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DUST – A WORK ENVIRONMENT POLLUTANT IN PORTS

1. INTRODUCTION

The era of globalisation, privatisation and liberalisation has given the port a pivotal role in the National economy. In view of this, there is faster growth in the industrial development in the country, resulting in handling of import / export of cargoes more than 100 million tonnes annually through ports which include about 14 - 15% dangerous goods. In India, there are at present 12 major ports, 22 intermediate ports and 128 minor ports situated along the coastal line of the country. The cargo traffic at these ports is increasing @ about 7% annually.

The port and dock work is typically hazardous because the nature of cargo changes from ship to ship and from consignment to consignment which includes bulk cargoes giving rise to dust hazards while handling. The traffic, in particular of bulk cargoes in the ports involves the process of loading or/and unloading of cargoes like sulphur, rock phosphate, urea, coal, limestone, Iron Ore, food grains etc. by using suitable lifting appliances (cranes, derricks etc.) and loose gears (grabs, net slings etc.). The process also involves manual handling of these cargoes by dock workers from wharf to ship and vice-versa. During the export operation the cargoes are transported by truck or lorry from consignor's place to port and shifted from the wharf to the ship using suitable lifting appliances and loose gears. Whereas in case of import, the cargo is transported from ship's hatch, either by using net slings or grabs on to wharfs. In some cases, the cargoes are directly loaded into the truck or lorry parked on the wharf and transported to consignee's premises. In other system of operation like conveyor system, the cargo is stored in transit sheds and then loaded into the trucks and transported to consignees' premises. During all these stages of operation lot of dust is emitted causing dust hazards in the port in

general and to the dock workers in particular. Thus, air borne dust is one of the major occupational health hazards during handling of bulk cargoes in the ports.

2. STATUTORY PROVISIONS

As per the Constitution of India, the Central Government is empowered to enact National Laws for regulating safety and health of labourers. Accordingly, the Central Government has enacted the Dock Workers (Safety, Health and Welfare) Act, 1986, which extends to the whole of India. The Central Government had framed the Dock Workers (Safety, Health and Welfare) Regulations, 1990 under the said Act, applicable to all the major Ports of India. Few State Governments have already initiated action for framing the Regulations, under the said Act, applicable for intermediate and minor ports, in the respective States.

The Directorate General Factory Advice Service & Labour Institutes under Ministry of Labour, Govt. of India through its subordinate offices viz. Inspectorates Dock Safety established in all the major ports, enforces the various safety, health and welfare provisions made under Dock Workers (Safety, Health and Welfare) Act, 1986 and the Dock Workers (Safety, Health and Welfare) Regulations, 1990 framed thereunder in these ports.

The safety measures to be taken while handling dangerous goods have been prescribed under Regulations 76 to 82 of the Dock Workers (Safety, Health and Welfare) Regulations, 1990. Other related statutes concerning working in ports / docks are Manufacture, Storage and Import of Hazardous Chemical Rules, 1989 and Hazardous Wastes (Management & Handling) Rules, 1989 under Environment (Protection)

Act, 1986, International Maritime Dangerous Goods Code (IMDG Code) issued by the International Maritime Organisation (IMO). However, at present there is no specific provision regarding Permissible Exposure Limits of air borne dust in any of the above mentioned statutes.

In view of the foregoing, DGFASLI had conducted a National Study in all the major ports with the objective to assess and evaluate dust hazards while handling different types of bulk cargoes through its subordinate offices viz. Central Labour Institute located in Mumbai and Regional Labour Institutes located in Chennai, Calcutta and Kanpur, respectively. In the absence of provisions, permissible exposure limits value in the above said statutes, the values prescribed in respect of the same under the Factories (Amendment) Act, 1987 had been taken as guideline values for evaluating exposure levels of dust hazards and interpretation of results while preparation of the study reports.

3. PRESENT WORKING STATUS

Based on the National Studies conducted in the following Major Ports the average dust exposure levels are given below

Dust level (average – mg/m³) in Major Ports (Western region)

C O M M O D I T I E S									
Ports	Sulfur	Rock	Wheat	Soya	Iron	Alu-	Limre	Coke	
Chrome		Phosphate		bean		mina	Stone		
ore						Powder			
Mum- bai	56.29	67.40	-	16.61	-	-	-	-	-
Jawah- arlal Nehru	-	41.11	12.16	-	-	-	-	-	-
Morm- ugao	-	-	-	32.19	28.02	9.83	-	-	-
Coc- hin	103.57	135.17	-	-	-	-	-	-	-
New Mangalore	10.75	-	-	6.59	-	5.79	12.5	56.2	
Kandla	-	-	22.41	17.2	-	-	-	-	-
Av- erage	56.87	81.22	17.28	16.90	19.39	28.02	7.81	12.556.2	

The figure demonstrates the level of dust exceeding TLV – Times.

