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DGFASLI

Telephone : PABX 91-22-4092203
Fax : 91-22-4071986
Email : CLBOM@X400.nicgw.nic.in
Internet : *http://www bom.nic.in*

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DGFASLI *newsletter*

Contents

From The Desk

Heat stress is a common hazard in most of the industries. Heat stress produces heat strains which is directly proportional to the stress level. It is also well known that exposure to excessively high temperature may produce undesirable and debilitating effects on the individual. The present issue of the INDOSHNEWS has as its cover feature an article, the second part will be published in the next issue. I feel that this article will give the necessary input to tackle the problem of heat stress in industry.

I am happy to inform that INDOSHNEWS in future will try to publish articles received from different agencies working in the field of safety and health on industrial workers. We are inviting articles from enforcement agencies and other government agencies working in the field, associations of employees and employers and also social action groups. We are also starting a new section on important accidents and happenings in the industry and port sector. We strongly feel that with the introduction of these, INDOSHNEWS will be more useful to its esteemed readers.

(S.K.SAXENA)
Editor-in Chief

HEAT STRESS IN INDUSTRY

PART - 1

Dr. S.K.Sensarma

INTRODUCTION

Problems of heat stress are very common in some industries such as Iron and Steel Mills, Glass and Ceramic Units, Forge shops, Foundries, Bricks and Tiles Factories, Thermoelectric plants, Cements, Coke ovens, Laundries, Mines and many others. There are many work place in these units where artificial hot climates are deliberately created for the requirement of some processes.

Whenever an individual is exposed to heat stress condition, there is a resulting strain due to considerable changes in many physiological reactions such as 'sweat production', 'increased heart rate' and 'higher core temperature' etc. The greater the stress level, the greater is the degree of strain experienced.

It is well known that prolonged exposure to excessively high temperatures is a serious hazard to the health of an individual. High heat stress disturbs the thermal equilibrium of the body, and consequently produces many adverse physiological reactions in man. The condition becomes very alarming when high degree of industrial heat combines with the metabolic heat arising out of heavy physical work performed by the workmen, particularly during the summer months. Work under such conditions not only produces undue strain and fatigue but also results in progressive decline in efficiency and productivity. It is, therefore, of prime importance to investigate this problem in order to ascertain and quantify various contributory factors, and mitigate them, as far as possible, by suitable measures.

In general terms, the 'Heat Stress' of any given working situation is considered as the combination of all the factors, both climatic and non-climatic/personal which lead to convective or radiative heat gain to the body or which limit or prevent the 'Heat Dissipative Mechanism" of the body.

According to 'World Health Organisation' the 'Heat Stress' is the load of heat that must be dissipated by the body, if it is to remain in thermal equilibrium.It is represented by the sum of the metabolic rate (minus external work) and the gain or loss of heat by convection, radiation or the evaporation of sweat, these factors being governed by the temperature, humidity and movement of the air and by the temperature of the surrounding walls and objects.

It is important to evaluate the degree of heat stress imposed on the human body by a certain environment in order to determine whether it is within the safe limits or is harmful and to ascertain the need for improvement by adopting suitable control measures. Many indices have been designed for the effective evaluation of heat stress conditions which are used in occupational situations.

HEAT-EXCHANGES PHENOM-ENA AND HEAT-BALANCE

Heat Source:The heat stress on the human body results from two types of heat load – (i) External Heat (Environmental Heat) and (ii) Internal Body Heat (Metabolic Heat).

The environmental heat load results basically from two mechanisms: 'conduction convection', 'C' and 'radiation', R. Besides, the human body generates heat due to intra-cellular oxidative processes (metabolism), the metabolic heat, M. which is a combination of heat generated by the basal metabolism and that resulting from physical activity. In order that the body maintains 'internal thermal balance',the metabolic heat load must be dissipated and this can achieved through conduction, convection and radiation

(depending on environmental conditions, the body may gain or loss heat through these mechanisms). In addition, heat can also be lost by the body through another mechanism – the evaporative cooling (E), which the cooling effect of the evaporation of perspiration from the skin (the evaporation of one litre of sweat removes 580 kcal heat from body to the surrounding environmental).

Heat Balance

Heat exchanges between the human body and its environment follow certain physical laws and can be expressed by mathematical equation, popularly known as the heat balance equation which can be represented as follows:

$M \pm C \pm R - E = \pm S$

Where M is the heat of metabolism depending on the amount of physical activity involved in the task.

C = Convective heat gain or loss.
R = Radiant heat gain or loss

Both C & R depend on the climatic conditions of the work environment.

E = Evaporative heat loss. It partly depends on the rate of sweating and partly on climatic conditions of work environment, especially the humidity and vapour pressure on the surface of the skin. Sweat produced on the surface of the skin gets evaporated when the vapour pressure on the skin is higher than that of the surroundings providing relief to the individuals. Air movement enhances evaporative heat loss.

