

WORK ENVIRONMENT HAZARDS IN INDUSTRIES – AN OVERVIEW

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Abstract: *The occurrence of series of catastrophic events involving hazardous substances in the recent past has diluted the efforts in the direction of prevention of workplace contamination due to harmful physical and chemical agents all over the world including India. In India the permissible limits of harmful chemicals were introduced in the Factories Act in 1987 yet the efforts to monitor and ensure their enforcement has not been a priority issue till now. Still, the workplace environment is constantly improving due to the influence of international standards, conditions imposed by international financing organisations and import of technology from the developed countries. The paper summarises the common work place environment problems in about 53 industries/ industrial operations. The foundry operations for instance have been identified to pose the hazards of silica containing dust in sand preparation, mould and core making, shake out/knock out, fettling & grinding, sand/shot blasting etc. In addition to the above, the exposure to toxic metal fumes while metal melting and pouring, carbon monoxide from the furnaces and pouring of the molten metal into moulds, excessive noise in fettling operations, excessive heat stress due to furnaces, molten metal and hot castings, ionising radiations while NDT testing for identification of defects in castings have also been identified in foundries. Minor hazards of wood dust in air, dermatitis due to contact with the gluing agents in pattern shop have also been identified. The paper further reviews the work being done in the country in this connection and potential for compiling the information for use by the others concerned. The organisations working in this field are Central & Regional Labour Institutes, at Mumbai, Chennai, Kanpur, Kolkata and Faridabad under Ministry of Labour & Employment, Government of India, National Institute of Occupational Health under ICMR, Industrial Toxicology Research Centre, Lucknow, under CSIR, All India Institute of Hygiene & Public Health, Kolkata under DGHS etc. The professional bodies like Indian Association of occupational Health and Indian Society of Industrial Hygiene are also keenly interested in the matter and promoting the awareness with the help their periodicals. The paper concludes that recognition of health hazards in industries is the first step among the four components of workplace environment control i.e. recognition, evaluation, control and protection. The problems occurring in different industries should be brought to common platform for the benefit of all concerned.*

The scene of industrial health and hygiene in the industries of the country is not satisfactory. Though the reports of occupational diseases are not many, yet it is not an evidence of healthy work environment. Such a situation could also be due to lack of reporting of the occupational diseases. This could also be due to total lack of concern about such issues by the stake holders. Whether there are diseases or not, the on-going efforts to maintain healthful working conditions in the industries should continue. The preventive aspects of occupational diseases, i.e. recognition of the problems, evaluation of work environment, use of control measures and periodic monitoring of workplace environment and the health conditions of the workers should never be left loose because if the occupational ailments are identified at the later stage, nothing can be done at that stage.

In this country the enforcement of Safety & Health is so divided that neither Central Government nor State Government alone can bring about any significant change in the conditions. The regulations are framed by the Central Government, which are to be implemented by the State Governments. Central and State Governments are two different political systems, which may have altogether different priorities. Hence it can be ensured that both will act coherently. Making rules does not mean that their enforcement will necessarily be done.

If we examine the case of evaluation and control of work environment in industries, in the above perspectives, we find that the concept connected with evaluation and control were strengthened in the Factories Act in 1987, and the provisions were supplemented with training of personnel from the state factories inspectorates both

abroad and within the country and financial and technical supports in the form of Industrial Hygiene Laboratories to various states were given, but not much has come out as result of all these efforts. Thus, it is not the want of knowledge or infrastructure which is coming on the way of upkeep of industrial environment; instead, it is lack of adequate public concern about it. Public concern is most important driving force in a democratic economy.

The conditions in the country are getting influenced by the international affairs. The international agencies like UNO, ILO, World Bank, ISO, and International Trade Organisations are in constant efforts to harmonize the conditions all over the world.

With all these efforts from the Central & State Governments the overall picture still remains grim. The basic understanding about the work environment problems of various unit operations and industries is yet to come among various agencies related to this issue. Keeping this in view an attempt has been done to bring in all the work environment problems of various operations and industries to present an overview of the situation.

RECOGNITION OF HEALTH HAZARDS:

Recognition of the health hazards in industries is the first and foremost aspect of any effort to improve the industrial environment. The Second Schedule under Indian Factories Act consists of 116 chemical contaminants for which the permissible limits have been prescribed. This is no doubt an incomplete list as the Threshold Limit Values recommended by ACGIH (USA) consists of about 800 chemical substances. In spite of this, there is lack of awareness about the responsibility of the managements

to recognize the hazards present in their works and periodically evaluate the hazards to ensure that levels are within the limits. All other efforts for controlling the contaminants will start only after recognition & evaluation. An attempt has been done to list various industrial operations and indicate the environmental hazards associated in the plants and operations in that industry as presented in table 1.

