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SUMMARY OF BIS: 15001-2000-STANDARD ON OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT System – Specification with guidance for use

M.K.MALHOTRA

1. Occupational Health and Safety Management can be meaningful only if it is integrated into the overall management functions of the line staff. Many studies have proved that economic incentives and labour shortages are the key factors making senior management more occupational health and safety conscious. Although the legislation lay down the framework for the improvement of Occupational Health and Safety at work, the attitude, leadership and commitment to improve the status of Occupational Health and Safety ultimately rests with the top management. India has adopted a self-regulatory approach since 1987 through amendment to the Factories Act 1948 e.g. the declaration of Safety policy, Safety education and training, Safety committees etc. are made mandatory. Official recognition of good safety performance at the national level through National Safety Awards and other recognition spurred management to change its approach to Occupational Health and Safety. New safety management system and safety audits have been introduced to encourage further an integrated approach to Occupational Health and Safety. Hence, the Bureau of Indian Standards have prepared a document on “OHS Management System Specification with Guidance for use”.
2. Factories Act 1948, Section 7-A has placed general duty on the occupiers to ensure health, safety and welfare of all workers at workplace in the industry. Specific responsibility has been placed for formation and declaration of Safety Policy, and arrangements to implement the Safety Policy.
3. Health and Safety is one of the most important aspects of an organisation’s safe and effective functioning. Good health and safety performance ensures higher productivity and quality of working life. With the continuous and untiring efforts of various enforcement authorities as well as other agencies, institutions, professionals and others, the awareness of Occupational Health and Safety has improved considerably at local, state and national levels.
4. Considering the need and a great demand from the industry for a comprehensive frame work for Occupational Health and Safety, the Bureau of Indian Standards, New Delhi constituted a committee on which Shri M.K. Malhotra, Dy. Director General, Central Labour Institute, Mumbai was one of the member to formulate a National Standard on Occupational Health and Safety Management System.
5. The BIS has brought out a Standard on this subject as BIS 15001-2000 for the organizations to develop a practical approach to management of Occupational Health and Safety in such a way to protect employees and general public whose health and safety may be in danger because of the organisation’s activities. The Standard also directs to improve Occupational Health & Safety performance of the organizations by providing the necessary requirements and guidance for use. The Occupational Health & Safety Management System may be integrated with the management of other aspects of business performance in order to –

- assist the organizations to establish an image at the National and International markets
 - minimize risk to employee and others including general public
 - protect the environment and
 - improve productivity and business performance.
6. The requirements in the Standard are intended to be incorporated into any Occupational Health & Safety Management System. The extent of application and usefulness will depend on important factors such as the Occupational Health & Safety Policy of the organization, the nature of its activities and the conditions in which it operates. The Standard also provides necessary information and useful guidance.
7. The Standard is applicable to all economic activities to –
- i) assure itself of its conformance with its stated Occupational Health & Safety Policy
 - ii) demonstrate such conformance to enforcement authorities, general public and others
 - iii) implement, maintain and improve Occupational Health & Safety Management Systems
 - iv) get certification/registration of its Occupational Health & Safety Management Systems.

Each organization can develop its own procedure for implementing it as per the guidance available in the Standard. The Standard defines various terms like accident, hazard, risk, risk assessment, safety. It also includes Occupational Health & Safety objectives, targets and system, etc.

8. The specification includes commitment and policy, planning, implementation and operations, measurement and evaluation of the action taken and achievements and finally management review of Occupational Health & Safety Management System to ensure its continuing suitability, adequacy, and effectiveness. The details for the following five principles are also available in the Standard.

8.1 COMMITMENT AND POLICY

- i) Leadership and Commitment
- i) Initial Occupational Health & Safety Review
- ii) Occupational Health & Safety Policy covering integration and relevance, accountability, Consultations, Prevention and Compliance.

8.2 PLANNING

- i) Legal and other requirements
- ii) Hazard/Risk Identification, Assessment, Prevention and Control
- iii) Objectives, Targets and Performance Indicators.
- iv) Accountability and Responsibility
- v) Initial and Ongoing Planning

8.3 IMPLEMENTATION AND OPERATION

- i) Operation control by Design and Engineering, Contract Review, Purchasing, Emergency Preparedness and Response and Critical Incidence Recovery Plan.
- ii) Support action covering Communication, Reporting, Documentation-Control, Records and Information Management.

- iii) Ensuring stability by providing Resources – Human, Financial and Physical and Competence Building through Training and Awareness.

8.4 MEASUREMENT AND EVALUATION

- i) Internal and External Audit
- ii) Inspection and Testing
- iii) Non-conformance and Preventive Action

8.5 MANAGEMENT REVIEW

The management review shall include –

- i) The overall quality and standard of performance of the Occupational Health & Safety Management System.

- ii) The performance of individual element of the System

- iii) The findings of Audits and

- iv) Internal and external factors such as changes in organizational structure, legislation, Introduction of new technology etc. and shall identify what action is necessary to fill up the gray areas.

9. The Standard is very useful for the management, safety professionals and others in conducting the review of the existing Safety Management System in their organization and adopt a uniform and standardized Occupational Health & Safety System.

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OCCUPATIONAL HEALTH HAZARDS IN PROCESS INDUSTRIES

DR. S. K. HALDAR

The modern industrial processes present many hazards to the health of the employees. It is an established fact that there is no occupation which does not have any hazard. It is also true that there is no effective way of cure available for many of the Occupational related diseases. But there is a rosy part also i.e. most of the occupational diseases can be prevented. Preventive medicine and occupational health have the same aim. Occupational health is the promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations. One of the declared aims of occupational health is to provide a safe occupational environment in order to safeguard the health of the workers and to step up industrial production. 'Occupational Environment' means the sum of external conditions and influences prevailing at the place of work which have a bearing on the health of the working population. Ergonomics is now a well recognized discipline and constitutes an integral part of any advanced occupational health service. Training in ergonomics involves designing of machines, tools, equipment and manufacturing process, layout of the places of work, methods of work and environment in order to achieve greater efficiency of both man & machine.

An industrial worker may be exposed to five types of hazards, depending upon his occupation : (a) Physical Hazards b) Chemical Hazards and (c) Biological Hazards (d) Mechanical Hazards and (e) Psychosocial Hazards.

PHYSICAL HAZARDS :

1. **Heat** –The most common physical hazard in most industries is heat. The direct effects of heat exposure are burn,

heat exhaustion, heat cramps, heat syncope, heat hyperpyrexia, heat stroke etc. The indirect effects are decreased efficiency, increased fatigue, enhanced accident rate etc.