The data envisaged that the concentration of airborne dust, during handling of bulk commodities in ports - the wharf and ship including storage and transportation areas, exceeded more than the Permissible Exposure Limits prescribed in the **Second Schedule, Section 41F, of the Factories (Amendment) Act, 1987**. The general observation made in the Port/Dock working condition, highlights that the workers were not found using uniform including the required specific protective equipment. The bulk commodities are generally over-loaded in the net sling resulting into dropping of the materials in the work environment from wharf to ship and vice versa. The damaged bags as well as broken net slings were also found emitting dust in the port working area. In the hatches the work condition is like working in a confined space. Particularly, when the workers manually load/unload materials in the hatches, they are exposed to the dust. As the material goes down and down to the hatches, the emitted dust getting accumulated in the hatches causing exposure of dust to the workers resulting in the demand of oxygen available and increasing the carbon dioxide levels that enhances the breathing problem in long run. Thus, damaging the lungs due to the over exposure of the dust and breathing problem (suffocation) prevailing in the hatches are the prominent hazards. In most of the ports, the silos as well as transportation of the material by the conveyor belt system cause exposure to the dust at the site. While handling the various commodities in the ports, the dust generated by the bulk commodities was also getting mixed up with the other commodities handled along the site in the port. Due to partially covering the gap between the ship and wharf, a lot of material was also being dropped into the sea causing a national loss as well as marine pollution.

4. DUST – A TOXICOLOGICAL CONCERN

4.1 Dust

Dust hazard has been defined as solid particles, derived from larger masses by physical force, which are capable of being suspended in air but mainly larger than colloidal size. Dusts do not tend to flocculate except under electrostatic forces; they do not diffuse and settle under the influence of gravity. Derivation from larger masses through the application of physical force is usually implied.

The fate of any inhaled particle in the human respiratory tract is determined to a large extent of its aerodynamic diameter. The particles behavior in air is controlled by - Size of spatial extent; Size distribution; Shape or form ; Specific gravity or density; Surface characteristics. The particles terminal settling velocity is the most important physical parameter for dust in the context of industrial hygiene. The health effects of dust vary with its chemical composition and particle size as well as its concentration, exposure period, methods of work procedures and practices. The toxic dusts are broadly classified into inhalable dust and respirable dust.

4.1.1 Inhalable dust

Dust particles above 10 μm deposited in the nasopharyngeal and tracheobronchial are usually trapped on the mucous membrane. These particles are either expectorate or effected via the nasal passage or swallowed. In case of toxic dust the implication of swallowing are obvious. Other dust, the effects are felt only after prolonged and repeated exposure to excessive concentrations. The chief danger to health is the constant over-loading of the defensive mechanism. The upper particle size cut-off for inhalable particulates varies with : Breathing rates ; Wind speed; and Orientation of the nose and mouth in relation to wind direction.

4.1.2 Respirable dust

Respirable dust can be defined as dust which can penetrate the defences of the nasopharyngeal region and settle in the bronchial and alveolar regions of the lungs.

Criteria for classification of respirable dust vary. However, there is general agreement that particles with size more than 10 μm do not penetrate the bronchial region in significant quantities. Particles whose aerodynamic diameters fall within the range which can achieve this are of prime importance when considering occupational lung diseases. Such particles can lead to fibrosis or be readily absorbed into the blood stream to cause systemic poisoning.

4.2 Dust Hazards

The basic modes of entry of dust into the body goes through Inhalation (90%), Skin (9%) ingestion (1%). The rate of inhalation varies with the activities of the persons carried out in the Port and dock work as given under :

RATE OF BREATHING FOR AN AVERAGE MAN

<u>ACTIVITY</u>	<u>AIR INHALED (L/MIN)</u>
a) Resting in bed	6
b) Sitting	7
c) Standing	8
d) Walking (3 km/hr.)	14
e) Walking (6km/hr.)	28
f) Slow run	43
g) Maximum exertion	65-100

Thus, the volume of air breathed per minute varies with the activity. Similarly, the rate of inhalation of any toxic impurity in the air increases with increase in exertion.