Table 1: Industrial Operations with Common Problems Related to Work Environment

S.No.	Operation	Main environmental hazards at workplaces	Minor Hazards
1.	Foundries (Engineering Industries)	1. Silica dust while sand preparation; mould & core making, shake out/knock out, fettling & grinding, sand/shot blasting etc. 2. Toxic Metal fumes while metal melting and pouring. 3. Exposure to carbon monoxide from the furnaces and while pouring the molten metal into moulds. 4. Excessive noise in fettling operations 5. Excessive heat stress due to furnaces and molten metal and hot castings 6. Risk of exposure to ionising radiations while NDT testing for blow holes in castings.	Wood dust in pattern shop; Contact with gluing agents in pattern shop; Vibration in fettling operations; Coal dust;
2.	Tool cutting & grinding (Engineering Industries)	Dust of abrasive materials like emery, silicon carbide, alumina, and base metal and sticking dust on the jobs from tool cutting machines.	Coolant mist
3.	Forging (Engineering Industries)	Excessive heat stress from the hot jobs and muffle furnaces; Excessive noise from the hammer mills.	Oil mist & smoke from the forging hammers;
4.	Machining (Engineering Industries)	Exposure to oil mist and contact with cutting oil and coolants;	Exposure to noise & vibration.
5.	Heat treatment (Engineering Industries)	Excessive heat stress; Exposure to toxic fumes of sodium cyanide; Risk of cyanide poisoning. Exposure to ammonia while nitriding; Exposure to carbon monoxide while carburising.	Fumes of from neutral salt baths; Fumes from oil quenching tanks
6.	Surface cleaning of metals (Engineering Industries)	Exposure to trichloroethylene vapours from the vapour or spray degreasers; Caustic solution mist from alkali degreasing.	Acid mist from de-rusting and pickling operations.
7.	Electroplating (Engineering Industries)	Fumes containing cyanides and toxic substances like hexa-valent chromium, nickel etc. while electroplating and anodising.	Risk of hydrogen cyanide gas due to mixing of wastes
8.	Painting (Engineering Industries)	Paint mist and thinner vapour while painting.	Dust while electro deposition.
9.	Abrasive blasting (Engineering Industries)	Sand dust, dust of steel shots, steel grit, alumina, glass beads, carbides, slag, organic materials etc. depending upon the medium used. (Open blasting by sand is prohibited in some states in the country)	Some polymer shots are also used for abrasive blasting.
10.	Welding & Thermal cutting	Welding fumes containing base metal, weld material and coating on jobs.	Thermal Stress, Ultraviolet & IR rays.
11.	Galvanising	Zinc fumes, hydrochloric acid fumes	Ammonium Chloride fumes
12.	Metallising	Fumes of metal being sprayed.	
13.	Blowing and carding of cotton (Textile Industries)	Cotton dust;	Excessive noise
14.	Spinning and weaving (Textile Industries)	Thermal Stress due to high humidity; Excessive noise;	Cotton dust; batch oil mist; Lubricating oil mist.
15.	Bleaching; Dyeing and finishing (Textile Industries)	Exposure to excessive thermal stress; Exposure to dyes, acid and alkali fumes; Contact with corrosive chemicals.	Exposure to chlorine and hypochlorites.
16.	Polyester (Synthetic Fibres)	DMT dust while charging; Excessive noise from high speed machines; Heat stress due to molten polymer while chip formation, chip re-melting, spinning, heating fluid retorts and piping.	Exposure to offensive and toxic fumes of bi- phenyl and di-phenyl ether from leaking

			thermic fluids.
17.	Nylon-6 (Synthetic Fibres)	Excessive noise from high speed machines; Heat stress due to heat radiation from molten nylon at chip formation, chip re-melting, spinning, heating fluid retorts and piping.	Exposure to offensive and toxic fumes of bi- phenyl and di-phenyl ether from leaking thermic fluids. lubricant aerosol; Contact with batch oils.
18.	Viscose rayon (Synthetic Fibres)	Carbon di sulphide vapours; Hydrogen sulphide gas; Caustic lye mist;	Sulphuric acid mist
19.	Acrylic fibre (Synthetic Fibres)	Exposure to toxic acrylonitrile vapour, methyl acrylate & Dimethyl formamide	Noise & Heat stress
20.	Poly styrene- butadiene rubber (Synthetic rubber & Plastics)	Exposure to benzene & monomer vapours; Acid fumes in rubber coagulation. Fugitive emissions; thermal stress; Thermic fluid vapours.	Exposure to butadiene.
21.	Nitrile rubber (Synthetic rubber & Plastics)	Exposure to toxic acrylonitrile vapour; Noise while palletising.	
22.	Poly vinyl chloride (Synthetic rubber & Plastics)	Exposure to carcinogenic vinyl chloride gas; PVC dust while bagging and bag handling and fugitive emissions of chlorine..	HCl gas as combustion product of PVC
23.	Polyurethane (Synthetic rubber & Plastics)	Exposure to toluene di- isocyanate vapours; halocarbons (blowing agents); tertiary amines;	Release of toxic decomposition products.
24.	Urea Formaldehyde& Malamine Formaldehyde (Synthetic rubber & Plastics)	Exposure to formaldehyde gas	Thermal stress during hot curing.
25.	Vinyl acetate resins and adhesives (Synthetic rubber & Plastics)	Exposure to acetaldehyde; acetic acid, acetic anhydride	Noise & Thermal stress
26.	Asbestos cement products (Asbestos using industries)	Exposure to carcinogenic asbestos fibres	Exposure to cement dust; Thermal stress in curing area.
27.	Asbestos fabric products (Asbestos using industries)	Exposure to carcinogenic asbestos fibres	Noise; Contact with binders.
28.	Brake linings and clutch plates & automobile workshops (Asbestos using industries)	Exposure to carcinogenic asbestos fibres	Contact with adhesives.
29.	Porous mass cylinder (Asbestos using industries)	Exposure to carcinogenic asbestos fibres	Cement dust; thermal stress
30.	Glass bottles; glass bangles; (Glass manufacture)	Exposure to Silica dust; Excessive heat stress; oxides of arsenic, colouring metals.	Exposure of eyes to IR rays.
31.	Glass fibre (Glass manufacture)	Exposure to Silica dust; Excessive heat stress; Glass fibres & dust.	Exposure to solvent vapours and formaldehyde gas.
32.	Sheet glass; Optical glass & Opal glass (Glass manufacture)	Exposure to Silica dust; Excessive heat stress; Exposure to lead fumes & lead oxide dust.	
33.	Batch preparation (Pottery, ceramics and refractory)	Exposure to Silica dust;	
34.	Finishing & Baking (Pottery, ceramics and refractory)	Silica dust; Excessive thermal stress;	Lead and other substances in the glaze
35.	Mercury Cell Process (Caustic / Chlorine)	Exposure to mercury vapours; fugitive emission of chlorine; hydrogen chloride; calcium oxide dust;	