2. **Cold** -Important hazards associated with cold work are frostnip, frost bite (superficial, deep & freeze – thaw – refreeze injury), water immersion, arterial thrombosis, sudden cardiac death etc. General hypothermia is not uncommon.
3. **Noise** -Noise is an unwanted sound. The effects of noise are of two types : Auditory effect which consists of temporary noise induced hearing loss or noise induced temporary threshold shift (NITTS) and noise induced hearing loss (NIHL) or noise induced permanent threshold shift (NIPTS). Non-auditory effects which consist of nervousness, fatigue, tiredness, sleeplessness, annoyance, interference with communication by speech, decreased efficiency & productivity, increased accident rate & errors, irritability & socially undesirable behaviour, peptic ulcer etc.
4. **Vibration** -Vibration may cause Hand-Arm Vibration Syndrome (HAVS), Vibration white fingers or Raynaud's phenomenon.
5. **Ultra Violet Radiation Hazards** and (Occupational exposure to ultraviolet radiation occurs mainly in arc welding which affects the eyes, causing (Welder's flash) symptoms like conjunctivitis &

- keratitis. These usually disappear in a few days with no permanent effect on the vision. However, repeated attacks of welder's flash may result in permanent corneal damage and diminished vision.
6. **Ionizing radiation**-The effects of ionizing radiation are a) Somatic effects – which consists of radiation sickness, acute radiation syndrome, leukaemia, carcinogenesis, foetal developmental abnormalities, shortening of life, etc. b) Genetic effects – these are 1) Chromosomal mutation – causes sterility 2) Point mutation – affects gene.
 7. **Light** - The workers may be exposed to the risk of poor illumination or excessive brightness. The acute effects of poor illumination are eye strain, headache, eye pain, lacrimation, congestion around the cornea, eye fatigue, etc. The chronic effects of health include 'Miner's Nystagmus'. Exposure to excessive brightness or 'glare' is associated with discomfort, annoyance, visual fatigue, cataract formation etc. Improper illumination levels at the workplace may also result in accidents.
 8. **Atmospheric Pressure** (a) Raised barometric pressure – The acute effects are musculoskeletal pain, cardiopulmonary decompression, chest pain (Pulmonary barotrauma), neurological decompression (psychosis), Latency (loss of consciousness on coming to surface due to gas embolism), etc. The chronic effects are hearing loss, neurological sequela, dysbaric osteonecrosis, etc. Reduced barometric pressure – the health effects are decompression sickness like joints pain (Bends), substernal pain & chest compression (Chokes), tingling & itching on chest (Creeps), neurological disturbances, post recompression shock, high altitude haemoglobinopathy etc.
 9. **Extremely low frequency electric magnetic fields (EMF)** –The long term effects on health are carcinoma, congenital malformation of foetus & childhood cancer if father is exposed, general neurasthenia, suicidal tendency etc.
 10. **Electricity**-The effects of electricity are burn, cardiac and respiratory arrest, thrombosis and necrosis of tissues, musculoskeletal injuries, kidney damage, shock etc.
 11. **Ultrasound**-It may cause tearing of cellular structure leading to disintegration. Blood is the main target.

CHEMICAL HAZARDS

Hazards due to chemical agents may be a)Gases b)Dusts c)Metals & their compounds d) Solvents.

Hazards due to some Gases :

1. **Carbon Monoxide (CO)**
Poisoning: CO poisoning is the most common of all poisonings in industry today. It is colorless & odorless and therefore, gives no warning of its presence under any circumstances. The mechanisms of toxicity are a) it has about 240 times more affinity towards haemoglobin than oxygen and produces readily thecarboxyhaemoglobin. The acute effects are : faintness, giddiness, tightness of chest, weakness in the legs, pink complexion (cherry red lips), etc. The chronic effects are headache, nausea, occasional

- breathlessness, cough, ischaemia of heart, muscle weakness, dizziness, confusion, stupor & unconsciousness, poor memory, paralysis, perkinsonism, etc.
2. **Cyanide Poisoning** : Hydrogen cyanide & its sodium, potassium & calcium salts manifest their toxicity by way of a common mechanism, namely, inhibition of the respiratory enzyme Cytochrome oxidase. The inhibition causes cellular anoxia and if a large enough dose is received, results in death. Skin contact with solution of cyanide salt can cause itching, discoloration or corrosion. Cyanide salt aerosols can cause upper respiratory irritation. Enlargement of the thyroid gland has also been reported. An increased occurrence of the objective symptoms of headache, changes in taste and smell, irritation of the throat, vomiting, effort dyspnea, lacrimation, abdominal colic, precordial pain & nervous instability has been noted among workers having long-term occupational exposure to low concentration of HCN.
 3. **Ammonia** : Ammonia is a colourless gas and is one of the most widely used industrial chemicals ranking fourth in volume of production after sulfuric acid, lime & oxygen. Ammonia vapour is a severe irritant to the eyes, respiratory tract & skin. It may cause corneal irritation, dyspnea, bronchospasm, chest pain & pulmonary edema that may be fatal. Production of pink frothy sputum often occurs. Complication can include bronchitis or pneumonia. Liquid anhydrous ammonia in contact with the eyes may cause serious eye injury or blindness and on the skin, it causes first & second-degree burns which are often severe & if extensive, may be fatal.
 4. **Chlorine** : Chlorine gas is a severe irritant of the eyes, mucous membrane, skin and respiratory system. A major accidental exposure to unmeasured but high concentration for a brief period causes burning of the eyes with lacrimation, burning of nose and mouth with rhinorrhoea, cough, choking sensation and substernal pain. These symptoms frequently are accompanied by nausea, vomiting, headache, dizziness and sometime syncope.
 5. **Hydrogen Sulphide** : Hydrogen sulphide is acute acting toxic substance and a leading cause of sudden death in the workplace. Brief exposure at high concentrations have caused conjunctivitis & keratitis and exposure at very high concentrations have caused unconsciousness, respiratory paralysis and death. Eye irritation, cough, sore throat, vague gastrointestinal symptoms & photophobia may occur with low-level exposure and with overwhelming exposure, collapse and respiratory arrest can develop within minutes.
 6. **Sulfur Dioxide** : It is a severe irritant for the eyes, mucous membrane and skin. Exposure to concentration of 10 to 50 ppm for 5 to 15 minutes causes irritation of eyes, nose & throat, rhinorrhoea, choking, cough and reflex bronchoconstriction. The liquid form may cause corneal & skin burns.
 7. **Benzene** : Inhalation of high concentration of benzene (3000 to 7500 ppm) may cause a state of excitation & euphoria (Benzol jag) followed by drowsiness, fatigue, vertigo, nausea & vomiting, convulsion followed by paralysis, loss of consciousness & death from respiratory failure. Inhalation of small amount of benzene over a long period has caused blood dyscrasias, including

