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FROM THE DESK

The cover feature of this issue talks about the problems in connection with Dioxins in the environment and how to avoid or reduce the possibility of these affecting our health. Although, the level of dioxins in the environment in our country has been declining, these are still capable of creating problems because of their extremely persistent nature. From the article, you will see that the sources of dioxins are many and it is necessary that general population should have an idea about their ill-effects and how to avoid it.

Our second article is on ergonomic aspect of the Visual Display Terminal (VDT). The use of VDT is so common that sometimes we miss the ergonomical problem associated with this type of activity. The content of the article should have a wide spread application and should be beneficial to a varied number of work places.

**(S.K. SAXENA)
EDITOR-IN-CHIEF**

DIOXINS IN THE ENVIRONMENT- PROBLEMS AND PERSPECTIVES

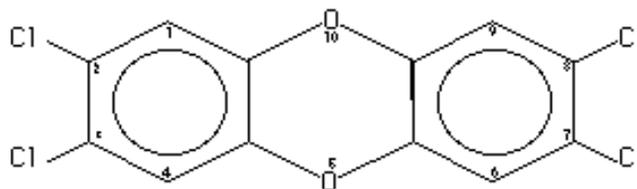
S. P. RANA

INTRODUCTION

"Dioxins" refers to a group of chemical compounds that share certain chemical structures and biological characteristics. Several hundreds of these compounds exist and are members of three closely related families: the chlorinated dibenzo-*p*-dioxins (CDDs), chlorinated dibenzofurans (CDFs) and certain polychlorinated biphenyls (PCBs). Sometimes the term dioxin is also used to refer to the most studied and one of the most toxic dioxins, 2, 3, 7, 8-tetrachlorodibenzo-*p*-dioxin (TCDD). CDDs and CDFs are not created intentionally, but are produced inadvertently by a number of human activities. Natural processes also

produce CDDs and CDFs. Dioxins are the most toxic man-made organic chemicals; their toxicity is second only to radioactive waste.

Major public interest in dioxins originated with the 1976 incident in Seveso, Italy when a phenol/dioxin mixture was released after an explosion at a trichlorophenol manufacturing plant. Dioxins also gained notoriety as a contaminant in "Agent Orange" which was used as a leaf defoliant during Vietnam War. The structure of the 2,3,7,8-TCDD molecule is shown in the figure below.



SOURCES OF DIOXINS

Dioxins are formed as a result of combustion processes such as commercial or municipal waste incineration and from burning fuels (like wood, coal or oil). Dioxins can also be formed when household trash is burned and as a result of natural processes such as forest fires. Chlorine bleaching of pulp and paper, certain types of chemical manufacturing and processing and other industrial processes such as

herbicide manufacture and paper manufacture can create small quantities of dioxins. Cigarette smoke also contains small amounts of dioxins.

Some of the major industrial processes or the manufacturing of the products identified where the dioxin formation is there are as under:

- Pentachlorophenol (PCP) - a product used as wood preservative.

- Polychlorinated biphenyls (PCBs) – its production is banned in many countries.
- 2, 4, 5-trichlorophenol – it is one of the constituents of Agent Orange.
- Chloranil – a product used as a precursor for dyes, but substitutes have been found.
- Chlorobenzene – dioxin formation concerns only trichlorobenzene.
- Chlorine – dioxin formation was more significant when graphite anodes were used.
- Ethylene dichloride (EDC) – an intermediate in the chemical industry particularly for the manufacture of PVC. The oxychlorination reaction is a source of formation of dioxin related compounds.
- Chlorinated aliphatic compounds – the heavy end of the EDC cracking and epichlorohydrin production processes involves dioxins formation.

RELEASE OF DIOXINS

In addition to manmade sources, natural processes, such as bush and forest fires produce dioxins. The term "natural background" for dioxins refers to the dioxins that are in the environment because of these natural processes. The term "current background" refers to the level of dioxin in the environment today. Current background is primarily made up of dioxins from manmade sources.