		calcium hypochlorite dust; caustic soda dust; skin contact with caustic lye etc.	
36.	Membrane cell process (Caustic / Chlorine)	Fugitive emission of chlorine; hydrogen chloride; calcium oxide dust; calcium hypochlorite dust; caustic soda dust; skin contact with caustic lye etc.	Exposure to high magnetic fields
37.	Sulphuric acid plant (DCDA)	fugitive emission of sulphur di oxide gas; sulphur trioxide gas; sulphuric acid mist; skin contact with acid etc.	Noise & thermal stress.
38.	Urea (Fertilisers)	Exposure to fugitive emission of ammonia; Risk of Carbon monoxide exposure; Risk of hydrogen sulphide exposure; Urea dust while bag filling and loading and unloading.	Excessive noise & heat stress.
39.	Phosphatic Fertilisers (Fertilisers)	Exposure to rock phosphate dust; sulphuric acid fumes; hydrogen fluoride gas; super phosphate dust etc.	Noise & heat stress
40.	Aluminium (Metallurgical industries)	Exposure to bauxite dust; lime dust; caustic mist; alumina; fluorine, particulate and gaseous fluorides; carbon monoxide, sulphur dioxide, skin contact with alkaline solutions; coal tar pitch dust; exposure to coal tar pitch volatiles including polycyclic aromatic hydrocarbons.	Shift work, vibration, noise & heat stress
41.	Lead - Zinc (Metallurgical industries)	Exposure to ore concentrates containing lead and zinc; sulphur dioxide & sulphur tri oxide gas; sinter dust containing lead and zinc; lead and zinc and cadmium fumes;	Noise & heat stress.
42.	Manganese (Metallurgical industries)	Manganese dioxide dust; Manganese fumes;	Thermal stress; Noise
43.	Copper (Metallurgical industries)	Copper rich ore concentrate dust; Sulphur di oxide and sulphur tri oxide gases; possible skin contacts with sulphuric acid;	Thermal stress; Noise.
44.	Titanium (Metallurgical industries)	Exposure to ore dust and titanium oxide dust; sulphuric acid mist, hydrogen sulphide gas from the settling tank; Excessive noise and thermal stress..	
45.	Iron & Steel (Metallurgical industries)	Exposure to carbon monoxide; fluorides, sulphur dioxide, hydrogen sulphide, coke oven emissions, silica dust from refractory & foundry, iron oxide, lead fumes, zinc fumes from flux, lead & manganese fumes, sulphuric acid mist, benzene vapour; iron ore & coal dust; thermal stress and excessive noise.	
46.	Pharmaceuticals, dyes, pigments, pesticides, turpenoids etc. (Petrochemicals & other Organics)	Generally complex processes are involved posing the risks of exposure to variety of toxic substances including the finished products. Each unit operation involves characteristic emissions. The exposures to solvent vapours, acids, alkali mists, hydrogen sulphide, chlorine and chlorinated compounds and the finished products while drying, pulverising, packing and transporting are often involved.	While preparation of formulations of pesticides and pharmaceutical products, dust is exposures are common.
47.	Coal based Thermal Power Plants	Exposure to coal dust & ash dust; acid and alkali mist; chlorine; etc.	Excessive noise. thermal stress
48.	Gas based Thermal Power Plants	Acid and alkali mist; chlorine; etc.	Excessive noise. thermal stress
49.	Petroleum refineries	Potential exposure to hydrocarbon vapours; hydrogen sulphide; catalyst dust; carbon monoxide; coke dust; polycyclic aromatic hydrocarbons; ketones; phenols; etc.	Excessive noise; thermal stress
50.	Pulp & Paper	Exposure to bagasse dust, wood and bamboo dust; offensive mercaptan vapours; caustic vapours; lime dust; talc dust; coal dust;	Excessive heat stress and noise.
51.	Leather Tanning	Lime Dust; Bark dust; Mirabolan dust; Risk of acute poisoning on exposure to hydrogen sulphide gas; Lacquer mist; solvent vapour; animal matter dust with the risk of spores of Anthrax Bacillus.	Offensive odours

52.	Rock and stone grinding	Silica dust;	Excessive noise.
53.	Lead acid batteries	Exposures to lead fumes; lead oxide dust;	Sulphuric acid mist

The above picture is not comprehensive as many other industries and industrial operations do not find place in it. Yet this is quite illustrative and provides an insight to identify the problems in other industries. Most of the problems indicated in the above table are derived from the experience of the author. In some cases, however, the information have been drawn from the publications^(1 to 3), which are highly recommended readings for every professional and worker in this field:

The scope of the present paper does not permit to discuss the processes of various industrial operations mentioned in table 1, without which the proper grasping of the scenario will be difficult. The evaluations of most of the above operations have been done by the researchers and industrial hygiene professionals in the country and abroad. Discussing all of them in the present paper is not possible.

It is unfortunate that further details about extents of hazards and the existing status of conditions and control measures are available in some sporadic reports on some industries carried out by the professional institutions either on the requests of the managements or as research or survey projects carried out by the institutions under Ministry of Labour, ICMR or CSIR. There is a need for comprehensive review of the work done in the country. Some review papers have been published from time to time but none of them give true picture because the information are limited to the parent organisations of the authors. A lot of data is present in the form of health hazard evaluations of different industries on the instance of the industrial managements. It is possible to collate the information to develop the country data.