- aplastic anaemia, leukaemia and thrombocytopenia. Additional signs & symptoms of chronic toxicity may include headache, dizziness, fatigue, loss of appetite, irritability, nervousness, nose bleeding & other haemorrhagic manifestations.
8. **Carbon Disulfide** : Acute high exposures (200 to 500 ppm) result in narcosis, respiratory failure & death. Exposure under 100 ppm may result headache, dizziness, respiratory irritation, nausea, vomiting & abdominal discomfort, conjunctivitis and keratitis. Chronic carbon disulfide exposure may damage the cranial
 9. nerves with decrease in corneal and pupillary reflexes, a Parkinson-like syndrome characterized by speech disturbance, muscle spasticity, tremors, loss of memory and severe mental depression. Severe ocular disturbances may occur. Gastrointestinal changes include chronic gastritis, achlorhydria and liver damage have been reported.

HAZARDS DUE TO SOME DUSTS

The term 'Pneumoconiosis' is defined by the Fourth International Conference of Experts in 1971 as 'The accumulation of dust in the lungs and the tissue reaction to its presence'.

COMMON PNEUMOCONIOSIS

DISEASES	CAUSES	SOURCE OF DUST
1. Baritosis	Barium sulphate	Mines of barium sulphate
2. Siderosis	Iron Oxide	Welding
3. Stannosis	Tin Oxide	Smelting
4. Kaolinosis	Hydrated aluminium silicate	China clay
5. Alluminosis	Stamped aluminium	Paints
6. Anthracosis	Coal dust	Mining
7. Silicosis	Free silica dust	Mining, Quarring, felting etc.
8. Talcosis	Hydrated Magnesium silicate	Rubber Industry
9. Berylliosis	Beryllium compounds	Atomic reactor, aero engg.
10. Asbestosis	Asbestos dust	Mining, Legging, Brake lining.

HAZARDS DUE TO SOME METALS & THEIR COMPOUNDS

1. **Lead poisoning** : The clinical picture of lead poisoning or plumbism is different in the inorganic and organic lead exposures. The toxic effects of inorganic lead exposure are abdominal colic, obstinal constipation, loss of appetite, blue line on the gums, stippling of red blood cells, anaemia, wrist drop & foot drop. The toxic effects of organic lead compounds are mostly on central nervous system – insomnia, headache, mental confusion, delirium etc.
2. **Mercury Poisoning** : The clinical picture of mercury poisoning are like – gingivitis, excess salivation, glossitis, gastritis, tremors, speech defects, kidney damage (nephritic syndrome), features of psychosis i.e. extreme irritability, sudden outburst of temper, loss of memory etc., haemorrhage on the lense (Mercuria Lentis), Minamata Disease, etc
3. **Arsenic Poisoning** : Toxicity may be acute when there is ingestion of arsenic. It causes acute diarrhoea, shock and death. Chronic toxicity may cause – hyperpigmentation, eczematous dermatitis, ulceration of skin, skin cancer, loss of vibration sense, difficulty in walking, pain and burning sensation of calf muscles, hepatic cirrhosis, anaemia, painless perforation of nasal septa, bronchitis, pneumonitis, broad wide strip type of line under the nailbed called Mees Line. Arsine Gas is the gaseous form of arsenic which is very toxic. It is the commonest cause of occupational jaundice.
4. **Chromium Poisoning** : It may cause contact dermatitis, Chrome ulcer, perforation of nasal septa, asthma, pneumonitis, conjunctivitis, lungs cancer, etc.
5. **Nickel Poisoning** : It may cause itching called nickel itch, lungs cancer, cancer of nasal septa, etc. Nickel Carbonyl is one of the most toxic of all toxic metal fumes in industries. It causes lungs alveolar damage and enzyme system damage very quickly.
6. **Cobalt Poisoning** : The toxicity of cobalt are – interstitial fibrosis called hard-metal pneumoconiosis, occupational asthma, cardiomyopathy and allergic dermatitis. It affects thyroid gland (increases T4) also. The International Agency for Research on Cancer (IARC) concluded that cobalt and its compounds are possibly carcinogenic to human.
7. **Alluminium Poisoning** : A worker heavily exposed to alluminium in a ball-mill room of an alluminium powder factory develops a rapidly progressive encephalopathy and pulmonary fibrosis. It may cause Alzheimer's disease resulting in deterioration of mental function involving memory, judgement, abstract thinking as well as changes in personality and behaviour. It can cause recurrent eczema and skin telangiectasis.

OCCUPATIONAL CANCERS:

1. **Skin** :The causes may be –coal tar, X-ray, dyes, certain oils, sunrays, etc.
2. **Lungs**:The causes may be – Asbestos fibre, nickel, chromium, coal tar, radioactive substances, cigarette smoking, petroleum products, etc.
3. **Bladder**:The causes may be – Beta-naphthylamine, benzene, para-aminodiphenyl, etc.
4. **Blood** : The causes may be – Benzene, radioactive substances, Roentgen rays, etc.

CASE STUDY : No. 1

An Occupational health Medical-cum-Biochemical study was conducted in a Tetra Ethyl Lead Blending Plant by the Regional Labour Institute, Kolkata in the year 1998. Tetra Ethyl Lead (TEL) is a toxic organic lipid soluble lead compound absorbed through skin and respiratory tract. Poisoning usually starts with nonspecific symptoms. The clinical findings have been divided into two groups. Mild signs and symptoms includes

tiredness, change of bowel habit, anorexia, nausea, pallor, metallic taste, muscles pin, fatigue, eyes and skin irritations, irritability, inability to concentrate, drowsiness, depression, etc. The severe signs and symptoms include reduction of muscles power, paraesthesia, neuropathy, restlessness, bad dream, hallucination, schizophrenia, acute maniacal symptoms with suicidal tendency, etc.

INTERPRETATION OF ADULT BLOOD LEAD LEVELS

TEST VALUE	INTERPRETATION
Up to 9 µgm/100 ml.	Unexposed, normal reading
10 to 42 µgm/100 ml.	Acceptable levels for chronic long-term exposure, retest in 6 months.
43 to 53 µgm/100 ml.	Exceedance of OSHA action level, close observation and follow-up indicated. Retest in 2 months
Above 53 µgm/100 ml.	Removal from exposure, retest within 2 weeks.