When released into the air, some dioxins may be transported to long distances. Because of this, dioxins are found in most places in the world. After the release has taken place, it is washed into the aquatic system by rain water and taken up by the microscopic plants called phytoplankton. These plants will then be eaten by aquatic

animals. Since dioxin cannot be removed from the organisms, it will concentrate into the food chain. Dioxins may be concentrated in the food chain so that animals have higher concentrations than plants, water, soil, or sediments. Within animals, dioxins tend to accumulate in fat.

Even with a small concentration of dioxin in the microscopic aquatic plants, it will become so high in man which causes various diseases and even death. Dioxin is similar to the banned pesticide DDT in this aspect, but need not to be emphasized that dioxin is much more toxic than DDT.

DIOXINS EXPOSURE

Most of the population has low-level exposure to dioxins. Although dioxin is an environmental contaminant, most of the dioxin exposure occurs through the diet, with over 95% coming through dietary intake of animal fats. Small amounts of exposure occur from breathing air containing trace amounts of dioxins on particles and in vapor form, from inadvertent ingestion of soil containing dioxins and from absorption through the skin contacting air, soil, or water containing minute levels.

Different dioxin compounds have different toxicities and dioxins are most often found in mixtures rather than as single compounds in the environment. The most toxic forms of dioxin are 2, 3, 7, 8-TCDD and 1, 2, 3, 7, 8-PCDD. Scientists use a shorthand method for comparing the toxicity of different types or mixtures of dioxins to the toxicity of 2,3,7,8- TCDD and 1,2,3,7,8-PCDD. This method is called the "Toxicity Equivalence" or TEQ.

HARMFUL HEALTH EFFECTS

People are constantly exposed to dioxins through ingestion of dioxins that are present at low levels as environmental contaminants in food. Although they are at low levels in food, some dioxins are very slowly removed from the body and therefore they accumulate in our fat tissue. In laboratory animals, dioxins are highly toxic, cause cancer and alter reproductive, developmental and immune functions. The health effects associated with dioxins depend on a variety of factors including the level of exposure, when someone was exposed and how long and how often.

Dioxin exhibits serious health effects when it reaches as little as a few parts per *trillion* (*1 trillion=10¹²!*) into the body fat. Dioxin is a powerful hormone disrupting chemical. By binding to a cell's hormone receptor, it modifies the functioning and genetic mechanism of the cell, causing a wide range of effects, from cancer to reduced immunity to nervous system disorders to miscarriages and birth deformity. The most common health effect in people exposed to large amounts of dioxin is chloracne. Chloracne is a severe skin disease with acne-like lesions that occur mainly on the face and upper body. Other effects of exposure to large amounts of dioxin include skin rashes, skin discoloration, excessive body hair and possibly mild liver damage.

Tests for measuring dioxin levels in humans are not routinely available. Moreover, the test carried out may not be precise enough to detect dioxin levels that occur in the general population.

EFFORTS IN DIOXINS REDUCTION

Government regulatory actions along with voluntary industry actions have resulted in dramatic reductions of the sources of Dioxins formation. Currently, the uncontrolled burning of residential waste is thought as one of the largest sources of dioxins to the environment. Source characterization is an ongoing effort and if new major sources are identified, they will be factored into future inventories.

The waste incinerators burning industrial, municipal, hospital wastes containing chlorine compounds can exhibit high concentrations of dioxins. It is widely accepted that the formation of dioxin like compounds in flue gases generate in a temperature range of 200 – 400°C. The poor combustion process leads to incomplete conversion of the desired product and formation of toxic gases like dioxins. The formation of dioxins in the incinerators can be minimized by optimizing the following parameters:

- temperature above 1000°C.
- residence time to be kept more than 2 sec.
- turbulence to be optimized in view of furnace design and air flow.

In order to avoid any further chemical transformation in the off gases and minimizing the toxic gas emission into the atmosphere after the reactive zone and the eventual heat recovery boiler, a quench column provision to quickly cool the exhaust gases can be a better option. The dioxin equivalent level in the off gases should be lower than 0.1 ng TEQ/m³.