INDUSTRIAL HYGIENE IN INDIA

Industrial Hygiene work in India is being done by the following Government agencies in the country:

DGFASLI under Ministry of Labour & Employment:

The Directorate General, Factory Advice Service & Labour Institutes (DGFASLI), Mumbai which is an attached office of the Ministry of Labour & Employment, functions as a technical arm of the Ministry in regards to matters concerned with safety, health and welfare of workers in factories and ports/docks. It assists the Central Government in formulation and review of policy and legislation on occupational safety and health in factories and ports; maintains a liaison with Factory Inspectorates of States and Union Territories in regard to the implementation and enforcement of provisions of the Factories Act, 1948; renders advice on technical matters; enforces the Dock Workers (Safety Health & Welfare) Act, 1986 and the Regulations 1990 in all major ports in India., undertakes research in industrial safety, occupational health, industrial hygiene and industrial physiology and psychology and provides training on all the aspects of industrial safety and health including one year Diploma Course in Industrial Safety, three-months Post Graduate Certificate Course in Industrial Health (Associate Fellow of Industrial Health-AFIH) and one month course for supervisors of process industries.

The Central Labour Institute, Mumbai and Regional Labour Institutes at Chennai, Kanpur & Kolkata are functioning with full fledged industrial hygiene laboratories in all these institutes. A new Regional Labour Institute at Faridabad is also under development

Other Organisations:

1. National Institute of Occupational Health under ICMR
2. Industrial Toxicology Research Centre Lucknow, under CSIR
3. All India Institute of Hygiene & Public Health , Kolkata under DGHS

Professional Associations:

1. Indian Society of Industrial Hygiene
2. Indian Association of Occupational health

Industries:

Occupational Health Centres at some public sector enterprises like BHEL Trichy, Bhopal, Haradwar

Current Issues

Industrial Hygiene had not received due consideration after the focus of the industrial safety & health professional has shifted to process safety after Bhopal accident, two important events have drawn some attention of the stake holders to the issues on Silicosis and Asbestosis are worth mentioning here.

Silicosis:

Concern shown by the National Human Rights Commission towards the occurrence of silicosis among the industries using silica containing materials has drawn the attention of the stake holders to the problem and efforts have been initiated to control the conditions. Several tripartite Workshops & meetings have been conducted by DGFASLI to develop right strategy to control the dust exposures and to promote proper diagnosis of the disease. The Employees State Insurance Corporation Corporation, being the organisation responsible for the health care of the industrial employees and the primary health Centres across the countries are being sensitized to pay special attention towards proper diagnosis of the diseases and bringing the cases to light. The task involved is very vast as the country is full of small and cottage industries involved in the operations making use of rocks and materials consisting of crystalline silica. It is very difficult to bring them into the fold of statutes and compel them to adopt the expensive dust extracting devices in the machines. The problem is extending to stone crushing units all over the country, quartz grinding units in MP, Gujrat and Tamilnadu, agate industries in Khambhat in Gujrat, slate pencil industries in Mandsur (MP) and markapuram (Andhra Pradesh), stone slicing industries in Cudappa (AP), small and big steel & non ferrous foundry industries all over the country, pottery industries including small and cottage industries in Khurja (UP), glass industries including glass bangle industries in Firojabad. A special silicosis cell has been established in Central Labour Institute who is preparing an extensive action plan to eliminate silicosis in this country.

Asbestosis:

The Supreme court judgement on asbestos in 1995 has created synergy in organized asbestos using industries to adopt the control measures to control the concentration of silica dust in organized asbestos cement and other asbestos using units. There are still a number of small units manufacturing brake linings and clutch plates, and the industries engaged in disintegration of asbestos fibres from the basic ore which are economically poor. Some special measures are required to cope up the problem. The permissible limit of exposure for asbestos fibres has been reduced to 0.5 fibres per cubic centimeter of the air. There is need for attention among the enforcement agencies to bring about the real outcomes of the statutory efforts.

CONCLUSIONS:

Recognition of health hazards in industries is the first step among the four components of workplace environment control i.e. recognition, evaluation, control and protection. So unless and until the first is popularized effectively the solution of the problems is impossible. The basic problems occurring in different industries should be known by all concerned so that the attention is diverted towards the problems and there after the matter can be taken up by the professionals to methodically analyze and solve it. It is hope that all concerned with work place environment will take this issue seriously and do all within their capacity to render the work place to a healthful and comfortable.

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3. Burgess, William A.; (1995); "*Recognition of Health Hazards in Industry*"; John Wiley & Sons, Inc. New York.

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CENTRAL LABOUR INSTITUTE: MUMBAI



During the quarter Central Labour Institute carried out several studies, workshops, training programme etc. which are described here.

Studies

Safety Audit of a Air Conditioning and Refrigeration Products Manufacturing Plant in Maharashtra (Elangovan, R.K., Safety Division, Central Labour Institute, Mumbai)

Safety Audit of a Plant manufacturing Disposable Razors, Double Edge, Shaving Systems and Toiletries in Maharashtra (Elangovan, R.K., Safety Division, Central Labour Institute, Mumbai)

Safety Audit of a construction project site confined to the installation and commissioning of air conditioning system (Elangovan, R.K., Safety Division, Central Labour Institute, Mumbai)

Safety Audit of a Chemical and Fertilizer Plant in Maharashtra (Gautam, S.S., Sharma, S.C., Major Hazard & Chemical Safety Division, Central Labour Institute, Mumbai)

Consequence Analysis of Acetaldehyde Storage of a Sugar Manufacturing Plant in Maharashtra (Gautam, S.S., Sharma, S.C., Major Hazard & Chemical Safety Division, Central Labour Institute, Mumbai)

Assessment of Airborne Concentration in the Work-zone of a Compressor Manufacturing Plant at two different places in Maharashtra (Mandre, M.K., Industrial Hygiene Division, Central Labour Institute, Mumbai)

Training Programme

Safety Division conducted a two-week collaborative training programme on *Safety and Health in Ship Building & Ship Repair* for Goa Shipyard Ltd., Goa with NSC Maharashtra Chapter at CLI from June 29-July 10, 2009. Twenty two supervisors from Goa Shipyard Limited participated in the programme.