A total of 23 workers engaged in this plant were subjected to general medical examinations. Urine and blood samples were collected for estimation of urinary and blood lead levels.

Out of these 23 workers, 9 workers were exposed to TEL for less than 10 years, 3 workers were exposed for 11 to 20 years and remaining 11 were exposed to TEL for more than 20 years.

All workers except one exhibited one or more than one mild signs and symptoms related to TEL exposure. The mean blood lead level was about 44 $\mu\text{gm}/100\text{ ml}$. All the workers showed their urine lead level above normal (150 $\mu\text{gm}/\text{L}$.) and 12 workers showed their blood lead level above OSHA action level.

DETAILED PICTURE OF HIGH BLOOD AS WELL AS URINE LEAD CASES

SL. NO.	NO. OF MILD SIGNS AND SYMPTOMS	URINE LEAD mgm/L.	BLOOD LEAD LEVEL mgm/100 ml.
1.	2	300	80
2.	2	150	80
3.	3	400	50
4.	1	350	50
5.	15	250	50
6.	3	400	70
7.	3	250	70
8.	10	500	50
9.	10	300	50
10	2	150	60
11.	7	200	60
12.	14	300	50

CASE STUDY : NO. 2

An Occupational health study was conducted in 1998 by the Regional Labour Institute, Kolkata in a pesticide industry. The industry usually formulated ethion, malathion, 2, 4-D and Lindane. Ethion and malathion are organophosphate derivatives. The toxic effects of these pesticides are divided into three divisions. (1) The mild signs and symptoms are – anorexia, headache, dizziness, weakness, anxiety, tremors of tongue and eye lids, miosis and impairment of visual acuity. (2)The moderate signs and symptoms are – increased sweating, nausea, excess salivation, lacrimation, abdominal cramps, vomiting, slow pulse, muscle tremors, etc.(3) The severe signs and symptoms are – pin point and non-reacting pupils, respiratory difficulty, diarrhoea, pulmonary edema, cyanosis, loss of sphincteric control, convulsions, heart block, coma and death. Lindane is a chlorinated hydrocarbon with gamma-isomer. The toxic effects of Lindane are – eye, nose & throat irritation, nausea and headache. It can

produce aplastic anemia. 2, 4-D or 2, 4-dichlorophenoxy acetic acid can cause chloracne (inclusion cysts), liver disorders, neurological and behavioral changes and it can also produce prophyria.

The Organophosphate compounds are also called cholinesterase inhibitors because the signs and symptoms of these insecticides are caused by the inhibition of enzyme cholinesterase, resulting in accumulation of Acetylcholine at peripheral nervous system. Organophosphate compounds are most irreversely phosphorylate the acetylcholinesterase. The measurement of enzyme Cholinesterase is very difficult. The cholinesterase activity in the blood from the subject under test is expressed as a percentage of the activity in normal blood. This is done with the help of cholinesterase measuring kit by the method of Rapid Field Determination of Cholinesterase Activity (%) through Colorimetric Chemical Analytical Process.

CHOLINESTERASE ACTIVITY

PERCENTATE OF CHOLINESTERASE ACTIVITY	REMARKS
100% - 75%	Normal
75% - 50%	Over-exposure probable
50% - 25%	Severe over-exposure
25% - 0%	Very serious and dangerous over-exposure

After stratified random sampling 10 workers (about 50%) were subjected to general medical examinations and investigations. All except 2 workers exhibited one or more than one signs and symptoms related to pesticides

over-exposure. All the 10 workers showed their Cholinesterase Activity in blood below 75% which is attributable to the over-exposure of Organophosphate Compounds.

TEST RESULT OF CHOLINESTERASE ACTIVITY IN BLOOD

% OF CHOLINESTERASE ACTIVITY	NO. OF WORKERS
75% - 50%	2
50% - 25%	4
25% - 0%	4

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SAFETY AUDIT IN A GAS POWER PLANT

Regional Labour Institute, Kanpur undertook a Safety Audit in a Gas Power Plant in northern India. Observations were made in the storage area of Naphtha and its decanting area, hydrochloric acid, sulfuric acid and in process areas like gas turbine, steam turbine, chlorination, gas reducing station, natural gas pipeline, transformer etc. The observations and recommendations regarding safety and health conditions and systems in the plant are discussed in detail.

OBJECTIVE

The objective of the study was to identify the deviations from the standard practices codes etc. and also to assess the hazards to health and safety of employees of the plant and the life and property around the plant and to suggest the control measures.

METHODOLOGY

The audit was carried out with the help of detailed checklist developed on the basis of process and operations involved in gas power plant. The code of practice on occupational safety and health audit (IS-14489-1993) was also referred.

RECOMMENDATIONS

Some of the important recommendations were:

- The Safety Policy should address accountability system for all levels and should be signed by the occupier.
- The organization may establish targets and measurable safety performance. The safety committee meetings may be properly documented and worker members should be elected members. The members may be encouraged to attend such meetings.

- The system of reporting near miss incidents may also be developed and inspections may be carried out with the help of checklist.
- Workers may be provided with a job safety card containing general safety and health measures specific to his job. The safety manual covering all classes and description of processes or jobs being carried out may be prepared.
- The scrubbed air in Chlorination plant (P.T) may be recirculated to reduce the chlorine residue in the air and system may be improved by checking strength of caustic at periodical interval.
- The documentation system of various test and examination may be improved.
- Gas lines may be tested for leakage by pressuring by naphtha before start of plant after each repair/overhauling.
- The safety valve may be provided after regulating valve at the entry point of gas reducing station and the P & I diagrams of gas reducing station and other areas may be updated.
- Different permit formats be used for different activities and confined space permits may also be developed.
- The emergency showers may be identified and these showers may be tested for full flow at least once in a month. Periodic drill may also be done for its proper use.
- The fire protection system in cable galleries may be improved by provision of suppression system.

- Gas turbine battery room may be provided with flame proof light fittings and area classification may also be done.
- Metal cubicle provided in the vicinity of gas reducing station may be made flame proof in order to eliminate spark/ignition source.
- The jumpers in the pipelines may be periodically checked for proper bonding and grounding.
- The various recommendations given for Naptha storage and transfer areas may be examined and followed. Official supervising the operation must be fully conversant with terms and conditions of license issued under petroleum rule 1976.
- The supports of hydrochloric acid tanks may be checked for adequate strength.