S = Amount of heat gain or loss by the body. When there is heat balance, there is no storage of heat (S = O and accordingly the equation may be represented as:

$M \pm C \pm R - E = O$ (or $M \pm C \pm R = E$)

This would mean that heat generated internally, as well as heat received from the external environment through convection and radiation could be dissipated solely by evaporation of sweat. Obviously the sweat production should be much increased and this situation would place a definite strain on the human body.

Factors Responsible for Heat Balance: Climatic and Non-Climatic:
Climatic Factors: Environmental factors determine as to how, and as to what extent, the metabolic heat can be lost to the outside environment, or as to how and as to what extent the body will gain heat from the environment around, since:

C – depends on ambient air temperature and movement of air.

R – depends on the mean radiant temperature of hot equipment or process heat.

E – depends on ambient air temperature, humidity and air movement.

The thermal environment (climatic factors), therefore comprises of the four climatic parameters: (i) air temperature, (ii) air humidity, (iii) air movement, (iv) radiant heat. The above parameters need to be measured simultaneously and at the same spot considering the locations of the workers' exposure.

Non-climatic factors : In addition to the climatic factors as stated above there are also other factors (Non-climatic) to reckon with (i) the 'rate of work', (ii) whether or not an individual is acclimatised, (iii) the 'amount and type of clothing work', (iv) 'physical fitness level of the individual workers' (v) 'age', (vi) 'sex', etc. which are likely to modify the level of discomfort or distress, and consequently the 'heat strain' developed among the individuals exposed to such environment.

MEASUREMENT OF HEAT STRESS

Measurement of Environmental (climatic) Factors (Stress Parameters)
Heat has been on record as a hazard to man

since biblical times. However, it is only in the late few decades that national means have been developed for evaluating the stresses of hot environment identifying the contributing factors and predicting the resulting physiological strain.

Air Temperatures: The air temperature is expressed in degrees celsius (^oC), or degree Fahrenheit (^oF), and can be measured with the help of mercury thermometers, thermocouples, thermistors and resistance thermometers. The mercury thermometers are most widely used which are very simple, and more convenient than other types, particularly from the cost point of view, but very fragile, requiring care in handling.

Air Humidity : The air humidity can be estimated from the absolute and relative humidity values. Whereas the absolute humidity indicates the actual amount of water vapour in the air (expressed in grams of water vapour per cubic centimetre), relative humidity is the percentile ratio of the amount of moisture present in the air and the amount that the air could hold if saturated and at the same temperature.

Psychrometer – Instrument used for measuring air temperature and humidity:

The psychrometer basically consists of two thermometers – a 'dry bulb' and a 'wet bulb' – over which air passes at a certain speed. Dry bulb thermometer is just a liquid (most frequently used liquid is mercury) in glass thermometer. Wet bulb thermometer is a similar one, but having its bulb covered by a cotton wick. The wick which covers the bulb of one of the thermometers is fully wetted with distilled water.

The psychrometer is placed at the point of measurement and air at a certain speed is passed over the bulbs. When air passes over the thermometer bulbs, the reading in the dry bulb remains unchanged, while reading in the wet bulb decreases until equilibrium is attained. The air movement which directly influences the evaporation of water from the wick, will have a cooling effect, thus decreasing the temperature in the wet bulb, referred to as the 'depression of the wet bulb'. The air velocity over the bulbs must be sufficient to ensure that equilibrium is reached rapidly.

The temperature values in both thermometers are read and recorded as 'dry bulb' and 'wet bulb' temperature which are plotted on to a psychrometric chart, and the values for relative humidity, few point and absolute humidity can be obtained.

Sling Psychrometer (Whirling Hygrometer):

This is a very simple instrument in which the thermometers are mounted in a sling. The air movement over the bulbs is made by whirling the whole assembly. It is recommended to whirl at about 60 revolutions per minute. Usually one minute is enough to get the wet bulb thermometer to its lowest reading. After checking the reading, it is advisable to whirl a few more times, and check if the wet bulb temperature remains the same. If it continues to fall, the process should go on until the reading is stabilized.

Aspirating Psychrometer:

This instrument is basically the same as the sling psychrometer. However, the air is circulated over the bulbs by means of an aspirator bulb to eliminate error from manual rotation. The same precautions as for the sling psychrometer should be applied.

Air movement :

Instruments to measure air velocity are generally anemometers. The air velocity is measured from the cooling power of the moving air. These are very useful for evaluation of heat stress because they also measure non-directional, turbulent air movement which is important for heat transfer. Example of instruments in this category are: (i) Katathermometer , (ii) Anemotherm air meter (ii) Alnor thermoaneomometer.

Katathermometers are mostly used for

measuring movement of air.

Katathermometer:

- This instrument was designed, by Dr. Willinam Hill Kata to measure the cooling capacity of the surrounding air, which depends on its movement whether linear or not. The katathermometer is glass thermometer which has alcohol (liquid) with a large bulb and an upper reservoir with two marks on the stem. These instruments are made for different ranges (105^o – 100^oF, 130^o – 125^oF, 150^o – 140^oF), and hence the selection should be made bearing in mind the thermal conditions before its use. The katathermometer can be used to evaluate the cooling power of the air movement even for very low air velocities – round or below 0.25 m/sec. (50 fpm).