Safety Division conducted a three-day collaborative training programme on *Industrial Safety* with NSC Maharashtra Chapter from July 15-17, 2009. Twenty seven delegates from seventeen organisations participated in the programme.

Safety Division conducted two one-day in-plant training programmes on *Safety in Material Handling* in two different plants on August 08, 2009 and August 14, 2009

which were attended by twenty five and twenty seven personnels from supervisory level respectively.

Safety Division conducted a three-week *Basic Course for Inspector of Factories* from September 07-25, 2009. Seventeen Inspectors of Factories from five states and two officers from DGFASLI organization attended the course.

Safety Division conducted a five-day collaborative programme with NSC-Maharashtra Chapter on *Safety & Health in Ship Building and Ship Repair Industry* at CLI from August 31, 2009 to September 04, 2009. Twenty two supervisory level delegates from ten organisations attended the programme

Staff Training Division conducted a three-day training programme on *Team Building for Safety, Health and Environment at Work* from July 21-23, 2009. The programme was attended by twenty-one participants from four organisations.

Staff Training Division conducted one-month specialized certificate course in *Safety and Health* from August 24 to September 23, 2009 for supervisory personnel working in hazardous process industries. The course was attended by twenty eight participants from twenty two organisations.

Learning Centre conducted a three-day training programme on *Hazard & Operability (Hazop) Studies* from September 23-25, 2009. The programme was attended by fourteen participants from four organisations.

Major Hazard & Chemical Analysis Division conducted a three-day training programme on *Occupational Safety & Health Management in Process Industries* from July 22-24, 2009. The programme was attended by nine participants from seven organisations.

Industrial Hygiene Division conducted a three-day training programme on *Selection and Quality Assurance for Effective Use of Personal Protective Equipment* from September 15-17, 2009. The training programme was attended by six participants from an organization.

Industrial Psychology Division conducted a three-day programme on *Making Safety Committee More Effective* from August 26-28, 2009. The programme was attended by twenty participants from six organizations.

Industrial Psychology Division conducted one-day orientation programme on *Mental Health of Workers* on September 16, 2009. The programme was attended by fourteen post-graduate students from SNDT University.

Industrial Medicine Division conducted an advanced course of *Occupational and Environmental Medicine* from September 07-11, 2009. Eleven medical officers from eleven industries attended the course.

Workshops/Seminars/Conference

A tripartite meeting of stake holders for ratification of ILO Conventions on Asbestos (162) and on Chemicals (170) was arranged on August 07, 2009 at Central Labour Institute, Mumbai. The meeting was attended by twenty four delegates representing Government agencies, Non-government bodies, professional bodies and associations of industries.

Paper/Presentation/Talks

Shri H. Vishwanathan, Director (Safety) presented a paper on *Operationalisation of the National Policy on SHE at Workplace* in the Seminar on *National Policy on OSHE - A Way Forward* conducted by the Indian Chamber of Commerce, Kolkata on August 28, 2009.

REGIONAL LABOUR INSTITUTE, KANPUR



During the quarter from July 2009 to September 2009, Regional Labour Institute carried out a study and training programmes which are described below.

Study

Safety Audit of a Polyester Chips & Film Manufacturing Plant (Chakraborty, A.K., Safety Division, Regional Labour Institute, Kanpur)

Training Programme

The Institute conducted a four-day training programme on *Chemical safety in Plant Operations for the Workers, Members of Safety Committee* from 7-10 July 2009. The training programme was attended by twenty four participants from ten organizations.

The Institute conducted a five-day training programme on *Testing and Examination of Lifting Tackles and Pressure Vessels* from August 17-21, 2009. The training programme was attended by fifteen participants from eight organizations.

Paper/Presentation/Talks

S.B. Mathur Director (Safety) presented a paper on *On-site and Off-Site Emergency Plan and Mock Drills* in a seminar organized by Chemical Council of India, at New Delhi on August 27, 2009.

REGIONAL LABOUR INSTITUTE: CHENNAI



During the quarter from July 2009 to September 2009, Regional Labour Institute carried out several studies, workshops and training programmes which are detailed below.

Training Programmes

The Institute conducted a one-day training programme on *Safety Management in Construction Safety* on July 01, 2009. The programme was attended by twenty two participants from one organization.

The Institute conducted a three-day training programme on *Fire and Explosion Hazards in MAH Industries for Factory Inspectors* from September 23-25, 2009. Thirteen participants representing seven states participated in the programme.

Workshops/Seminars/Conference

The Institute conducted two one-day workshops on *Innovative Enforcement Methods for Factory Inspectors* from Southern States of Tamil Nadu and Pondicherry on September 04 and 18, 2009. The total number of participants was forty two and forty seven at the respective workshops.

REGIONAL LABOUR INSTITUTE, KOLKATA



During the quarter from July 2009 to September 2009, Regional Labour Institute carried out a seminar and two training programme.

Seminar

On 28th August, 2009, a seminar on *National Policy on Safety, Health and Environment at Work Place – The Way Forward* was organized by ICC Kolkata in Collaboration with DGFASLI, Ministry of Labour & Employment, Govt. of India and Directorate of Factories, Govt. of West Bengal.

Training programmes

The Institute conducted a five-day training programme on *Environmental Hazards and their Control in Industries* from August 24-28, 2009. The training programme was attended by four executives from four organisations besides twenty eight students.

The Institute conducted a five-day training programme *on Chemical Safety* from September 07-11, 2009. Eleven Inspector of factories from six different states attended the programme.