SAFETY AUDIT IN AN OIL TERMINAL

This safety audit was conducted by the Regional Labour Institute, Kanpur in an oil (storage) terminal. The site had storage of Motor Spirit(Petrol). S.R.Naptha, HSD and S.Kerosene Oil in bulk quantities. The Motor spirit and SR Naptha were stored in floating roof tanks and HSD and kerosene oils in fixed roof tanks. The quantities of flammable substances were large enough to identify the site as Major Accident Hazard Unit. The petroleum products were being received by cross-country pipeline from Baroni and by rail wagons. The dispatch of products was by tank trucks.

OBJECTIVE

The objective of the safety audit was to identify the hazards originating due to deviations in the plants and practices from the applicable statutes, standards and guidelines.

METHODOLOGY

The methodology included checklist inspection , perusal of records and interviews with different levels of employees. The audit evaluated deviations in plant operations and work practices in storing, loading and unloading operations from applicable codes, standards and statutes on safety and health.

FINDINGS

The house keeping in the site was satisfactory. Some of the raised walkways were without any railings and toe boards. The structures at the tank truck filling railway siding stations were not fire proof. The practice of filling of petroleum products into the tank trucks did not match with the operating manual. The filling pipe was not sealed with the filling port of the tank truck and venting of vapours was done by opening emergency vent without the use of flame arresting device.

RECOMMENDATIONS

Suggestions were made to adhere to the safety norms. Railway siding was too close to the electrified railway lines posing risk of ignition of vapours while decanting and contact of water jet with high tension line while fire fighting. It was suggested that the use of the present railway siding for decanting of petroleum products may be suspended.

TECHNIQUES OF HAZARD ASSESSMENT AND ITS CONTROL IN MAJOR ACCIDENT HAZARD INSTALLATIONS

PROGRAMME PERSPECTIVE

A major hazard installation has potential to cause a major emission, fire or explosion that leads to a serious danger to life or environment. It results from uncontrolled development in the course of an "Industrial Activity" and it involves one or more dangerous substance(s). Based on indicative criteria and assigned threshold quantity, an industry is identified as a major hazard installation for specific enlisted hazardous substance(s) in accordance with the Manufacture, Storage & Import of Hazardous Chemical Rules, 1989 by Ministry of Environment and Forests notified under the Environment Protection Act. As a part of compliance with these Rules, an occupier of a major hazard installation is required to prepare an Onsite Emergency Plan and if its inventory of hazardous chemical exceeds a second degree specified quantity of specific identified chemicals, a safety report is also required to be prepared. The philosophy behind preparation of an Onsite Emergency Plan and/or safety report is that the occupier of a major hazard installation has correctly identified and assessed the hazard potentials and accordingly (i) incorporated the appropriate control measures; and (ii) is well prepared to encounter an emergency scenario. This training programme is designed to impart the various aspects of identification, assessment and control of major hazards in industries by application of the well established techniques. Various techniques have been developed to discover the hazard potentials of the installation which primarily aims in qualitative and/or quantitative assessment of the hazard potentials.

OBJECTIVE

To strengthen the safety status of the organization by familiarizing the

participants with –

- The statutory obligations
- Hazard identification techniques
- Methods of control and mitigation of emergency
- Guidelines for preparation of emergency plan and safety report.

HIGHLIGHTS

- Statutory obligations
- Hazard and Operability study
- Hazardous chemical processes
- Fault tree analysis
- Safety Audit
- Fire & Explosion Impact Assessment (Bleve, UVCE, Pool Fires)
- Toxic Releases - Continuous and Instantaneous
- Dispersion Modeling
- Emergency Plan
- Safety Report
- Bulk Storage of Hazardous Chemicals

MODE OF TRAINING

- Audio Visual
- Syndicate Exercises
- Case Studies

PARTICIPANTS

Senior Plant Operator/Managers and Safety Officers of hazardous installations.

DURATION: 5 DAYS

Conducted by:

**Major Accident Hazard Control
Advisory Division Central Labour
Institute, Sion, Mumbai.400022**

INTERNATIONAL OCCUPATIONAL SAFETY AND HEALTH INFORMATION CENTRE (CIS)

CIS (from the French name, Centre international d'Information de securite et d'hygiene du travail) i.e. International Occupational Safety and Health Information Centre, is a part of the International Labour Office, Geneva, Switzerland. The mission of CIS is to collect world literature that can contribute to the prevention of occupational hazards and to disseminate this information at an international level. CIS imparts to its users the most comprehensive and up-to-date information in the field of Occupational safety and health. The work of CIS is supported by a worldwide Safety and Health information exchange network which includes over 91 affiliated National Centres and 38 CIS collaborating Centres. Central Labour Institute, Mumbai has been designated as the CIS National Centre of India.

CIS can offer you rapid access to comprehensive information on occupational safety and health through:

- Microfiches on original documents abstracted in CIS DOC (CISILO)
- ILO CIS Bulletin "Safety and Health at Work"
- Annual and 5-year indexes
- The CIS Thesaurus
- The list of periodicals abstracted by CIS

EXCERPT FROM CIS DOC

Title: Tank truck driver exposure to vapors from oxygenated or reformulated gasolines during loading and unloading.

CIS ACCESSION NUMBER

CIS 00-456

Tank truck drivers' exposure to gasoline vapours was studied by collecting breathing zone samples during loading and unloading of gasoline at ten locations in Finland. The sampling times ranged from 16 to 57 min, and time-weighted average concentrations for a 30-min period were calculated. Using the time-adjusted values, geometric mean concentrations (GM) were calculated for three periods of dispatch measurements and a period of unloading measurements at service stations. The GM for methyl tert-butyl ether ranged from 0.95 to 7.3mg/m³ and that for tert-amyl methyl ether from 0.30 to 1.1mg/m³. The GM concentrations of hexane, benzene, and toluene were in the range of 0.25-2.3mg/m³, 0.15-0.28mg/m³, and 0.73-1.7mg/m³, respectively. Multiple regression analysis yielded an r² value of 0.98 for the daily mean concentration of toluene and correspondingly 0.94 for benzene when daily wind speed (0.1-3.7m/sec) and daily air temperature (-7.4±17.2°C) were used as independent variables. The average number of gasoline loads per tank truck was 2.5, corresponding to 23,000L of gasoline.

Note: For details write to CIS National Centre for India, Central Labour Institute, Sion, Mumbai 400 022.

The Library & Information Centre of Central Labour Institute has unique collection of Material Safety Data Sheet of about 1,20,000 chemicals/materials taken from Canadian Centre for Occupational Health & Safety. MSDS provides extensive coverage over safety perspective with detailed evaluation of health, fire and reactivity hazards. It also provides precaution as well as recommendation on handling, storage, personal protective equipment, accidental release etc.