  Operation:

- The bulb is warmed (usually by placing it in warm water) until the alcohol dilates and fills up the whole thermometer (until about 40^oC).

- The thermometer is then carefully dried and placed at the sampling site.

- Due to the cooling effect of the air movement, the alcohol will contact, in a time interval inversely proportional to 'cooling capacity' of the air (air movement).

- The time elapsed from the moment the alcohol passes by the upper mark to the moment reaches the lower cooling time is determined by means of a stopwatch.

- The values of the 'cooling time', 'air temperature' and 'instrument factor' (Kata Factor, marked on each Katathermometer) are combined through equations or nomograms to calculate the air movement.

Radiant Heat:

The mean radiant temperature of the surrounding is calculated – not measured. The values for this calculation are the 'air temperature' (dry bulb), the 'globe temperature' (Temperature read in a globe thermometer) and the 'air velocity'.

Globe Thermometer (Vernon Globe):

This instrument consists of a hollow sphere made of metal 'copper' (Globe – with a diameter of 15 cm (or 6 inches) painted in a matte black to absorb as much as possible of the incident infra-red radiation. A thermometer is inserted in the globe so that the bulb (or sensing element is located at its centre).

Operation:

- The globe is suspended, at the point of measurement, about 1.20 m (4 ft.) above the ground, with as little contact as possible with any other solids. Thus the globe gains heat by radiation and loses by convection (not conduction).

- When thermal equilibrium is reached, which usually takes about 25 – 30 minutes, the reading in the thermometer will give the globe temperature (t_g). the mean radiant temperature (t_w) can then be calculated, if necessary, from globe and air temperatures, and air velocity. For most practical applications, the globe temperature (t_g) is required.

(Contd. to Vol. IV No.4)

OCCUPATIONAL HEALTH STUDY IN AN INSECTICIDE FORMULATION UNIT

An Occupational Health Study on Safety, Health & Working Environment in a Pesticide unit was conducted by the Regional Labour Institute, Calcutta. The unit formulated : Fenvalerate, Mancozeb, Ethophon, Carbaryl, Lindance, Malathion, Methyl Parathion, Cypermether and Matalaxyl.

METHODOLOGY :

A total of 32 workers were engaged in this factory. After stratified random sampling, 17 workers were subjected to general medical examinations and investigations.

FINDINGS :

All the 17 workers had high eosinophil count in blood and 14 workers were anaemic. One showed sugar in urine. Two showed mild lung obstruction in Lung Function Test. 4 workers had abnormal X-ray findings. All the 17 workers had one or more than one signs and symptoms related to pesticide over-exposure. Four workers showed their Cholinesterase activity in blood below normal. They were over-exposed to antichloinesterase pesticides (Malathion, Methyl Parathion and Carbaryl). Out of 4 workers, 3 workers showed Cholinesterase activity in blood within the range of 50% - 75% they were overexposed (probable).

RECOMMENDATIONS :

It is recommended that all these 17 workers should be continuously monitored. The workers who are potentially exposed to pesticides should be monitored regularly at periodic intervals for the detection of any toxic effect of pesticides in them. The Medical Officers attached to the factory may be trained in Occupational health. A medical centre with adequate facilities along with emergency medicines to handle cases of poisoning should be established. Paramedical staffs should be appointed as per rules and training imparted to them in Occupational health aspects.

PROCESS SAFETY STUDY IN A PESTICIDE UNIT

Process Safety study was conducted by the Regional Labour Institute, Calcutta in a pesticide unit. The unit produces two technical products namely 2,4-D sodium salt and 2,4-D dimelthylamine amine salt. Besides, it also formulates Ethion, Malathion, Endosulfan and Dicofol from the technical grade pesticides.

OBJECTIVES :

The main objective of the study is to identify the hazards prevalent in the manufacturing and formulation of pesticides, to review inspection, testing and maintenance system of plants and equipments and to suggest improvement.

FINDINGS :

In spite of batch process, deficiencies were noted in the design system, instrumentation, storage, monitoring of flammable/toxic gas release, fire prevention and control system, emergency preparedness etc.

RECOMMENDATIONS :

Specific recommendations were given to improve the deficiencies observed in the study.

WORK ENVIRONMENTAL STUDY IN A SERVO CONTROLLED STABILISER PRODUCING UNIT

The unit is engaged in production of Servo Controlled Stabiliser in both single and three phase range. Voltage stabilisers ranging from 3 to 350 KVA capacity are produced in this unit which employs 46 production personnel. Process involves soldering operation which leads to generation of Lead and Fluoride fumes. The environmental study was conducted by the Regional Labour Institute, Chennai with the objective to assess the

concentration of Lead and Fluoride fumes in work environment and to suggest remedial measures wherever necessary to improve the environmental conditions.