The hazard associated with excessive dust generation and exposure in the workplace are : Reduced visibility; Unsafe footing; Skin irritation; Eye irritation; Irritation of nose, mouth, throat; Lung disease; Systemic poisoning; Fire/explosion; Cancer; Poor morale/inefficiency; Environmental degradation; and Transfer of health hazards from workplace to home.

4.2.1 Acute Effects

This includes catarrhal inflammation of the nasal mucosae, which may lead to hyperplasia with abundant nasal secretions, Tracheobronchitis is a frequent occurrence, with dyspnoea, persistent cough and sometimes be streaked with blood.

- Respiratory Effects :

The inhalation of high concentration of toxic dust may have harmful effects in the respiratory system.

- Eye Effects :

It can cause irritation of the eyes with lacrimation, photophobia, conjunctivitis and belpharoconjunctivitis ; Cases of damage to the crystalline lens have also been described, with the formation of opacities ; and even cataract and focal chorioretinitis have also been described.

- Skin effects :

The skin effects may include : Erythematous; Eczematous lesions ; Signs and ulceration : especially in the case of workers whose hands are in prolonged or repeated contact with powdered bulk commodities which are toxic in nature.

4.2.2 Chronic effects :

The chronic effects consist mainly of bronchopulmonary disease which, after several years, may be complicated by emphysema and bronchiectasis ; At the beginning, the worker suffers from upper respiratory tract catarrh, with cough and expectoration which is mucoid and may have even contain grains of powder. Asthma is a frequent complication; and the maxillary and frontal sinuses may be affected; involvement is usually bilateral and pansinusitis may be observed in some cases.

4.3 Radiological Examination :

Radiological examination of the

respiratory system reveals irregular opacities, especially in the medial basal region; the apical regions are not usually affected ; In certain cases, nodulation has been observed ; Stratigraphy shows that the accentuation of pulmonary pattern depends on pulmonary vascular repletion.

5. SUGGESTIONS

Based on the assessment of dust hazards and environmental conditions prevailing in the bulk cargo handling operation at major ports, the following preventive and control measures have been suggested for improvement in work environment.

- 1) The spillage as well as settled airborne dust at workplaces – wharf and ship should be retrieved/cleaned on a regular basis to avoid its accumulation and spread/dispersion in the port.
- 2) The mechanised system of loading using grab may be considered as a better substitute to manual loading of cargoes as compared to rope net sling. This may be introduced in the phased manner.
- 3) The trucks used for transportation of bulk cargoes, after loading the cargo into the truck, should be covered with Tarpauline/other sheets of suitable material to avoid spillages along the side of the road.
- 4) Dock workers employed on loading/unloading of bulk cargoes should be provided with dust masks, protective clothings and helmets conforming with the BIS Specification.
- 5) Present system of working with over filling of net slings including use of defective slings should be prohibited so as to minimise spillage of bulk cargoes.
- 6) Opening at the transfer point of the conveyors and silos should be covered suitably from all sides so as to curtail the emitting dust.

- 7) Bulk cargo handling should be carried out in dedicated berths to avoid nuisances of dust in other cargo handling areas/berths.
- 8) Handling of bulk cargoes need to be modernised/mechanised particularly inside hatches so as to avoid workers personal exposure in confined spaces.
- 9) Employers of the workers of the port should ensure that the workers are educated about the hazards associated with the exposure to airborne dusts and the need for taking precautions including adherence to safe work practices and personal hygiene.

ASSESSMENT OF AIRBORNE CONCENTRATION OF TOBACCO DUST IN A CIGARETTE FACTORY

The present study was undertaken in a cigarette manufacturing factory to assess the airborne concentration of tobacco dust in the work environment and to suggest preventive/control measures, if necessary.

METHODOLOGY :

The total airborne tobacco dust samples were collected on 37 mm glass fibre filters at an average suction rate of 10 litres/min, while the respirable tobacco dust samples were collected on 25 mm membrane filters through cyclone separators at suction rate of 2 litres/min. These samples were analysed gravimetrically. Particle-sizing was carried out by using microscope.