Safety Audit of a Air Conditioning and Refrigeration Products Manufacturing Plant in Maharashtra (Elangovan, R.K., Safety Division, Central Labour Institute, Mumbai)

The audit was conducted as per the BIS 14489: 1998 standard codes of practices on Occupational Safety and Health (OSH) audit systems. The Audit covered various management and technical elements of occupational safety and health system in the industry. All the occupational safety and health elements of the management systems were checked during the audit. The major recommendations of the audits were creation of standard operating and maintenance procedures, internal audit system, testing and other certification procedures, and emergency planning

Safety Audit of a Plant manufacturing Disposable Razors, Double Edge-Shaving Systems and Toiletries in Maharashtra (Elangovan, R.K., Safety Division, Central Labour Institute, Mumbai)

The audit was conducted as per the BIS 14489: 1998 standard codes of practices on Occupational Safety and Health (OSH) audit systems. The Audit covered various management and technical elements of occupational safety and health system in the industry. All the occupational safety and health elements of the management systems were checked during the audit. The major recommendations of the audits were conduction of HAZID and HAZOP studies in the plant, creation of standard operating and maintenance procedures, internal audit system, testing and other certification procedures, fire safety, chemical safety, emergency planning and mock drills.

Safety Audit of a construction project site confined to the installation and commissioning of air conditioning system in Maharashtra (Elangovan, R.K., Safety Division, Central Labour Institute, Mumbai)

The audit was confined to the installation and commissioning of air conditioning system of a multi - storey building at Mumbai. The audit was conducted as per the BIS 14489: 1998 standard codes of practices on Occupational Safety and Health (OSH) audit systems. The Audit covered various management and technical elements of occupational safety and health system of the project. All the occupational safety and health elements of the management systems were checked during the audit. The major recommendations of the audits were accident records and analysis, near-miss reporting, documentation and records, creation of procedures, internal audit system, effective and systematic training and emergency planning.

Safety Audit of a Chemical and Fertilizer Plant in Maharashtra (Gautam, S.S., Sharma, S.C., Major Hazard & Chemical Safety Division, Central Labour Institute, Mumbai)

The document is a report of safety audit carried out in a Chemical and Fertilizers manufacturing unit in Maharashtra. It contains about hundred prominent recommendations. Some of the important suggestions made in the report are review of the safety policy in the light of the provisions in the rules, the chief Safety Officer

should report directly to the head of the organization, the chief safety officer should look after only safety instead of fire safety, the worker members of the safety committee should be elected amongst the workers by the workers, safety bulletin board should be installed at a conspicuous place to display current safety performance and any other safety information. In addition to these, many technical interventions have been suggested in the areas like upkeep of the structures, housekeeping, electrical safety, safety of storage tank, fire protection, etc.

Consequence Analysis of Acetaldehyde Storage of a Sugar Manufacturing Plant in Maharashtra (Gautam, S.S., Sharma, S.C., Major Hazard & Chemical Safety Division, Central Labour Institute, Mumbai)

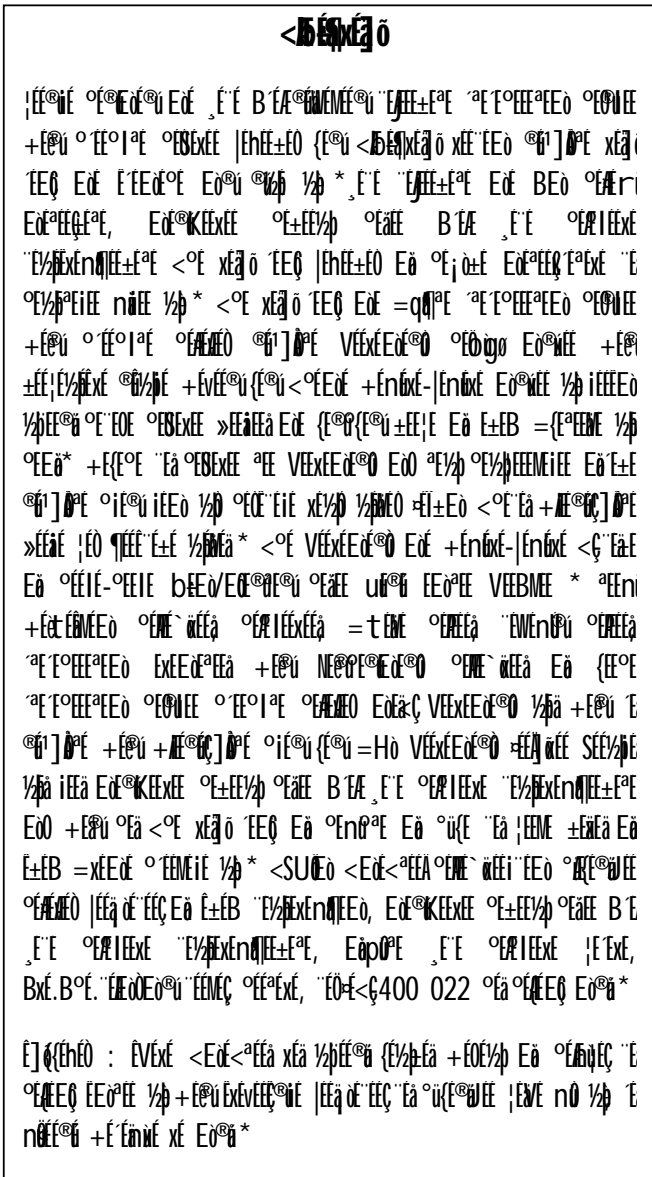
The document is a report of a consequence analysis carried out for Acetaldehyde storage tank in an organic chemical manufacturing plant in Maharashtra, with the help of computer model for dispersion and damage. The study analysed the damages likely in case of releases from the Acetaldehyde tanks of 40 Kl and 35 Kl capacity in case of breaking of any of the nozzle connection at the lower side of the tanks. The worst case and credible scenario is likely on breaking of liquid discharge line at the bottom of the tank. The nature of release from a nozzle breaking will release Acetaldehyde in gaseous and aerosol form. The release is likely to be almost continuous at the rate of 191 kg/min. This will form a cloud of both toxic and inflammable nature. For all the stability classes and under all the different levels of the injuries from the fire ball will reach up to the distance up to 232 and 333 meters for potential lethal within 60 sec. (10kw/sq.m.), distance for second degree burns within 60 sec. (5.0 kw/sq.m.) respectively and distance up to 523 meters for pain within 60 sec. (2.0 kw/sq.m.). For all the weather stability classes the heat radiation from the jet fire will be same. For five wind velocity meters per second, the distances up to which the different levels of radiant heat may reach up to 10 meters and 16 meters for potential lethal within 60 sec. (10 kw/sq.m.), distance for second degree burns within 60 sec. (5.0 kw/sq.m.) respectively and distance upto 26 meters for pain within 60 sec. (10 kw/sq.m.),