METHODOLOGY :

There are two machines which are housed in the same room, one is used for single phase transformer while other one is used for making three phase transformer. Both of these machines were provided with local exhaust systems to vent out the fumes. It was observed that hoods of both the local exhaust systems were having small openings which might adversely affect the efficiency of the exhaust system. The soldering operation is not continuous but intermittent depending upon the work load. One operator was engaged on each machine and they were found working without any respiratory protection.

Samples of airborne lead fumes were collected on cellulose membrane filter paper and analysed spectrophotometrically using Dithizone method. Samples of Fluoride fumes were collected by passing the air in Sodium Hydroxide Solution and analysed colorimetrically using SPADNS method.

FINDINGS :

The average concentrations of Lead fumes near soldering machine No.1 and No.2 and general atmosphere were found as 0.005, 0.004 and 0.002 mg/M^3 respectively. All these concentrations are well within the PLE for Lead fumes i.e. 0.15 mg/M3. The concentrations of Fluoride fumes near machine No.1 and 2 were found as 0.14 and 0.09 mg/M^3 respectively. These are also well within the PLE-TWA for Fluoride fumes i.e 2.5 mg/M^3.

RECOMMENDATIONS :

Modifications in the hood of the local exhaust system have been suggested to further improve its efficiency. Biological monitoring of blood and urinary lead levels has been suggested to ascertain the health status of exposed workers. Training of operators about the health hazards involved and their control has also been suggested as a preventive measure.

WORK ENVIRONMENT STUDY IN A PESTICIDE INDUSTRY

Regional Labour Institute, Calcutta carried out a study on work environment in a Pesticide industry which formulates corbofuran a carbamate pesticide from 'Carbofuran' technical under the trade name 'Furadan' which is a dry violet powder containing 3% active ingredient. The other ingredients required for the formulations are river sand (16 to 30 mesh), gum, methyl violet concentrate, mineral calcite, emulsifier and sugar.

METHODOLOGY :

All the raw materials are fed into a blending machine for uniform mixing and then the mixture is dried in a electrically operated drier at 90^{o}C. The dried mixture is sieved and sent for packing. The dry formulation is then packed both by manually and mechanically for bulk packing and cartoon packing respectively. Representative air samples were collected from different locations of the manufacturing process. Both personal and static sampling were carried out to assess the level of exposure of pesticides of the workers and to measure the prevailing airborne level of pesticide in the shop floor.

FINDINGS :

The results of the analysis reveal that the air-borne level of carbofuran in the work environment is well below the permissible exposure level of 0.1 mg/m^3.

RECOMMENDATIONS :

On the basis of the study and observations, suggestions have been recommended to further improve their work environment including training of their workers to prevent personal exposures and also periodic monitoring of their work environment.

ERGONOMICS & ITS MANAGING INDUSTRIAL HEAT FOR SAFETY, HEALTH AND PRODUCTIVITY

In some industries, viz. steel, foundry, forging, glass, textile, automobiles, etc. there are many work-stations where artificial heat is created from various hot processes. The climatic heat, particularly during extreme summer, when combines with the process-heat coupled with physical work involved in various activities, make the working environment often very adverse and results in undue strain and fatigue among the workers from physiological and psychological point of view. It has been fairly established that the work under such conditions would not only affect the health and well-being of the individual workman but it also might adversely reduce their work efficiency. Environmental heat is also well-known to increase the frequency of accidents at large.

Considering the wide magnitude of the heat problems in industries, this training programme aims at providiing the relevant tools to achieve the goal of making work more humane and productive through applications of the latest technology and scientific approach.

OBJECTIVE:

To acquaint with :

* The techniques of monitoring environm-ental heat-load and assessment of the magnitude of the problem.
* Some simple research methodologies to study the human reactions to work and working environments.
* Some appropriate methods for improving work-stations.

PARTICIPANTS:

Plant Physicians, Industrial Engineers, Safety Personnel, Industrial Hygienists, Trade Union Leaders.

DURATION : 4-Days

Conducted by Industrial Ergonomics Division, CLI, Mumbai

APPICATION FOR SAFETY, HEALTH & PRODUCTIVITY IN INDUSTRY

Human machine, is a complex and reliable system which needs careful handling for maximum benefit. The physiological, psychological and environmental needs of human beings is important to get maximum output from them. To cater this need, a new speciality has emerged which is known as 'ERGONOMICS'. The principles of Ergonomics involve various multidisciplinary approach to augment the complex needs of human beings in shopfloor. The practice of principles of 'ERGONOMICS' in shopfloor is a tool for increased safety, health and productivity of workers. Benefit goes to both the management and employees. Human factors which are responsible for acidents, low productivity, ill health and quality of working life, will be discussed in this workshop through inter-disciplinary approach during the delibration.

CONTENTS

* Physical work, fatigue and working posture
* Monotony/boredom - alertness, acquisition of skill, selection and training/retraining
* Environment/working condition-heat stress, noise, industrial illumination etc. & control
* Ergonomics of Machine Design/ Guarding
* Material handling - mechanical and manual
* Anthropometry and work station design
* Design and quality requirement
* Case studies

PARTICIPANTS:

Safety officers, Design/Production Engineers, Plant Medical Officers from Manufacturing Industries, Employees State Insurance etc. Plant Medical Officers, Safety professionals, Production Engineers etc.

