC, DGFASLI and AERB was entrusted the responsibility to review the Atomic Energy (Factories) Rules, 1984 and propose the amendments. The amendments rules after review in AERB and vetting by various ministries of Government of India were published in the Gazette of India as Atomic Energy (Factories) Rules, 1996, Chairman AERB for the first time designated some of the senior officers of AERB as inspectors under the Factories Act, 1948.

**Industrial Safety Regulation (2000-2008):** Following an organizational restriction in AERB in 2000, IRSD was renamed as Industrial Plants Safety Division (IPSD). The regulatory inspections for enforcement of the Atomic Energy (Factories) Rules, 1996 are now being carried out by IPSD for all nuclear fuel cycle facilities including nuclear power plants and projects and DAE accelerator facilities.

To bring industrial safety structure at par with that of nuclear and radiation safety, the Board reconstituted the ACFS as the Advisory Committee on Industrial and Fire Safety (ACIFS) in May 2005 with H.N. Mirashi, former Director, DISH, Govt. of Maharashtra as the Chairman in line with Advisory Committee on Nuclear Safety (ACNS) and Advisory Committee on Radiation Safety (ACRS). The scope of ACIFS was now extended to include the industrial safety aspects also. In September 2008, S.K. Mukherjee, Former, Executive Director (HSE), HPCL, Mumbai took over as the Chairman of the Committee. ACIFS advises AERB on generic industrial and fire safety issues, recommends measures on industrial safety aspects for prevention of accidents at all DAE installations including projects under construction, provides guidance on the overall planning for fire safety issues, recommends measures on industrial safety aspects for prevention of accidents at all DAE installations including projects under construction, provides protection at all DAE installations, conducts final review of the safety documents being developed by AERB on industrial and fire safety and advises on preparation of new documents and revision of existing ones on the subject.

The industrial safety aspects of uranium and thorium mines were being enforced by both Directorate General of Mines Safety (DGMS) and AERB. Based on a decision by DAE and AERB to remove this dual regulation, Chairman AERB issued an office order in October 2005. As per this order, Industrial Safety in mines of DAE
(Where Factories Act is not applicable) would be solely under the purview of DGMS under the Mines Act.

Industrial and fire safety review: IPSD prepared a checklist for Fire Safety Audit and based on this checklist AERB directed all DAE units to carry out Fire Safety Audit which is a detailed study and assessment of the fire prevention programme. The audit is required to be carried out by persons independent of the plant and the review is to be focused on site specific requirement, depending on the hazards potential of plan operation.

During life extension review of TAPS-1&2 and MAPS, AERB carried out a detailed study on the up-gradation of the fire protection system to meet the current standards. The recommendations of the study were implemented. These studies formed the basis of fire hazard analysis for all fuel cycle facilities and formed a regulatory requirement for consenting process. Guidelines for conducting fire hazards analysis have been incorporated in the AERB Standard for Fire Protection in Nuclear Facilities. Over the years AERB has enhanced its risk assessment capability by application of the state of the art software like FDS, COMPBRN-III etc for fire hazard analysis and PHAST, ALOHA, SAVE-II, EFFECTS etc for chemical consequence and risk analysis. IPSD carried out fire risk assessment study for Heavy Water Plants and several hazard identification studies and consequence analysis for projects and operating units with respect to hazard potential.

IPSD regularly reviews the tri-annual Safety, Health and Environment (SHE) reports containing information on injury statistics, fire occurrences, environmental releases etc. Safety Related Unusual Occurrences Reports (SRUOR) related to Fire and Industrial Safety events are subjected to three-tier review, namely, the Plant Safety Committee, Unit Safety Committees and SARCOP.

1.9 Fatal accident assessment

Fatal Accident Assessment: AERB constituted a Fatal Accident Assessment Committee [FAAC] to assess fatal accidents in DAE units and to arrive at the root causes of accident and preventive actions to be taken to avoid recurrence. Due to concern over the increase in fatal accidents at the Construction Sites of DAE, AERB issued in July 2002 the notification on "Industrial Safety Personnel at Construction
Sites" which stipulates the minimum requirement of safety personnel and their qualifications. AERB also organized a discussion meeting of the plant heads of DAE in July 2004. The meet focused on the job hazard analysis for different jobs/activities carried out at construction sites. Emphasis was given on strict usage of personal protective equipment, safety training to the workers, penalty clauses in tender documents, and supervision of the workplace and empowerment of inspectors. To further strengthen the industrial safety in DAE units, AERB issued another notification in November 2004 on "Empowerment of Inspectors- Power to Stop Work" in case of unsafe conditions. The minimum safety requirements needed on site were specified along with this notification.