IDENTIFICATION

PRODUCT NAME(S) : **ACETYLENE**

HAZARDS IDENTIFICATION

Colorless gas with garlic-like odor. Flammable gas. May cause flash fire. Reduces oxygen available for breathing. Contents under pressure.

POTENTIAL HEALTH EFFECTS

EYE: Not expected to cause prolonged or significant eye irritation.

SKIN: Contact with the skin is not expected to cause prolonged or significant irritation.

INGESTION: Material is a gas and cannot usually be swallowed.

INHALATION: This material can act as a simple asphyxiant by displacement of air.

SIGNS AND SYMPTOMS OF EXPOSURE: Symptoms of asphyxiation may include rapid breathing, incoordination, rapid fatigue, excessive salivation, disorientation, headache, nausea and vomiting. Convulsions, loss of consciousness, coma and/or death may occur if exposure to high concentrations continues.

FIRST AID MEASURES

EYE: No specific first aid measures are required because this material is not expected to cause eye irritation. As a precaution, remove contact lenses, if worn, and flush eyes with water.

SKIN: No specific first aid measures are required because this material is not

expected to be harmful if it contacts the skin. As a precaution, remove clothing and shoes if contaminated. Wash skin with soap and water. Wash or clean contaminated clothing and shoes before reuse.

INGESTION: No specific first aid measures are required because this material is a gas and cannot usually be swallowed.

INHALATION: For emergencies, wear a NIOSH approved air-supplying respirator. Move the exposed person to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get immediate medical attention.

FIRE FIGHTING MEASURES

SPECIAL NOTES: In case of fire do not extinguish. Stop flow of fuel and allow fire to burn out.

FIRE FIGHTING INSTRUCTIONS: Do not extinguish. Stop flow of fuel and allow fire to burn out. If flames are accidentally extinguished, explosive reignition may occur. Eliminate ignition sources. For unignited vapor cloud, use water spray to knock down and control dispersion of vapors.

Once fuel has stopped, small fires may be extinguished. Use water spray to cool fire-exposed containers and fire-affected zone until fire is out and danger of reignition has passed.

For fires involving this material, do not enter any enclosed or confined fire space without proper protective equipment, including self-contained breathing apparatus. Keep people away. Isolate fire area and deny unnecessary entry. Immediately withdraw all personnel from area in case of rising sound from venting safety device or discoloration of the container.

For fires involving acetylene containing vessels or lines, explosive decomposition is likely if the metal temperature exceeds 280C (536F).

COMBUSTION PRODUCTS: Normal combustion forms carbon dioxide and water vapor; incomplete combustion can produce carbon monoxide.

HANDLING AND STORAGE

Do not breathe vapor or fumes. When working with this material, the minimal oxygen content should be 19.5 percent by volume under normal atmospheric pressure. Before entry into confined spaces that may have contained hazardous material, determine concentrations and take precautionary measures for personal protection.

This material presents a fire hazard. Gas can catch fire and burn with explosive force. Invisible gas spreads easily and can be set on fire by many sources such as pilot lights, welding equipment and electrical motors and switches.

Do not use or store near heat, sparks or open flames. Use or store only in a well-ventilated area. Keep container closed when material is not in use. Store at low pressure to minimize explosive detonation.

Avoid work practices that may release volatile components into the atmosphere. Local air pollution regulations should be consulted to determine if the release of volatile components is regulated or restricted in the area in which this material is used.

For bonding and grounding information, refer to American Petroleum Institute (API) Recommended Practice 2003, "Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents" or National Fire Protection Association (NFPA) 77, "Recommended Practice on Static Electricity."

Auto-refrigeration: Drains can become plugged and valves may become inoperable because of the formation of ice due to expanding vapors or vaporizing liquids. Drains and valves may be thawed by applying an environmentally acceptable low freezing liquid to the outside surfaces. Liquid should be recovered for reuse or proper disposal.

Avoid acetylene contact with copper, silver or mercury. See Section 10.

EXPOSURE CONTROLS/PERSONAL PROTECTION

GENERAL CONSIDERATIONS: Consider the potential hazards of this material (see Section 3), applicable exposure limits, job activities, and other substances in the work place when designing engineering controls and selecting personal protective equipment. If engineering controls or work practices are not adequate to prevent exposure to harmful levels of this material, the personal protective equipment listed below is recommended. The user should read and understand all instructions and limitations supplied with the equipment since protection is usually provided for a limited time or under certain circumstances.

NOTE: The above details constitute part information of MSDS taken from Canadian Centre for Occupational Health and Safety. For complete MSDS write to MIS division, Central Labour Institute, Sion, Mumbai.400022. MSDS on about 1,00,000 chemicals/materials are available with Central Labour Institute. Computer printout will be supplied on nominal charge basis.

LIBRARY AND INFORMATION CENTRE

The Library-cum-Information Centre of Central Labour Institute has unique and rare collection of different kind of publications in the field of Occupational Safety, Health, Management and allied subjects. It also has a good collection of different standards, codes, regulations on these matters. In the current year the centre is subscribing to 25 Indian & foreign journals, besides receiving complimentary copies of different periodicals from all over the world. The centre provides facilities for study and research and at the same time supplies authentic and up-to-date information on Occupational Safety, Health and Management. It also extends reading facilities to students & scholars attending different training programmes & courses conducted by CLI. From January 2000 till date a number of publications in the field of OS&H have been added to Library. Some of them are :

TOXICOLOGY AND BIOLOGICAL MONITORING OF METALS IN HUMANS: Including feasibility and need.

Authors: B.L. Carson, H.V. Ellis III, J.L.McCann

Publisher: Lewis Publishers, Inc.

Persons in many disciplines besides toxicology need information about toxic effects of substances related to exposure and how to monitor exposure. These disciplines include industrial hygiene, occupational medicine, clinical chemistry, public health, epidemiology and environmental regulation. Anyone who has ever tried to track down information on the toxicology, exposure, and monitoring of the

stable metals and metalloids knows that such information is spread among several secondary sources as well as the regulatory and primary literature. In addition, no one toxicology reference covers all the stable metals. The current volume serves a definite need in bringing toxicological, exposure, and monitoring information about the metals together in a one-stop source in a brief, uniform format.

PRACTICAL ASPECTS OF HUMAN RESOURCE MANAGEMENT

Author : A.S. Bhambra

Publisher: Commonwealth Publishers

Human resources planning may be defined as an attempt to forecast how many and what kind of employees will be required in the future, and to what extent this demand is likely to be met. It involves the comparison of an organisation's current human resources with likely future needs and, consequently, the establishment of programmes for hiring, training, redeploying and possibly discarding employees. Additionally, over the past several decades we have managed to understand a considerable amount regarding how people learn and how this learning can be applied in a work setting. The author has made an attempt through this publication to explain each and every aspect of Human Resource Management through Human Resource Planning; Job Security; Employee Selection; Job Analysis; Training and Development; Work Force Reduction; Employee Relations; and Employee Coordination.