DURATION : 5-Days

Conducted by Industrial Ergonomics Division, CLI, Mumbai

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: Human occupational and performance limits under stress: The thermal environment as a prototypical example

CIS ACCESSION NUMBER :
CIS 99-1036

ABSTRACT :
This literature survey on contemporary stress limits for workers exposed to adverse thermal conditions shows that change in behavioural performance efficiency is the most sensitive reflection of human response to stress and such responses are superior as indices of incipient damaging effects compared to the traditional measurement of physiological function. Continuing exposure after work performance efficiency begins to fail, but before current physiological limits are reached, is inappropriate for both safety and productivity of the individual worker, colleagues, and the systems in which they operate. Behavioural performance assessment should therefore supercede physiological assessment as the primary exposure criterion. A new description of such performance thresholds for heat stress is presented, together with its substantive theoretical foundation. Topics: cognitive performance; heat load; heat stress indices; heat tolerance; human behaviour; literature survey; mental work capacity; neuropsychic stress; perceptual-motor performance; work capacity.

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

IDENTIFICATION

Product Name(s): Pureflame* Furnace Oil

INGREDIENTS & TOXICOLOGICAL PROPERTIES

Cas# : 68334-30-5
WHMIS controlled: yes

Rat	Oral LD50	9.0 mL/kg
Rabbit	Dermal LD50	> 5.0 mL/kg

TOXICOLOGICAL INFORMATION

Rationale for Whmis Toxicity Classification: Exposure may occur via inhalation, ingestion, skin absorption and skin or eye contact. The International Agency for Research on Cancer (IARC) considers that data is insufficient in order to classify as to the carcinogenicity of the product. Studies on similar products are currently underway to assess dermal carcinogenicity. This product is expected to be irritating to skin but is not predicted to be a skin sensitizer. Data is insufficient to further classify according to WHMIS criteria. See supplemental health information.

EMERGENCY AND FIRST AID PROCEDURES

Eyes : Flush eyes with water for at least 15 minutes while holding eyelids open. If irritation occurs and persists, obtain medical attention.

Inhalation: Remove victim from further exposure and restore breathing, if required. Obtain medical attention.

Ingestion: Do not induce vomiting obtain medical attention immediately. Guard against aspiration into lungs by having the individuals turn on to their left side. If vomiting occurs spontaneously keep head below hips to prevent aspiration of liquid into the lungs.

Skin : Start rinsing and remove contaminated clothing while rinsing. Wash contaminated skin with mild soap and water. If irritation occurs and persists, obtain medical attention.

Notes to physician: The main hazard following accidental ingestion is aspiration of the liquid into the lungs producing chemical pneumonitis. If more than 2.0 mL/kg has been ingested, vomiting should be induced with supervision. If symptoms such as loss of gag reflex, convulsions or unconsciousness occur before vomiting, gastric lavage with a cuffed endotracheal tube should be considered.

EMPLOYEE PROTECTION

The following information, while appropriate for this product, is general in nature. The selection of personal protective equipment will vary depending on the conditions of use.
Occupational exposure limits - valid 1995/1996
Not available for product.
Oil mist (mineral):
5 mg/m3 (TLV/TWA) ACGIH
10 mg/m3 (TLV/STEL) ACGIH
Recommend SHELL guideline of 125 mg/m3 for vapours (8 hour shift).

Eyes and Face: Chemical safety goggles and/or full face shield to protect eyes and face, if product is handled such that it could be splashed into eyes. Provide an eyewash station in the area.

Skin (Hands, Arms and Body): Impervious gloves should be worn at all times when handling this product. PVC or nitrile rubber gloves recommended. In confined spaces or where the risk of skin exposure is much higher, impervious clothing should be worn. Safety showers should be available for emergency use.

Respiratory :
If exposure exceeds occupational exposure limits, wear a NIOSH- approved respirator. Use either an atmosphere-supplying respirator or an air-purifying

respirator for organic vapours. Proper equipment for high concentrations

includes an atmosphere supplied, positive pressure demand, self-contained or airline breathing apparatus.

PREVENTATIVE MEASURES

Storage and handling : Avoid excessive heat, sparks, open flames and all other sources of ignition. Use explosion-proof ventilation to prevent vapour accumulation. Fixed equipment as well as transfer containers and equipment should be grounded to prevent accumulation of static charge. Vapours are heavier than air and will settle and collect in low areas and pits, displacing breathing air. Extinguish pilot lights, cigarettes and turn off other sources of ignition prior to use and until all vapours are gone. Vapours may accumulate and travel to distant ignition sources and flashback. Do not cut, drill, grind, weld or perform similar operations on or near containers. Empty containers are hazardous, may contain flammable/explosive dusts, residues or vapours. Keep container tightly closed. Never siphon by mouth. Wash with soap and water prior to eating, drinking, smoking or using toilet facilities. Launder contaminated clothing prior to reuse. Use good personal hygiene.