FINDINGS :

Out of the 10 locations studied, the concentration of total airborne tobacco dust exceeded its TLV (10 mg/m^3 - Nuisance dust) in three locations viz. Ripping - 44.3 mg/m^3 , Ripped Tobacco collection - 11.89 mg/m^3 and Dry Stem section - 17.41 mg/m^3 . The airborne concentration of respirable tobacco dust was found to be within its TLV (5.0 mg/m^3), at all the 4 locations studied.

RECOMMENDATIONS :

Several recommendations were suggested to improve the working condition in the factory and few of them were improving the efficiency of exhaust system installed in Ripping and Dry Stem sections, providing dust respirators to workers and conducting a follow-up study.

ASSESSMENT OF THE AIRBORNE DUST IN WORK ENVIRONMENT OF A GRINDING WHEELS MANUFACTURING PLANT

The study was undertaken in the plant with the objective of evaluation the levels of airborne particulate matter in the work place environment and suggesting preventive/control measures for further improvement.

The plant manufactures grinding wheels of different types having various shapes and sizes by mixing abrasive grains with bonding material and then moulding to required size and shape.

METHODOLOGY :

Airborne samples of total, as well as, respirable dust containing silicon dioxide, calcium carbonate, calcium sulphate, potassium sulphate, zinc sulphite, sulphur, talc etc., were collected from various sections such as Organic Plant, Vetrified Plant, Sulphur Plant and Vetrified Bond Section. The samples were analysed gravimetrically.

FINDINGS :

The airborne concentration of total dust exceeded its TLV (2.0 mg/m^3) by a large margin in Organic Plant, Vetrified Plant and Vetrified Bond Section, while in the sulphur plant, it was well within its TLV.

The airborne level of respirable dust exceeded its TLV (0.7 mg/m^3 - based on percentage of free silica) in Organic Plant and Vetrified Plant barring the operations of blending, mixing and

sieving the bond material and medium wheel dressing. In the Vetrified Bond Plant the average concentration of the respirable dust was 14.0 mg/m^3 against its TLV of 0.15 mg/m^3 (based on percentage of free silica).

RECOMMENDATIONS :

Improving the efficiency of the local exhaust system in sieving, mixing and blending operations, using personal protective equipment by workers, conducting periodic medical examinations, training and education on safety and health and conducting a follow-up study, were the recommendations made to improve the working condition in the factory.

AN ENVIRONMENTAL STUDY IN A CHEMICAL FACTORY

A follow-up environmental study was carried out in a chemical factory in Maharashtra, to assess the level of airborne contaminants in the work environment and to recommend preventive/control measures, if found necessary. The factory accommodates 23 reactors manufacturing various bulk drugs and intermediate chemicals.

METHODOLOGY:

Seven airborne contaminants - Methanol, Toluene, Ethylene dichloride, Hydrochloric acid, Sodium hydroxide, Sulphur dioxide and Sulphuric acid were sampled at different locations in the factory. Samples of Toluene and Ethylene dichloride were collected on activated charcoal and analysed by using gas liquid chromatograph. Similarly, Methanol samples were collected on silica gel and analysed by using GLC. Hydrochloric acid mist was trapped in dilute sodium hydroxide and determined spectrophotometrically by silver nitrate method. Sodium Hydroxide vapours were collected in water, treated with potassium iodide and measured spectrophotometrically. Samples of sulphur dioxide were analysed by West and Geik method. Sulphuric acid mist was collected in

dilute sodium hydroxide, treated with barium chloride and measured by using UV-VIS spectrophotometer.

FINDINGS:

The airborne concentration of all the seven contaminants was found well within their respective Permissible Limits of Exposure.

RECOMMENDATIONS:

No further recommendations were suggested in the follow-up study.

NATIONAL STUDY ON ASSESSMENT OF WORK ENVIRONMENT AT DIFFERENT PORTS

Directorate General Factory Advice Service & Labour Institute has undertaken the Project on National Study on Assessment of Work Environment at different Ports. As a part of this activity, Regional Labour Institute, Calcutta carried out the study at Haldia Port.

OBJECTIVES:

1. To assess the level of air-borne dust to which the workers are exposed.
2. To assess the extent of compliance of various provisions contained under the Factories Act, 1948 and the Dock Workers (Safety, Health and Welfare) Act, 1986, and
3. To suggest improvement and control measures wherever necessary.