ILO RULES EXCLUDE SUBSISTENCE FARMERS

Agricultural workers are finally getting the first ever Labour standard on safety and health the world over. With Agriculture classified by the ILO as one of the most hazardous professions in both the developing and developed world, apart from mining and construction, the International Labour Conference has overwhelmingly adopted a new International Convention and Recommendation on Health and Safety in Agriculture on which national policies can be developed. However, the ILO definition of agricultural farming excludes subsistence farming which is the major sector of the rural economy in the developing world and, therefore, excludes those engaged in it from health or safety protection.

The ILO puts an estimated 1.2 m occupational fatalities in the agricultural sector – mainly due to exposure to pesticides and other toxic chemicals, and accidents with machinery. But with subsistence and small-scale farming being excluded from the Convention only 5 per cent of the World's 1.3 bn agricultural workers will have some legal protection.

Yes, it is a known fact that agricultural workers engaged in subsistence farming in poor countries are more often than not illiterate or are unable to read the instructions labelled on the pesticides (if every they are labelled) because they are very likely imported from developed countries (where these very pesticides are banned) and are very likely written in languages they cannot understand. Though rich countries ban pesticides for use in their countries this is not necessarily so in the South.

The Latest Convention classifies 'agriculture' as covering agricultural and

forestry activities carried out in agricultural undertakings, including crop production, forestry activities, animal husbandry, insect raising, primary processing of agricultural and animal products. The ILO Convention also includes the use and maintenance of machinery, equipment, appliances, tools, and agricultural installations, including any process, storage, operation or transportation in an agricultural undertaking.

There are also provisions concerning young workers and child labour, temporary and seasonal workers, insurance against injuries and sickness, and welfare and accommodation facilities. The minimum age for assignment to potentially dangerous or unhealthy work fixed by the Convention is 18 years.

The Convention obliges ratifying member states to ensure that an adequate system of inspection for a agricultural workplaces is in place and is provided with adequate means. Workers in agriculture also have a right to be informed and consulted on safety and health matters including risks from new technologies. The Convention visualises social security, and states that agricultural workers should be covered by an insurance or social security scheme against fatal and non-fatal occupational injuries and diseases, as well as invalidity and other work related risks, providing coverage at least equivalent to that enjoyed by workers in other sectors. The Convention is accompanied by a Recommendation which sets out specific internationally agreed provisions designed to serve as guidelines as to how the national policy on health and safety in agriculture should be implemented.

Source: The Economic Times

WORKSHOP

A National tripartite workshop on Ship Breaking and Safety Work was organised by the International Labour Organisation in collaboration with Directorate General Factory Advice Service & Labour Institute (DGFASLI) at central Labour Institute (CLI), Mumbai on 14th & 15th May, 2001. The workshop was inaugurated by Dr. Hemant Deshmukh, Honorable Minister for Labour, Employment, Self Employment, Govt. of Maharashtra. Dr. Deshmukh highlighted the need for improving safety, health and welfare of the workers employed in ship breaking industry and assured that Maharashtra will play a leading role in the endeavor of ILO and Directorate General Factory Advice Service & Labour Institutes, Ms. Mary Johnson, Director ILO Area Office, New Delhi in her opening remark appraised the delegates about the background of the workshop and the work done by the national and international agencies on ship breaking and safe work. Dr. Igor Fedeto and Mr. Paul Bailey from ILO, Sectoral Activities Department from Geneva made presentations on objectives and organization of the workshop and health and safety hazards and preventive actions in ship breaking operations during the working sessions. Shri S.K. Saxena, Director General, DGFASLI, Mumbai presented the status report on occupational safety and welfare of workers in ship breaking industry at Alang. Thereafter, brief presentations were made by Government, employers and workers' representatives. Syndicate discussions were held by Government, employees and workers groups on problems on ship breaking and recommended measures (short term, mid term

and long term) to improve the safety, health and welfare aspects in ship breaking operations. Each group presented their views highlighting the areas where future initiatives are to be taken by concerned authorities namely, Government, employers, workers as well as ILO.

At the end of the workshop Dr. Igor Fedeto conducted the session on 'Plenary Discussions for Future Actions'. The workshop concluded with vote of thanks by Shri S.K. Saxena, Director General, DGFASLI.

MAY DAY CELEBRATION

May Day was celebrated on 1.5.2001 in the Central Labour Institute, Mumbai as an expression of solidarity with the cause of workers. The programme started with the show of film clippings on Child Labour prepared by the Ministry of Labour. The Seminar on 'Occupational Health Problems of Child Labour' followed the presentation of the film clipping. The seminar was followed by a highly interactive discussion involving the audience and two members of the faculty on various issues related to the child labour.

May Day was celebrated by Regional Labour Institute, Kanpur by conducting symposium on 'Rights of Workers about their Safety & Health'. Regional Labour Institute, Kolkata and Chennai also celebrated May Day. The celebration in RLI, Chennai was through a debate on the themes 'Employees' contribution for Organization development'.

**TRAINING PROGRAMMES
JULY TO SEPTEMBER 2001
CENTRAL LABOUR INSTITUTE , SION, MUMBAI - 400 022**

Programme Title	Contact Person
Diploma in Industrial Safety	Director (Safety) & Incharge Incl.Safety Division
Advanced Training Programme on Occupational Health & Environmental Medicine	Director (Medical) & Incharge Incl.Medicine Division
Safety & Health Management in the Thermal Power Plants	Director (Incl.Hygiene) & Incharge Incl.Hygiene Division
Selection Criteria of Incl. Workers for promotion of Safety, Health, Productivity	Director (Physiology) & Incharge Incl.Physiology Division
Personal Growth & Group Dynamics	Director(Staff Training) & Incharge Staff Training Division
Total Safety Management	Director(Safety) & Incharge Incl.Safety Division
Handling problem behaviour of employees	Director(Psychology) & Incharge Incl.Psychology Division
Work System Design for improving quality of worklife	Director (Productivity) & Incharge Productivity Division
Workshop on System approach to Safety, Health & Environment	Director(Safety) & Incharge Incl.Safety Division
Industrial Ergo/Human Factor for augmenting Safety, Health & Productivity	Director(Physiology) & Incharge Incl.Ergonomics Division
Evaluation & Control of Hazards in Drugs & Pharmaceutical Industry	Director(Industrial Hygiene) & Incharge Incl.Hygiene Division