It is important to note that dioxin levels in the Indian environment have been declining for the last 10 years due to reductions in manmade

sources. Because dioxins are extremely persistent compounds, levels of dioxins still exist in the environment from both manmade and natural sources. A large part of the current exposures to dioxins in India is due to release of manmade dioxins that occurred in the past, even decades ago. Even if all human-generated dioxins could somehow be eliminated, low levels of naturally produced dioxins will remain

However, dioxins break down so slowly that some of the dioxins from past releases will still be in the environment many years from now. Dioxins that remain in the environment from past releases are sometimes called "reservoir sources" of dioxins. Because of natural processes, dioxin levels in the environment will never be zero.

Over the last decade, the Indian regulatory authorities have aggressively looked for ways to reduce and control dioxins in all environmental media. Collectively, these actions have resulted in strict controls on all of the known and quantifiable major industrial sources of dioxin releases. For example, the industries dealing with halogenated hydrocarbons have been asked to setup incinerators for their hazardous waste. Ministry of Environment & Forests, Govt. of India has laid down Rules namely "Hazardous Waste (Management & Handling) (Amendment) Rules 2003. Similarly, municipal corporations and hospitals have been asked to incinerate their waste in incinerators which are thought to be considered emitting Dioxins. Rules for dealing with municipal and hospital wastes have also been laid down.

The other way to reduce the dioxin threat is to stop burning trash. The municipal corporation waste should first be segregated from recyclable waste before sending it to incinerator. Companies that use chlorinated hydrocarbons should be asked to use known safe substitutes.

HOW TO AVOID DIOXIN EXPOSURE

- Do not eat beef or pork, which have some of the largest concentrations of dioxin of all food sources. Limit your intake of ocean fish.
- Drink only skim milk, since dioxin is carried in the butterfat. Avoid all full-fat dairy products, such as butter, cheese and ice cream.
- Avoid all organic chemicals that have "chloro" as part of their names (such as the wood preservative pentachlorophenol, which is probably the most dioxin-contaminated household chemical).
- Avoid chlorine bleach (sodium hypochlorite) and products containing it. (Use oxygen bleach instead). Use unbleached paper products.
- Do not use weed killers or insecticides that contain chlorine. Especially avoid the chlorophenol weed killers, such as 2, 4-D, found in most fertilizer/weed killers and used by commercial lawn services.
- Wash all fruits and vegetables carefully to remove chlorophenol pesticide residue.
- Avoid all products which have cottonseed oil as an ingredient (such as potato chips), since cotton is often sprayed with chlorophenol insecticides.

- Avoid "deodorant" soaps and deodorants containing "triclosan," a chlorophenol.

CONCLUSION

There is little control on natural processes responsible for dioxins formation but efforts can be made to control the man made sources. The industries using halogenated hydrocarbons should be asked to develop/ institute substitutes for the same. Industries have to adopt the best available techniques (BAT) to control PCDD/PCDF emissions. Incinerators of proper design and optimization of process parameters will certainly help in reducing dioxins and other related obnoxious gases into the environment.

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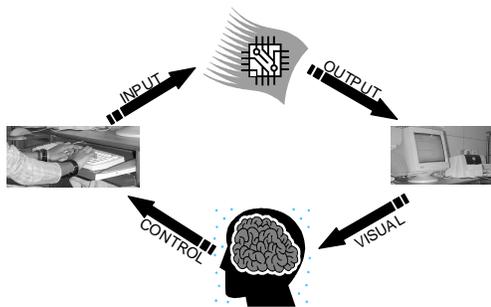
VISUAL DISPLAY TERMINAL ERGONOMICS DR R IQBAL

INTRODUCTION

Visual Display Terminal is the terminal (VDT) which makes electronic display to the operator. In broader sense the VDT refers to the computers. Computers have revolutionized the way we work. People whose occupations involve spending prolonged period of time at a computer workstation are subjected to stresses that may lead to painful, debilitating conditions (Saito, 1996). The resulting stress may cause higher levels of fatigue and tension during the day. One of the major contributing factors for stress is awkward or non-optimal body positions which are mainly due to improper work station layout (Sauter et al, 1991; Iqbal, 2001).