FINDINGS:

The concentration of airborne level of dust were found higher than the permissible level

during unloading of coal from ship through hopper, in wagon tippel section and also coal yard. In other locations the concentration were found within the permissible limit.

RECOMMENDATIONS:

Several specific recommendation were given to reduce the airborne level of dust in different operational areas. General recommendations like appointment of Safety Officers, periodic monitoring of operational areas were also suggested.

TRAINING PROGRAMME ON SELECTION & QUALITY ASSURANCE FOR EFFECTIVE USE OF PERSONAL PROTECTIVE EQUIPMENT

Use of different types of PPE have considerably been increased in industries to protect their workers from injuries and accidents as well as to safeguard from injurious effect of various type of hazardous chemicals. It is very much understood that the degree of protection that these devices can provide greatly depends on the quality of the equipment available alongwith effective use of selection and maintenance of the same at the place of work. Keeping in view of the above, the present training programme is designed with the objective of providing detail information on the equipment with a view to ensuring safety of persons, plant and equipment.

CONTENTS

- * Introduction to the course
- * Provisions contained in the Factories Act relating to use of PPE.

- * Classification of Safety Equipment on PPE
- * Criteria for selection of PPE
- * Specification & Testing methods for :
 - a) Respiratory PPE
 - b) Non-Respiratory PPE
- * Medical aspects of using PPE
- * Psychological aspects concerning use of PPE
- * Case studies on PPE by the participants

PARTICIPANTS:

Middle management such as Supervisors, Chemists, Safety Officers, Technical Officers

DURATION : 3-Days

Conducted by Industrial Hygiene Division, CLI, Mumbai

OCCUPATIONAL PHYSIOLOGY ITS APPLICATION IN INDUSTRIES

Occupational Physiology deals with human physiological limits and its reaction to various working environments thereby causing physiological fatigue incurred to the workers arising out of various working conditions. To determine the various safe limits of operation, the knowledge on occupational physiology is very essential. The programme deals with various physiological techniques employed in shop floor to ascertain the safe limit of industrial operations. The benefit of occupational physiology goes to both, the employees and employers. The various physiological parameters which have considerable influence on physical work will be dealt in detail. The actual benefits of the programme would be safe work environment, more work output and thereby increased productivity. The ill effects on various physiological systems due to exposure to physical chemical, environmental agents will be covered during the deliberation.

CONTENTS

- * Determination of safe limits of industrial operation based on physiological parameters.
- * Work Assessment due to physical exposure.
- * Human body as working machine.
- * Responses of human beings due to other agents present in working place or shopfloor
- * Physiological & Psychological limits of human beings

PARTICIPANTS:

Industrial Engineers, Plant Medical Officers, Safety professionals, Production Engineers etc.

DURATION : 5-Days

Conducted by Industrial Physiology Division, CLI, Mumbai

INTERNATIONAL OCCUPATIONAL SAFETY AND HEALTH INFORMATION CENTRE (CIS)

- The CIS Thesaurus

- The list of periodicals abstracted by 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 86 affiliated National Centres and 23 CIS collaborating Centres. Central Labour Institute, Mumbai has been designated as the CIS National Centre of India.

EXCERPT FROM CIS DOC

TITLE: Median mononeuropathy among active workers: Are there difference between symptomatic and asymptomatic workers?

CIS ACCESSION NUMBER :
CIS 99-115

ABSTRACT :

The two groups were compared in terms of demographic, anthropometric, psychosocial, electrophysiologic, and ergonomic risk factors. Workers with a median mononeuropathy who complained of hand symptoms were more likely to be female, to have jobs with higher hand repetition levels, to have higher ratings of job security, not to have a history of diabetes, to use more force in their jobs with more abnormal postures of their wrist and fingers, and to have a trend toward a more prolonged median sensory distal latency. Most logistic

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

regression models explained less than 15% of the variance. Women with jobs that have higher ergonomics risks and no history of diabetes were more likely to report symptoms associated with carpal tunnel syndrome compared to other workers with a documented median mononeuropathy. Psychological variables were not particularly discriminatory. None of the models allows enough precision to predict on an individual basis. Topics: carpal tunnel syndrome; cross-sectional study; electromyography; median nerve; nervous conduction disorders; nervous conduction; repetitive work; risk factors; social aspects; symptoms; women.