WASTE DISPOSAL METHODS

Waste management priorities(depending on volumes and concentration of waste) are: 1. recycle(reprocess), 2. energy recovery(cement kilns, thermal power generation), 3. incineration, 4. disposal at a licenced waste disposal facility. Do not attempt to combust waste on-site. Incinerate at a licenced waste disposal site with approval of environmental authority.

SPECIAL FIRE-FIGHTING PRO-CEDURES

Caution - Combustible. Do not enter confined fire space without adequate protective clothing and an approved positive pressure self-contained breathing apparatus. Do not use water except as a fog. Containers exposed to intense heat from fires should

be cooled with water to prevent vapour pressure buildup which could result in container rupture. Container areas exposed to direct flame contact should be cooled with large quantities of water as needed to prevent weakening of container structure. Product will float and can be reignited on surface of water. 7B - Reactivity Data.

ENVIRONMENTAL DATA REGULATIONS AND STANDARDS

No Canadian federal standards. This product, or all components, are listed on the Domestic Substances List, as required under the Canadian Environmental Protection Act.

ENVIRONMENTAL EFFECTS AND HAZARDS

Do not allow product or runoff from fire control to enter storm or sanitary sewers, lakes, rivers, streams, or public waterways. Block off drains and ditches. Provincial regulations require and federal regulations may require that environmental and/or other agencies be notified of a spill incident. Spill area must be cleaned and restored to original condition or to the satisfaction of authorities. May cause physical fouling of aquatic organisms.

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 400 022. 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 28 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 1999 till date a number of publications in the field of OS&H have been added to Library. Some of them are :

SAFETY PROMOTION RESEARCH

Publisher: Karolinska Institute, Department of Public Helath Sciences, Division of Social Medicine, Sweden

Accident and injury prevention through the promotion of safety is a concept that has gained considerable attention over the past decades - in an increasing number of countries and among persons operating in the field (decision-makers as well as members of the scientific community).

This books is envisaged to provide a basis for a ten day course of training, each chapter corresponding to the theme of the day.

The first chapter covers concepts, definitions and frameworks related to injury causation and prevention, and also to safety promotion. Chapter 2, illustrates how quality aspects in reporting/registering systems influence the injury mortality or morbidity panorama of a population. Chapter 3 addresses the basics and potentials of surveillance as a tool for injury prevention and safety promotion, stressing the importance of frequent evaluations of any system of this kind. Chapter 4 takes up the question of violence, and its causation and prevention, from a public-health perspective, combining fundamental, conceptual and theorectical knowledge accumulated in the fields of criminology, sociology and public health.

The three chapters that follow focus on intervention strategies for injury prevention and safety promotion, and on their evaluation. Chapter 5, which is strictly concerned with describing such strategies, Chapter 6 provides an overview of various meanings of and designs for evaluation in different settings and Chapter 7 reviews some major problems that can be encountered when dealing with the evluation of safety-promotion work, and suggests manners in which they can be tackled.

Three further chapters deal with more specific questions. Chapter 8 is concerned with the economic aspects of injury prevention. Chapter 9 address the mechanisms behind social indquality in injury risks. Chapter 10 discusses medical ethics from a historical perspective and reflect on major ethical issues in safety-promotions research.

The book ends with a chapter which seeks to identify the major questions left unanswered in safety-promotion research and discusses the challenges ahead.

OVERSEAS U.K. FIRMS MAY HAVE TO PAY THE PRICE FOR IGNORING WORKERS' HEALTH

It is unlikely that Rajendri Prasad Dwivedi has even heard of the House of Lords. But a recent decision taken by that British parliamentary body might well transform life for this sick and worried factory worker.

The House of Lords concluded some months ago that British companies which adopt poor safety standards in their factories overseas can be sued in British courts. This implies that companies taking a casual approach towards the health of workers in developing countries like India may now have to pay a hefty price.

In February, Mr. Dwivedi and his colleague, T.Kadam, became the first Indian workers to grasp this unexpected legal lifeline. Both claim they are suffering from asbestosis as a result of the negligent practices of their British employers. And if their case, which has been filed in the London high court succeeds, it may well prove a landmark for the occupational health movement in the country.

Mr. Dwivedi's saga began when in 1969, he joined Hindustan Ferodo, a subsidiary of the British T&N, which made clutch and brake linings. Constant exposure to raw asbestos took its toll and the machine-operator developed respiratory problems, chronic breathlessness and exhaustion. Finally, unable to take the physical strain, he forced to opt for voluntary retirement in 1996.

Unknown to the Ferodo workers, however, their battle was being fought in a remote part of the world. In 1993, two unions in Africa - one which represented the uranium miners in Namibia and another which represented the workers in a mercury processing plant in South Africa - decided to try and fight their cases in the British courts. Quick on their heels were 2000 workers from the South African asbestos mines run by Cape, another British company. In all the cases, workers had undergone horrible health problems because of the lack of even basic protective gear like masks, gloves and ventilation. Many had died, others were in the throes of cancer.