Assessment of Airborne Concentration in the Work-zone of a Compressor Manufacturing Plant at two different places in Maharashtra (Mandre, M.K., Industrial Hygiene Division, Central Labour Institute, Mumbai)

The factory is in the production of compressors located at two different places in Maharashtra. The compressors are required as cooling system for refrigerators and air conditioners. The study was carried out at both the plants for evaluation of airborne contaminants like carbon monoxide, carbon black, chromic acid, iron dust, oil mist, welding fumes, oxide of nitrogen and solvent vapours like ethyl acetate, toluene, xylene and tri chloro ethylene. The air-borne concentrations of all the contaminants were found well below permissible limit of exposure except in the paint-shop for xylene vapours. The recommendations such as use of organic vapour cartridge respirators in the paint-shop and repair of local exhaust system, in grinding operation and training to the workers were suggested.

Safety Audit of Polyester Chips & Film Manufacturing Plant in Uttarakhand (Chakraborty, A.K., Safety Division, Regional Labour Institute, Kanpur)

The audit found that the company has no written safety policy at present. At present the person who is looking after the activities of safety in the organization is a qualified safety officer but the factory has not appointed him exclusively as safety officer as per section 40-B of the factories Act & corresponding Rules framed there under. The factory has no central Safety Committee on industrial safety. Some of the main recommendations are to frame a safety policy and include the commitment of the management towards the contract workers in the health & safety policy, safety checklists for periodic safety inspections, separate permit to work formats for the each job category, the investigation of reportable and serious accidents by a team, alarm system in toner storage area, thickness monitoring of corrosive / hazardous lines, color coding on pipe lines, review of fire fighting arrangement in finished godown and appoint a safety officer and establish safety committee etc.



DGFASLI AT A GLANCE

The Directorate General Factory Advice Service & Labour Institutes (DGFASLI) is an attached office of the Ministry of Labour & Employment Government of India. DGFASLI organization was set up in 1945 under the Ministry of Labour, Government of India to serve as a technical arm to assist the Ministry in formulating national policies on occupational safety and health in factories and docks and to advise State Governments and factories on matters concerning safety, health, efficiency and well-being of the persons at workplace. It also enforces safety and health statutes in major ports of the country.

The Directorate General Factory Advice Service & Labour Institutes (DGFASLI) comprises:

- Headquarters situated in Mumbai
- Central Labour Institute in Mumbai
- Regional Labour Institutes in Kolkata, Chennai, Faridabad and Kanpur

Vision of DGFASLI: DGFASLI envisions emerging as an organization of excellence in creating knowledge, formulating policies, standards and practices to ensure safe and healthy workplaces for all in factories and ports.

Mission of DGFASLI: The mission of DGFASLI is to render its expertise in occupational safety and health for evolving safe and healthy workplaces in factories and ports through a process of partnership, guidance, regulatory activities in specific sector and information sharing.

DGFASLI organization comprises of its Headquarters situated in Mumbai, Central Labour Institute (CLI) in Mumbai, four Regional Labour Institutes (RLI) in Chennai, Faridabad, Kanpur & Kolkata and eleven Inspectorate of Dock Safety (IDS) offices located in Mumbai, Jawaharlal Nehru Port, Kandla, Mormugao, New Mangalore, Chennai, Tuticorin, Cochin, Visakhapatnam, Kolkata, and Paradip.

DGFASLI organization consists of a multidisciplinary team of around 129 officers (engineers, physicians, industrial hygienists, physiologists, ergonomists, industrial psychologists, commercial artists etc.) and 81 technical staff members.

Various specialty divisions/cells under DGFASLI office and Central Labour Institutes in Mumbai include a) Factory Advice Service, b) Dock Safety, c) Construction Safety, d) Awards, e) Statistics, f) Industrial Safety, g) Industrial Hygiene, h) Industrial Medicine, i) Industrial Physiology & Ergonomics, j) Staff Training, Productivity & Small Scale, k) Industrial Psychology, l) Major Hazards Chemical Safety, m) Management Information Services; n) Environmental Engineering and o) Communication Division. The Regional Labour Institutes are a scaled-down version of the Central Labour Institute and cater to the needs of their respective regions through its specialty divisions like Industrial Safety, Industrial Hygiene and Medical. The organization is poised to grow further, and meet the increased demands on it. In a developing country with a large number of industries having diverse and complex nature, the task of protecting safety and health of workers is an uphill task. Armed with the technology, good will of the industrial society and the strength of the dedicated staff, the organization is well prepared to meet the challenges of tomorrow. It is committed to the goal of making the workplace safer.