In the human computer interface, input is given through the key board or mouse and the output is displayed on the monitor. During the entire input-output cycle, operator's brain remains continuously busy, either for watching the display or for giving further control (Fig 1). Therefore, the computer work makes human brain more occupied than the computer processor.

Fig 1: Human Computer Interface



Hence during this prolonged involvement with the computer, the operator ignores his working posture, work environment and

work process and exposes himself into a non-ergonomic work situation (Swoboda 1992).

Prolonged exposure to a non-ergonomic work posture develops stress on the body especially in the neck, shoulder, back and knee region causing pain which ultimately leads to Cumulative Trauma disorders, or CTD'S (Saito, 1996; Laville, 1980). Cumulative Trauma disorders or CTD'S are class of musculo-skeletal injuries that arise from putting excessive pressure on the body to perform over a period of time (Hill, 1989; Iqbal, 2001). Findings of a National study on 'Occupational health profile of the Visual Display Terminal Operators' undertaken by the DGFASLI show that that the computer users have developed occupational pain in various bony joints in the body. Most frequently appeared pain is back pain and neck pain followed by knee, shoulder, wrist and elbow pain (Fig 2).

Another problem in the VDT work is glare and reflection. Strong light sources from windows, doors and also improper positioning of the room light causes direct or indirect reflection of the lights to the eye of the operator. Regular exposure to glare and reflection develops eye strain, burning, tearing, soreness of eye, blurred vision and headache (Jaschinski et al 1988). Findings of the National study on 'Occupational health profile of the Visual Display Terminal Operators' show that the computer users have the problems of fatigue, watering, burning, itching and redness of eyes (Fig3).

The problems associated with computer work can be avoided by following some Ergonomic Guidelines relating to work station, posture, work environment and working habit of the workers. Following are the guidelines which can be followed to reduce the chances of occurring future injuries (Gross and Hassel, 1991).

WORKSTATION AND POSTURE DURING VDT USE

The seated position

The chair is a key component in the ergonomics of a computer workstation. A good chair is one that allows the operator to maintain a variety of comfortable task positions while working throughout the day. Since there is no “perfect” working posture for everyone, the following guidelines are useful for improving the body geometry of the workstation:

- The seat height should be fully adjustable so that the thighs are nearly horizontal and the feet are resting flat and comfortably on the floor. This doesn't mean that the feet should always be flat on the floor. Legs should be free to stay in different positions.
- Use a footrest if the feet are not resting comfortably on the floor.
- The angle between the seat pan and seat back should permit the person to assume a working posture in which the thigh-torso angle is not less than 90 degrees, with 100 degrees as preferable.
- Depth from the front of the seat to the backrest should allow the sitters to be able to use the backrest without any pressure behind the knees. In case the depth is more, then a cushion should be placed on the backrest. The gap between front edge of the chair and the back of the knee should be approximately 2 inches.
- The chair should have a spring loaded backrest with support for the curvature in the lumbar area (lower back). This is intended to prevent the flattening of the lumbar spine that occurs in most people when seated. Lumbar support is usually done through a gentle curve in the backrest shape. The backrest curve

should fit with the spinal curvature for maximum comfort.

- An arm rest should be used to provide maximum support to the arms and shoulders. Arm rest should be soft or padded to avoid uncomfortable pressure on the undersides of the fore arm and elbows.
- Always sit upright. Make sure your chair is adjusted to provide adequate support on your back.
- Ensure that there is at least 1 inch of clearance between the top of your thighs and the bottom of the keyboard tray or table.
- Height of the arm rest of the chair and the keyboard tray should be of equal height so that forearm and wrist are held in a straight line (neutral position) and parallel to the floor. This will prevent tendon and nerve stress. Ideally, the wrist should be supported near the keyboard by a padded wrist support to help provide a neutral (straight) arm/wrist position.

Posture and workstation

Proper posture while using a VDT can help prevent tension or stiffness in the neck, back and shoulders. These posture checkpoints can be used to reduce stress on the muscle and skeletal system:

- Elbows to be kept close to the sides. This will reduce upper back and shoulder muscle tension.
- The document holder should be placed near the screen and at the same height as the screen to avoid eye strain and fatigue.
- The upper and lower arm should be placed at approximately 90 degree angle to each other. This is considered as “neutral,” and since it is not possible to work in this ‘neutral’ arm position continuously, a working deviation from 80 degree to 120 degrees is acceptable.