"The companies argued that the cases should be fought in Africa," says Daniel Bennett, a solicitor with Leigh Day and Co, which has taken on all three cases. "But, as in the case in India, legal delays and a lack of funds would have stacked the cases terribly against the workers".

Finally, the House of Lords arrived at its landmark decision-justice would be best served if the cases proceeded in the British courts. "If an MNC is made accountable in its home country, it will not be able to escape obligations merely by shifting its factories abroad," says Mr. Benett, pointing out that some MNCs exploit the relatively lax laws in developing countries. "This move will do much to dispel the dreadful double standards which exist."

It was while working on other matters related to British asbestos companies that Leigh Day and Co came upon documents related to T&N's factories in India. "By the 1930s, the ill-effects of asbestos were well-known in the UK," says Mr. Bennett, who began tracking down affected workers some months ago. "The Asbestos Industry Regulations (1931) stressed the need for expensive measures like fans, ventilation, rotation of workers and protective equipment.

"By the time Hindustan Ferodo started its factory in Ghatkopar in 1956, it was clear that exposure to asbestos caused asbestosis as well as lung and pleural cancer. But the company ignored the need for safety measures". As a result, workers inhaled lethal asbestos fibres on a daily basis. In 1990, T&N sold the factory to an Indian company. As the factory has now been sold, no representatives of Hindustan Ferodo were available for comment.

Source: The Times of India

SEMINAR ON "BACK PAIN - PROBLEMS & SOLUTION"

Seminar on "Back Pain - Problems & Solutions" was organised by the Central Labour Institute, Mumbai and the students of the Diploma Course in Industrial Safety. An officer of the Institute delivered the welcome address. The chief guest Col. S.K. Singh, AMC and participants were appraised regarding the objective of the seminar. The Director General, DFASLI inaugurated the seminar. The following technical presentations were made by the guest speakers : (i) Anatomy of Backache by Dr. Puri, Associate Prof. Department of Orthopaedics, Sion Hospital, Mumbai (ii) Workstation Design - Control of Back Pain by Prof. K. Munshi, Head, Industrial Design Centre, IIT, Mumbai (iii) Back Pain - Industrial Experiences by Dr. V.T. Ingalhalikar, Specialist - Back Pain, Mumbai (iv) Management of Backache by Mrs. P.V. Rege, Physiotherapist, AIIPM & R, Mumbai (v) Back-pain-Case studies by Shri K.K. Kanchan, General Manager (SHE), Siemens Ltd., Kalwa Works, Thane (vi) Back pain among Women by Dr. Lakshmi Lingam, TISS, Mumbai. Besides the technical presentation, Yoga demonstration was also arranged. About 180 delegates, invitees, officers from CLI, DGFASLI, IDS and guest from industries participated in the seminar. The fund collected was presented to the Chief Guest for onward transmission to "Prime Minister's Defence Fund" New Delhi. The seminar was appreciated by all the delegates because the subject of back-pain was delivered for the first time in the area of "Occupational Health & Safety".

TRAINING COURSE ON OCCUPATIONAL SAFETY AND HEALTH

A specialised training course on Occupational Safety and Health for officers of His Majesty Government of Nepal was conducted in collaboration with International Labour Organisation(ILO), New Delhi.

The course commenced on 6th July, '99 at the Central Labour Institute, Mumbai. The participants of the course included six Factory Inspectors and One Industrial Hygienist.

Special inputs, theoretical as well as practical were also given on the aspects of Construction Safety, Industrial Noise and Industrial Hygiene by dividing participants into three groups as per their requirements. Five industrial visits were also organised in which the participants were demonstrated the management of safety and health in these factories. An additional visit to the factory manufacturing boilers was also organised in order to enable them perform their statutory duty as factory inspectors. On conclusion of the programme the participants expressed their accomplishment of purpose of their training.

PROMOTION OF HINDI AS AN OFFICIAL LANGUAGE

"Hindi Pakhwara" was celebrated in this Directorate General from 14-28 September, 1999. During this period a number of competitions on Essay, Typing, Noting & Drafting, Debating, Translation in Hindi etc. were held amongst the employees of the Directorate and prizes were distributed to the winners. A lecture on use of computers in Hindi was also arranged. The occasion was inaugurated by the Senior Officer(CLI) of this Directorate where the use of Hindi in a day-to-day official work was highlighted. In the valedictory function the Director General appreciated the motivated employees and invited all to do day to-day work in Hindi. Similarly the Hindi Day was also celebrated at RLI Kanpur on 14th September, 1999, Dr. Brij Lal Verma, an eminent Hindi Professor & Writer inaugurated the programme and addressed the gathering. Some important resolutions about use of Hindi in the Institute were passed during the occasion.