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TRAINING CALENDER FOR THE YEAR 2009: DGFASLI

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S.No.	Title of the Programme	Period	Coordinating Division
1.	Training Programme on Industrial Safety (for NSC Members Only) - MC	October 07-09	SAFETY
2.	Monitoring of Work Environment in Industries	November 09-11	IH/NRTL
3.	Refresher Course for Senior Inspectors of Factories	November 16-27	SAFETY
4.	Productivity & Quality through Effective Employee Participation	November 17-19	ST/PROD
5.	Storage, Handling & Management of Hazardous Substances in Process Industries	November 18-20	MH&CS
6.	Handling Problem Behaviour of Employees	November 18-20	IND. PSY.
7.	Impact of Environmental Pollutants & their Control at Work Place	November 24-26	EED
8.	Industrial Hygiene Techniques	December 07-09	IH
9.	Training Workshop on Occupational Health Practice for Nurses, Medical/Health Assistants	December 07-11	IND. MED.
10.	Testing & Examination of Lifting Tackles & Pressure Vessels	December 09-11	SAFETY
11.	OSH-MS	December 15-17	ST/PROD
12.	Effective Leadership for Safety, Health & Productivity	December 16-18	IND. PSY.
13.	Training Programme on Industrial Safety (for NSC Members only) - MC	December 16-18	SAFETY

Abbreviations: I.H. – Industrial Hygiene, PHY/ERG – Physiology/Ergonomics, IND.PSY. – Industrial Psychology, IND. MED. – Industrial Medicine, EED – Environmental Engineering Division, MH&CS – Major Hazards & Chemical Safety, NRTL – Non-respiratory Testing Laboratory, ST/PROD – Staff Training/Productivity.

- The concerned division will mail the training programme brochures sufficiently in advance, confirming the dates of commencement of course, its venue etc. to the organizations as per the mailing list available with the division.
- The Director In-charge of the respective co-ordinating division should be contacted for further details such as training programme dates, venue, programme contents, level of participants, details of course fee and its payment etc.
- Admission to the course will be restricted to 20 participants on First-Come-First-Served basis. Participants are not allowed to attend the training course without written confirmation by the concerned division.
- Limited Hostel Accomodation on sharing and chargeable basis will be available on 'First-Come-First-Served' basis.

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S.No.	Title of the Programme	Period	Coordinating Division
1.	Workshop On Monitoring of Work Environment and its Execution	October 6-8	IH
2.	Seminar On 'Emerging Issues on Process Safety Management'	October 30	IH
3.	One Month Specialized Certificate Course in Safety and Health for Supervisory Personnel Engaged in Hazardous Process Industries	November 3 to December 1	SAFETY
4.	Workshop on Safety Audit	December 8-10	SAFETY
5.	Training Programme on Process Safety for Inspector of Factories	December 14-18	IH

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S.No.	Title of the Programme	Period	Coordinating Division
1.	Training on Lifting Tackles	October 29-30	SAFETY
2.	Training Programme on Management of Hazardous Substances	December 15-18	IH

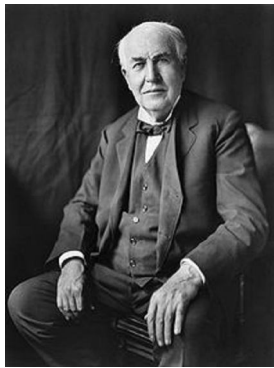
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S.No.	Title of the Programme	Period	Coordinating Division
1.	Safety in Construction Industries	October 26-30	SAFETY
2.	Workers Development Programme	November 10-11	IND. MED.
3.	One Month Specialized Certificate Course in Safety and Health for	November 17-16	SAFETY

THOMAS ALVA EDISON (1847-1931)



Thomas Alva Edison
(1847-1931)

LIFE AT A GLANCE

Born: February 11, 1847

Religious beliefs: Deist

Citizen: American

Parents: **Father** - Samuel Ogden Edison, Jr. (1804–1896), **Mother** - Nancy Matthews Elliott (1810–1871)

Occupation: inventor, scientist, businessman

Childhood (1859-62): Sold newspaper on Grand Trunk Railway

Greatest Achievements:

1868: Patents his first invention – an electric vote recorder

1869: Takes up inventing full time. Starts his first business of making telegraph equipments

1877: Invents the Phonograph

1879: Develops the first commercially viable electric light bulb

1889: Established Edison General Electric Company

1910: Invents a Nickel-Iron-Alkaline storage battery

Died: October 18, 1931

Thomas Alva Edison was born in 1847 in a small town of Milan, Ohio, America. He was an inventor, scientist and businessman and developed many devices which greatly influenced the life around the world. Edison is considered one of the most prolific inventors in the history and one of the first inventors who apply the principle of mass production and large team work to the process of invention. He is often considered to be the first person who created the first industrial research laboratory.

From his early age, Edison displayed an entrepreneurial spirit. His childhood was busy in selling vegetables and newspaper on Grand Trunk Railroad due to economic hardships in the family. This began his long streak of entrepreneurial ventures as he discovered his talent as a businessman. These talents eventually led him to work with various renowned companies including General Electrics.

Edison began his career as an inventor with the automatic repeater and his other improved telegraphic devices. Telegraphy turned out to be the catalyst for Edison's greatness. He was natural with the morse key, becoming one of the fastest transcriber of his day. In 1877 he invented Phonograph which made him famous in the scientific world. He concentrated his work towards the mass communication and to improve the life of the mankind. In 1879 he developed the first commercially viable electric light bulb. He also invented the first Kinetograph (an early motion picture camera) with the help of W.K.L.Dickson in 1889. He has more than one thousand patents in his name only in the United States of America, besides, many patents in U.K., France and Germany. Edison was the first person who originated the concept and implementation of electric-power generator and distribution to home, businesses and factories – a crucial development in the modern industrialized world.

REFERENCES:

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2. *Wikipedia*, The free encyclopedia.
- 3.

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ESTABLISHMENTS OF DIRECTORATE GENERAL FACTORY ADVICE SERVICE & LABOUR INSTITUTES