Management of Occupational Stress for improved Safety Health & productivity	Director (Physiology) & Incharge. Incl.Physiology Division
TB for Health,Safety & Welfare at work	Director(Staff Training) & Incharge Staff Training Division
Training programme on Occupational Health Practice for Nurses	Director(Medical) & Incharge Incl.Medicine Division
Behavioural skills for Safety & Health Professionals	Director(Psychology) & Incharge Incl.Psychology Division
Bad work posture-Design for Ergo workstation for Safety, Health & Productivity at work	Director(Physiology) & Incharge Ergonomics Division
Safety Engineering & Management	Director(Safety) & Incharge Incl.Safety Division
Training programme on Emergency planning & Preparedness in Major Accident Hazards Installations	Director(Incl.Hygiene) & Incharge Major Accident Hazard Control Advisory Division
Selection Criteria of Industrial Workers for promotion of Safety, Health & Productivity	Director(Physiology) & Incharge Incl.Physiology Division
TQM & Business process Reengineering	Director (Productivity) & Incharge Productivity Division

**TRAINING PROGRAMMES
JULY-SEPTEMBER 2001
REGIONAL LABOUR INSTITUTE, SARVODAYA NAGAR,KANPUR**

Programme Title	Contact Person
Industrial Safety & Hygiene	Director Incharge
One year Post Diploma in Industrial Safety	Director Incharge

Chemical Safety	Director Incharge
Team Building for Safety, Health & Welfare	Director Incharge
Safety for Factory Inspectors	Director Incharge
Occupational Health	Director Incharge
Effective Supervision in Managing Safety, Health & Productivity.	Director Incharge
Workshop on Dispersion Modelling & Effect Calculation for gases of Moderate density	Director Incharge

**TRAINING PROGRAMMES
JULY-SEPTEMBER 2001
REGIONAL LABOUR INSTITUTE, LAKE TOWN, KOLKATA**

Programme Title	Contact Person
Workshops on Monitoring of Work Environment	Director Incharge
Workers Development Programme	Director Incharge
Chemical Safety & Major Accident Hazard Control in Industries	Director Incharge

INDOSHNET

Ministry of Labour, Government of India, is developing a National Network on Occupational Safety and Health information system known as INDOSHNET. Directorate General Factory Advice Service & Labour Institutes (DGFASLI), an attached office of the Ministry of Labour will act as a facilitator of the network system. The objective of the network is reinforcement and sharing of national occupational safety and health (OS &H) information on no-profit no-loss basis with a view to pooling our information resources for mutual benefit. The sharing of information will not only confine to the national level but also includes international sources. The communication of information will be through E-mail as well as postal/courier service. DGFASLI invites industrial organisations, institutions, industry associations, trade unions, professional bodies and non-governmental organisations having information on OS&H and willing to share the same with others at the national and international level to participate as members in the network. Interested agencies may please write for proforma of organisational profile to Director General, DGFASLI, Central Labour Institute Bldg., N.S. Mankikar Marg, Sion, Mumbai 400 022.

Note: Those who have responded to our earlier communication and sent organisation profile in the prescribed format need not write again.

NATIONAL REFERRAL DIAGNOSTIC CENTRE

Early detection and diagnosis of occupational health disorders and occupational diseases is one of the most important factors in the prevention and control of adverse health effects on workers due to various factors - physical, chemical, biological and psycho-social. The Industrial Medicine Division of Central Labour Institute, Mumbai runs a National Referral Diagnostic Centre (N.R.D.C.) for early detection and diagnosis of occupational diseases and recommends necessary measures for prevention/control of occupational health problems/occupational diseases. The diagnostic centre is well equipped for medical examination of the exposed workers and facilities are available for carrying out special investigation, e.g. Pulmonary function tests, Audiometry, ECG, Titmus vision test, Biological monitoring, etc. Medical professionals including Factory Medical Officers, ESI Doctors, Medical Inspectors of Factories and Certifying Surgeons, Doctors from Medical Colleges and Hospitals can refer suspected cases of occupational diseases to N.R.D.C. for diagnosis and advice. The communication should be addressed to the Director General, DGFASLI, Central Labour Institute Bldg., N.S. Mankikar Marg, Sion, Mumbai 400 022 for further details.

INOSHNEWS is a quarterly newsletter that facilitates exchange of ideas and data developed through research, study and surveys in the areas of occupational safety and health. DGFASLI invites articles from individuals, industry, industrial associations, trade unions, professional bodies etc. having information on OS & H and willing to share the same with others at the national and international level.

- 1. Manuscripts for publication should be typed in double space within 3 to 4 A4 size sheets only on one side of the paper and sent in duplicate to the Editor-in-Chief. No photographs can be published.**
- 2. Once the manuscripts are accepted for publication, publisher reserves the right to make editorial changes as may be necessary to make the article suitable for publication; and publisher reserves the right not to proceed with publication for whatever reason.**
- 3. Authors should take care to ensure the accuracy of data and reference.**

**GOVERNMENT OF INDIA, MINISTRY OF LABOUR
DIRECTORATE GENERAL FACTORY ADVICE SERVICE & LABOUR
INSTITUTES**

The Directorate General Factory Advice Service & Labour Institutes (DGFASLI) is an attached office of the Ministry of Labour, Government of India. DGFASLI organisation 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

The Central Labour Institute in Mumbai functions as a socio-economic laboratory and is a national institute dealing with the scientific study of all aspects of industrial development relating to the human factors.

Over the past 33 years the Central Labour Institute has constantly grown not only in size but also in stature and has earned national and international recognition. It has been recognised by the International Labour Organisation as a Centre of Excellence in training on Occupational Safety and Health in the Asian and Pacific Region. It also functions as a National Centre for CIS (International Occupational Safety and Health Information Centre) and the Centre for National Safety and Health Hazard Alert System. At the national level, apart from providing research and training support to the Government and functioning as a technical arm of the Ministry of Labour, the institute provides comprehensive and multi-disciplinary services to the Industrial Port sector through studies, technical advice, training and dissemination of information. It also runs National Referral Diagnostic Centre for early detection of occupational disorders and thereby controls and prevents them. It has a modern Audio Visual Studio fully equipped with sophisticated video production equipment to produce quality U-matic video films on Safety and Health. The Regional Labour Institutes are a scaled-down version of the Central Labour Institute and cater to the needs of their respective regions.

The organisation 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 organisation is well prepared to meet the challenges of tomorrow. It is committed to the goal of making the workplace safer.

Visit us at : www.dgfasli.nic.in