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

IDENTIFICATION

Product Name(s) : Lead

HAZARDS IDENTIFICATION

Primary routes of entry :

Ingestion Inhalation Skin

Carcinogenicity : IARC classifies lead and some lead compounds as 2B carcinogens (possibly carcinogenic to humans).

Acute Overexposure (Symptoms And Effects):

Extremely high doses of lead may cause encephalopathy, a brain condition that can result in seizures, coma and death. It should be recognized, however, that exposures of this magnitude in an industrial environment are extremely unlikely.

Chronic Overexposure (Symptoms And Effects) : Chronic overexposure may cause diseases of the blood and blood-forming organs, kidneys and liver, damage to the reproductive systems, a decrease in fertility in men and women, and damage to the fetus of a pregnant woman. Symptoms include loss of sleep, loss of appetite, metallic taste, and tiredness.

Medical Conditions Possibly Aggravated Diseases of the blood and blood-forming organs, hypertension, kidneys, nervous and possibly reproductive systems.

FIRST AID MEASURES

Inhalation: Remove from exposure; place individual under care of a physician.

Ingestion: Induce vomiting in conscious individual and call a physician.

Skin or Eyes: Flush with plenty of water. If symptoms develop, consult a physician.

FIRE FIGHTING MEASURES

Flash Point : Not Applicable

Auto Ignition Temperature : Not Applicable

Flammable Limits in Air (% By Vol.):

Not Applicable

Unusual Fire and Explosion Hazards :

Not Applicable

Fire Extinguishing Agents Recommended :

No specific agents recommended

Fire Extinguishing Agents To Avoid :

No specific agents

Special Fire Fighting Precautions : Use NIOSH/MSHA approved self-contained breathing apparatus and full protective clothing if involved in fire.

RELEASE MEASURES

Spills Or Leaks : Any method which keeps dust to a minimum is acceptable. Vacuuming is preferred for dust. Use approved respiratory protection if possibility of dust or fume exists. Do not use compressed air for cleaning.

HANDLING AND STORAGE

Normal Handling : Use of approved respirators is required for applications where adequate ventilation cannot be provided. Activities which generate dust or fume should be avoided. When melted, the temperature should be kept as low as possible.

Storage : General storage procedures acceptable.

EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls : Local exhaust ventilation is recommended for dust and/or fume generating operations where airborne exposures may exceed permissible air concentrations.

Personal Hygiene : Avoid inhalation or ingestion. Practice good housekeeping and personal hygiene procedures. No tobacco or food in work area. Wash thoroughly before eating or smoking. Shower and change clothes at end of work shift. Do not wear contaminated clothing home. Do not blow dust off clothing with compressed air.

Special : Precautions/Procedures/Lable

Instructions: Where airborne lead exposure may exceed the OSHA action level and or PEL, refer to the OSHA Lead Standard 29CFR1910.1025.

Label Signal Word : Warning

Respiratory Protection: Where airborne exposures may exceed OSHA/ACGIH permissible air concentrations, the minimum respiratory protection recommended is a negative pressure air purifying respirator with cartridges that are NIOSH/MSHA approved against dust, fumes and mists having a TWA less than 0.05 mg/cu.m.

Eyes and Face : Safety glasses recommended where the possibility of getting dust particles in eyes exists.

Other Clothing And Equipment : Full protective clothing is recommended for exposures that exceed permissible air concentrations. All contaminated clothing should be removed before leaving plant premises.

STABILITY AND REACTIVITY

Stability	Conditions To Avoid
Stable	Not Applicable

Incompatibility (Materials To Avoid) : Contact with > 52% hydrogen peroxide may cause a violent reaction. Powdered lead fused with ammonium nitrate may cause a violent reaction.

Hazardous Decomposition Products :At temperatures above the melting point, metal oxide fumes may be evolved.

Hazardous Polymerization Conditions to Avoid
Will not occur
Not Applicable

TOXICOLOGICAL INFORMATION

LD50 (SPECIES, ROUTE) Not available.

LC50 (SPECIES) Not available.

Mutagenicity Lead tested positive as a mutagen in the Ames test.

ECOLOGICAL

Ecotoxicity : The LC50 of lead for the daphnia magna is 3.6 mg/L, and 5.1 mg/L for the daphnia pulex.

Environmental Fate : Lead is bioaccumulative in most aquatic life and mammals. It is highly mobile as lead dust or fume, yet forms complexes with organic material which limits its mobility.