Despite these measures, fatal accidents recurrence continued at construction sites of DAE. In view of this AERB organized a meeting with all unit heads of DAE in August 2005 to discuss various pertinent issues like lack of supervision, inadequate job hazard analysis, violation of safety norms, faulty procedures etc. Consequently, it was decided that special regulatory inspections of all construction units of DAE shall be carried out once in every month from September 2006 onwards with particular emphasis on works at heights. These monthly inspections have helped in improvement of safety culture at construction sites and betterment of safety.

Safety Professional Meet: The first Meeting of the safety professionals was held way back in June 1982 at Kalpakkam under the leadership of G.R. Balasubramanian, the then Head, reprocessing Programme at IGCAR. The meet was attended by 9 safety professionals. Subsequently, the next three meets were also held at Kalpakkam. In the 5th Meeting of Safety Professionals, held at Mumbai in September 1988, the then Chairman, SAR COP, M.S.R. Sharma informed about the report brought out by the RI SSADEAU Committee. During the meeting two major decisions were taken (i) to hold workshop at the individual units to discuss statutory requirements and their implications and (ii) to conduct a seminar on industrial safety. As a follow-up to the meet, a one-day workshop was organized with the top management of Department of Atomic Energy at OYC auditorium, Mumbai. The requirements like commitments to the provisions for safety in tender documents,
safety organization at site and headquarters, safety supervision, safety review, responsibilities of management etc were discussed in great detail in the workshop.

During this workshop it was decided that one day seminar should be conducted during the safety officers meet to be held at various units and an attempt should be made to bring in the local authorities like Inspectorate of Factories, etc. for participation in the two days workshop. The 6th DAE safety professionals meet was held at JGCAR, Kalpakkam. It was then decided that AERB should conduct the safety professionals meet every year at various units with the help of concerned units. The 7th meet was held at Kakrapar Atomic Power Station in August 1990 and for the first time, a theme was assigned to the meet. Since then, safety professional’s meets are being held at different DAE units to discuss safety issues and to share information.

The 11th Safety Professionals meet was held at NFC, Hyderabad in November 1994. This meet was preceded by one-day seminar on "Occupational Health". The meet was attended by safety professionals and doctors of various units of DAE. It was felt that the medical officers should also be aware of the various legislations relating to occupational health and it was then unequivocally decided that all Medical Officer/Certifying Surgeons shall meet every year during the DAE Safety Professionals Meet to discuss the various issues of occupational health. This meet became the forerunner for future safety and occupation health professionals meet. From 15th DAE Safety and Occupational Health Professionals meet, AERB decided to arrange endowment lecture of experts in various field for knowledge up-gradation of the safety professionals. In the 24th meet it was announced that the future endowment lectures would be named as Ramaswamy Memorial Endowment Lecture in memory of Late Dr. S.S. Ramswamy, Former Member, AERB Board. A monograph on construction safety was also released during the meet.

1.10 Recent Developments

The experience and feedback gained over the years while enforcing the regulations has served as valuable inputs for further strengthening of the regulations. Based on the current amendments to the Factories Act, 1948, the review amendments to the Atomic Energy (Factories) Rules, 1996 are now being carried out. Similarly review of AERB Standards for Fire protection systems of Nuclear Facilities has been
undertaken to incorporate the current changes and developments in Fire Safety. Review of Safety Guide on Works Contract is being carried out in the light of the experience gained in the construction safety in various DAE units. Thus regulatory activities related to industrial and fire safety has come a long way since the inception of AERB. However, there is a constant endeavour in AERB to keep upgrading the industrial and fire safety status in DAE units.

Voices have been raised by leaders in the Government and Corporate sector against inflexible labour laws which have been limiting the rate of growth. But in spite of these laws, it has been possible to record high growth rates—there has been growth in almost all the sectors including in hazardous processes of mining machinery and building activates. However, the laws pertaining to health and safety of workers at workplaces have remained static. There is an upward swing in the number of accidental deaths and injuries and occupational diseases— but the figures reported are much lower than the actual figures. Specialized manpower and related infrastructure for dealing with health and safety aspects of workers and surrounding safety has already been announced in 2010, it lacks guidance in implementation. Developed countries like the UK have placed in position umbrella legislation and an apex institution to cover health and safety of workers in all the sectors and have devised sound mechanism for achieving significant development results. It is imperative that India also adopts a similar approach within a compressed time frame. It is one labour reform which governments and corporate should perceive as a productivity investment strategy targeted at both early gains and long-term goals.