- Keyboard is to be adjusted to a slope between 0 and 25 degrees.
- Head of the operator should be kept up and the ideal distance of the screen should be as far away as possible while still being able to read it clearly. Grossly the distance will be about 18 to 24 inches from the VDT users' eyes depending on the size of the font. The minimum acceptable distance between eye-to-screen distances is 12 inches since the distance below 12 inches causes difficulty in eye accommodation and develops eye stress.
- The line of sight from eyes to the screen's primary viewing area (mid screen) should be maintained 20 degrees below the horizon (Saito, 1996; Turville et al, 1998).
- Neck tension is a common problem caused by holding the telephone between the head and neck. Headset or speakerphone is recommended if the telephone is used for extended periods of time. This is especially important for the control panel operators who require frequent communication on telephone.
- The monitor should be slightly tilted back so that the top is slightly

farther away from the eyes than the bottoms. This is similar to holding and reading a magazine. Ideal tilt is 15 degrees back from the vertical line.

VISION AND LIGHTING

Lighting that is not appropriate for computer work is a major factor in visual discomforts such as eye strain, burning, itchy eyes, headaches and blurred or double vision. Initially the problems may feel like non-existent or inadequate but in due course of time the problems slowly appear and become severe. Visual stress not only

depends on lighting but also on other factors like glare, reflection, flicker and visual noise (Display Mate Technologies Corporation, 2003).

Display

- VDT should be positioned at a 90 degrees angle to strong light sources such as windows or bright lights.
- The screen should have adequate character resolution and luminance. The screen intensity needs to be adjusted if necessary.
- VDT screens with a matte finish and bright-back-ground displays will reduce the contrast of reflected images. Attention should also be given to VDT position, particularly with regard to windows. Reflected images from windows are a major problem to be solved in the VDT environment, and careful attention to be given to window treatments, again following the principle that very bright, sharp-edge reflection should be avoided.
- Screen filters can be used to reduce glare. Using a tinted glass on the screen will improve contrast because light reflected by the display screen must travel through the dark layer twice (screen itself and tinted glass), whereas light generated by the display passes through it only once.
- Screen angle needs to be adjusted if needed to reduce glare.

Lighting

- Blinds should be used to control the amount of outside light entering the room through windows. The optimum lighting level for VDT work is generally about 200 to 300 lux less than half of the standard office lighting. Indirect lighting should be used wherever possible.
- Overhead lights should be provided with light diffusers / sharp cut-off louvers to minimize glare and reflection. Uniformly balanced light levels are important in order

to reduce eye fatigue that results from continual iris adaptation. If local task lighting is necessary, a dimmer should be available to adjust the light level. If sharp cut-off luminaries are used to reduce reflected images in the screen, the walls should also be illuminated.

- Light intensity can also be reduced by indirect lighting i.e. emitting all lights toward the ceiling. If indirect lighting is used, an adequate distance between the luminaries and the ceiling must be provided (these vary with design of the unit) and the luminary should have a lightly colored finish on its underside.
- Curved screens catch light from a wider field of view than flat screens, so low curvature or flat screen will reduce reflections somewhat. This is especially important for Control panels in which screen size is larger than office computers.

GENERAL GUIDELINES

There are some general guidelines which can help the VDT user to stay more alert and reduce strain and fatigue while using a VDT:

- Physical stress and musculoskeletal strain arise from poor posture, poor quality chairs, poorly designed work areas, as well as the static and sedentary nature of VDT work. Change your seating position frequently and get up and stretch regularly so that muscle flexibility can be maintained.
- Gazing at something too long tires the eyes. A frequent break from the work schedule is to be taken to get the eyes focused off of the screen and into different distances from time to time to relax eye muscles. "20/20 rule" can be followed ---

every twenty minutes, look twenty feet away for twenty seconds.