DISPOSAL CONSIDERATIONS

Waste Disposal Methods (Disposer Must Comply With Federal, State, And Local Disposal Or Discharge Laws) :

If hazardous under 40 CFR 261, Subparts B and C, material must be treated or disposed in a facility meeting the requirements of 40 CFR 264 or 265. If non-hazardous, material should be disposed in a facility meeting the requirements of 40 CFR 257. Lead has an EPA hazardous waste no. of D008.

RCRA status of unused material : 40 CFR 261

If discarded in unaltered form, material should be tested to determine if it must be classified as a hazardous waste for disposal purposes. Under specific circumstances, application can be made to the EPA Administrator to have a particular waste designated non-hazardous.

TRANSPORT

Dot Regulation And Id (Or Pin) Number : This material is only regulated by the DOT if in a powder form with a particle size < 100 microns, and has an ID no. of UN3077.

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 :

GUIDELINES FOR AIR SAMPLING AND ANALYTICAL METHOD DEVELOPMENT AND EVALUATION

Publisher: National Institute for Occupational Safety and Health, USA

NIOSH and Occupational Safety and Health Administration jointly undertook the evaluation of sampling and analytical methods for airborne contaminants to determine if method met one criterion to reduce a result that falls within 25% of the true value 95 times out of 100. The basic objective of this guideline document is to provide guidance and procedures to 1) estimate the precision, bias and accuracy of sampling and analysis method and 2) provide guidance and procedure to evaluate a method relative to 25% accuracy criterion in terms of one of three mutually exclusive possible conclusions i.e. a) a definite positive conclusion b) a definite negative conclusion and c) unconclusion. The experiments listed in this document include

determination of analytical recovery from the sampler, sampler capacity, storage stability of samples and effect of environmental factors. Evaluation criteria for the experiments and details for the calculation of bias, precision and accuracy has also been included.

NIOSH AND NIOSH BASIS FOR AN OCCUPATIONAL HEALTH STANDARD: CHLOROBENZENE

Publisher: National Institute for Occupational Safety and Health, USA

The present document evaluates information that has been considered most relevant for the assessment of the potential adverse health effects from occupational exposure to chlorobenzene. The effect of chlorobenzene on different organs of the body, the toxicity, carcinogenicity are dealt within this document. The occupational exposure and ambient air levels and the analytical methods for air monitoring has also been included.

NIOSH RECOMMENDATIONS FOR CONTROL OF OCCUPATIONAL SAFETY AND HEALTH HAZARDS ... FOUNDRIES

Publisher: National Institute for Occupational Safety and Health, USA

Published scientific data on occupational injuries in foundry workers, their working conditions, the engineering controls, work practices in sand casting foundries are reviewed in this document. Based on the review, recommendations have been developed for reducing the safety and health risks related to working in sand casting foundries. Because of the diversity and complexity of the foundry industry this document is limited to those facilities that pour molten metal into sand moulds. Permanent

moulds, die, investment and other types of casting are not specifically discussed in this document except those processes, materials and work procedures specific to sand casting.

‘LUNG AILMENTS RAMPANT AMONG FLOUR MILL WORKERS’

An estimated 25 per cent of flour mill workers, who are regularly exposed to grain dust, have been found suffering from various lung diseases, says a study.

The study was carried out among 286 flour mill workers. Of these, 71 workers, who had been employed in the industry for about five years, complained of one or more respiratory disorders.

While more than half of the affected persons were diagnosed with chronic bronchitis and bronchial asthma, the other ailments suffered by them were tuberculosis, acute respiratory diseases of lungs and obstructed lung functioning.

“The higher prevalence of respiratory disorders in workers may be attributed to their occupational exposure to grain dust, and that too for a long duration,” the researchers said.

The study also takes into account the age factor and smoking, two factors that are known to be ‘traditional confounders’ in assessing relationship between dust exposure and lung disorders.

Source: The Times of India

ILO WELFARE LAWS SHOULD REFLECT REGIONAL POSITIONS, SAYS JATIYA

Union Labour Minister S.N. Jatiya has urged the International Labour Organisation (ILO) to explore new methods of setting standards concerning labour welfare laws so that regional positions were reflected at the international level.

The discussion on such a agenda should be based on a two-tier procedure with talks at both the regional and international levels, Mr. Jatiya said. He was addressing the International Labour Conference in Geneva.