TRAINING PROGRAMMES
OCTOBER -DECEMBER '99

CENTRAL LABOUR INSTITUTE , SION, MUMBAI - 400 022

Programme Title	Period	Contact Person
Diploma Course in Industrial Safety 1999-2000	01 June 1999 - 31 March, 2000	Director (Safety) & Incharge Indl.Safety Division
Testing & examination of lifting machines, tackles & pressure vessels	04-07 October, 1999	Director (Safety) & Incharge Indl.Safety Division
Managing Stress at Work	06-08 October, 1999	Director(Psychology) & Incharge Indl.Psychology Division
Total Quality Management	11-15 October, 1999	Director(Productivity) & Incharge Productivity Division
Occupational Physiology, its application in industry for promotion of health, safety and productivity	18-22 October, 1999	Director(Physiology) & Incharge Indl.Physiology Division
Health & Safety Management system for Inspectors of Factories	08-10 November, 1999	Director(Safety) & Incharge Indl.Safety Division
Selection criteria and quality assurance of PPE	15-17 November, 1999	Director(Indl.Hygiene) & Incharge Indl.Hygiene Division
Overused syndromes & Musculo-skeletal disorders	15-19 November, 1999	Director(Physiology) & Incharge Indl.Physiology Division
Leadership effectiveness for Incharge safety, health and productivity	16-19 November, 1999	Director(Psychology) & Indl.Psychology Division
Supervisory Development	22-26 November, 1999	Director(Staff Trg.) & Incharge Staff Training Division
Industrial Ergonomics/Human factor for augmenting safety health & productivity at work	06-10 December, 1999	Director(Physiology) & Incharge Indl.Physiology Division
Advanced training programme on Occupational Health and Environmental Medicine	06-17 December, 1999	Director(Medicine) & Incharge Indl.Medicine Division

Programme Title	Period	Contact Person
Emergency Planning in MAH Installation	09-10 December, 1999	Director(MAHCA) & Incharge MAHCA Division
Productivity Techniques for effective employee participation	13-17 December, 1999	Director(Productivity) & Incharge Productivity Division
Handling Problem Behaviour of Employees	13-17 December, 1999	Director(Psychology) & Incharge Indl.Psychology Division
Construction Safety	20-22 December, 1999	Director(Const. Safety) & Incharge Construction Safety
Occupational Backache, prevention through physiological techniques	20-24 December, 1999	Director(Physiology) & Incharge Indl.Physiology Division
Environmental Management System	22-24 December, 1999	Director(Indl.Hygiene) & Incharge Indl.Hygiene Division
Training course for CIS	27-29 December, 1999	Director(Staff Trg.) & Incharge Staff Training Division

TRAINING PROGRAMMES
OCTOBER-DECEMBER '99

REGIONAL LABOUR INSTITUTE, SARDAR PATEL ROAD, CHENNAI-600 113

Programme Title	Period	Contact Person
Productivity Techniques for Effective employee participation	11-15 October, 1999	Director Incharge
Management of Work Environment Stresses	26-28 October, 1999	Director Incharge
Major Accident Hazard Control	08-12 November, 1999	Director Incharge

Programme Title	Period	Contact Person
Management of Hazardous Substances	15-19 November, 1999	Director Incharge
Identification, Analysis, Assessment & Control of MAH in Chemical industries	08-14 December, 1999	Director Incharge

TRAINING PROGRAMMES
OCTOBER-DECEMBER '99

REGIONAL LABOUR INSTITUTE, SARVODAYA NAGAR, KANPUR - 208 005

Programme Title	Period	Contact Person
Seminar on Industrial Environment & its control	5th October, 1999	Director Incharge
Specialised Course on Chemical Safety for Safety Officers	11-15 October, 1999	Director Incharge
Workshop on HAZOP	27-29 October, 1999	Director Incharge
Chemical safety for Safety Committee Members	15-19 November, 1999	Director Incharge
Safety Engineering & Management	22-26 November, 1999	Director Incharge
Occupational Health Practices for Nurses	01-03 December, 1999	Director Incharge
Industrial Safety and Health	20-24 December, 1999	Director Incharge

TRAINING PROGRAMMES
OCTOBER '99 -MARCH 2000

REGIONAL LABOUR INSTITUTE, LAKE TOWN, CALCUTTA - 700 089

Programme Title	Period	Contact Person
Refresher Course on Occupational Health	1st & 2nd week of November, 1999	Director Incharge
Advanced Action Oriented Programme on "Safety, Productivity & a Better Place to Work"	3rd week of November, 1999	Director Incharge
Workshop on Monitoring of Work Environment	3rd week of November, 1999	Director Incharge
Major Accident Hazard Control	2nd & 3rd week of December, 1999	Director Incharge
Safety Audit	4th week of December, 1999	Director Incharge
Safety Engineering & Management	1st week of January, 2000	Director Incharge
Evaluation & Control of Gaseous Pollutants in Industries	2nd week of February, 2000	Director Incharge
Chemical Safety for Workers Members of Safety Committee	2nd week of March, 2000	Director Incharge
Advanced Action Oriented Programme on "Safety, Productivity & a Better Place to Work"	3rd week of March, 2000	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.

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 Calcutta, 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.

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