With many ILO conventions being adopted by ignoring the realities in developing countries, the Minister said the two-tier discussion would help remove the regional imbalance.

Referring to the worsening employment situations across the world, Mr. Jatiya said employment generation must top ILO’s agenda for the next decade keeping in mind the Copenhagen Declaration.

The Minister said all other objectives would remain incomplete unless sufficient progress was made towards productive employment for all. He pointed out that the financial crisis faced by the Asian countries recently had left about 20 million unemployed.

Mr. Jatiya stressed that the ILO’s task wasn’t only to recommend policies to tackle the immediate social consequences of the current financial crisis but also to formulate a comprehensive employment strategy. This should be done with a long term perspective, he said.

Calling for greater emphasis on providing social protection for the discriminated and economically exploited people, Mr Jatiya said state intervention, particularly in infrastructure and employment oriented service sectors, was unavoidable to create greater employment opportunities.

Source: The Hindustan Times

FIRE SAFETY WEEK

1. Fire Safety Week was celebrated from 14-18 April, '99 at Central Labour Institute, Mumbai in which two visits were arranged for officers and staff of the Institute. One group visited Thane-Belapur Industrial Association to get apprised with the systems adopted for emergency preparedness. Another group visited Mumbai Fire Brigade, Kandivali (East) to get acquainted with the services and facilities available at Fire Station Kandivali.

As part of the Fire Safety Week Celebration, a half-day programme was organised on 16th April, 1999 which was inaugurated by a senior officer of CLI. A brief presentation on the provisions under the Factories Act with relation to fire prevention and control in Industrial premises was given by a senior officer of DGFASLI. Presentations were also made by two experts invited from the organisations. Shri B.S. Khade, Asstt.Divisional Officer, Mumbai Fire Brigade presented a paper on "Fire Safety in Office Premises and high rise building and another paper on LPG Home Safety was presented by Shri K.M. Khanake, Manager (Safety) in Bharat Petroleum Corporation Ltd., Mumbai.

2. Fire Safety Week was celebrated at Regional Labour Institute, Kanpur from 12 to 16 April, 1999. During the period training programmes on "Industrial Fire Prevention & Control" was organised for the plant operators and persons involved in Fire Service in Industries. Dr. Ram Nath, Vice Chancellor, Shri Chandra Shekhar Ajad, Agriculture, University, Kanpur inaugurated the Fire Safety Week. The participants visited Fire Station Fazalganj, Kanpur. Shri Arvind Kumar, Commandant, Staff Fire Training Centre, Unnao, distributed the certificates and validated the programme.

A poster on "Industrial Fire Prevention" was also prepared.

3. Fire Safety Week was also celebrated at Regional Labour Institute, Chennai from 13-16 April, '99. Four guest speaker delivered talk in the field of Fire Safety. As a part of the celebration, fire fighting practical demonstration were arranged. A poster on Fire Safety Week was also prepared.

ILO-DGFASLI TRAINING PROGRAMME

His Majesty Govt. of Nepal has started a project on Occupational Safety & Health (OSH) under the Ministry of Labour with the objective to create safety awareness among all concerned. Sr. Official of the project, Inspectors of Factories, Scientific Assistants and Representatives of Trade Union and Employers Association for training was identified as target groups. The ILO area office of India and Bhutan, New Delhi was approached for organising a series of training course on OSH for these target groups.

The ILO area office, New Delhi in turn approached the Directorate General Factory Advice Service & Labour Institutes for organising the training courses on OSH. Four training courses were conducted at CLI for the identified groups in 1998. In the year 1999 once again the ILO area office, New Delhi approached DGFASLI to organise second series of training courses for the identified groups.

The first training course on OSH under the second series was organised from 25th May to 14th June, 1999 for Sr. Official of H.M. Govt. of Nepal. There were 66 sessions including visits to factories and various laboratories in the CLI. During the training course, the participant was taken to factories; comprising petrochemical, engineering, thermal power station and Glass Containers manufacture factory. The infrastructure available in the factory on OSH were explained and shown to the participant. On conclusion of the course the participant appreciated the training programme.

**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 safety, health and productivity	16-19 November, 1999	Director(Psychology) & Incharge 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 Incharge	20-22 December, 1999	Director(Const. Safety) & 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 (OSH) 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 OSH 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.

Visit us at : <http://www.dgfasli.nic.in>