- Optical illusion is also useful to reduce eye stress. An optical illusion may be fixed on the wall in front of the operator to reduce eye fatigue (Saito, 1996; Jaschinski, 1998). Look at the optical illusion for one to two minutes after every 20 minutes of work with the computers to reduce eye stress.
- Sometimes eyestrain is just a case of dry eyes. Lowering the monitor can help. Looking downward means more of the eye surface is covered by the eyelid and two other things happen: the eyes unconsciously blink more and they produce more lubrication.
- People who need bifocals should consider other options besides bifocals. Two good ones are:

1. Computer glasses that focus at the right distance for the computer screen.
2. Wearing contact lenses corrected for computer or reading distance.

- Bifocal wearers often experience sore necks and shoulders because they have to tip their heads back to see the computer screen.

1. Lower the screen as much as possible --- if it sits on the CPU, move the CPU.
2. Increase the chair height. Use a foot rest to rest the feet flat on the foot rest.

- Regular eye exams are recommended. A significant fraction of the population has improperly corrected vision, so before beginning regular VDT work, an initial eye exam is necessary. Regular monitoring of the eye power is

important. Doctor should prescribe a special pair of reading glasses for the distances involved in video display work. This becomes increasingly important after age 40.

- Use a “light touch” on the keyboard to reduce hand stress and lower the risk of developing Cumulative Trauma Disorder.
- Rotate the eye ball both clock wise and anti-clock wise and also concentrate the eyes on a distant object and near object alternately to reduce eye stress.
- Keep the VDT screen should be regularly cleaned to maintain a good quality display.

Work Area:

It is important to have an adequately sized work area and a work table that is large enough for all necessary equipment and materials. A functional layout is very important, with frequently used items within easy reach.

CONCLUSION

Use of computer is becoming a must in the present scenario. Ergonomics can assure that individuals function most efficiently and effectively to protect their health as well as to increase the productivity. Above mentioned guidelines will help the VDT user to be more productive and enhance the health and well-being of the body.

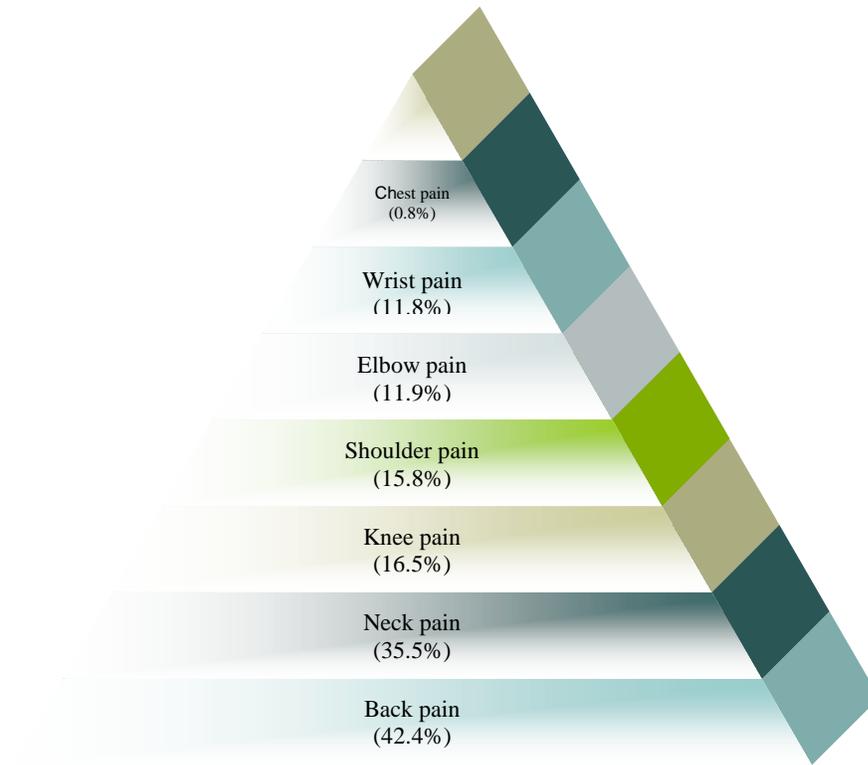


Fig 2: Occupational pain among Office computer users (n = 127).

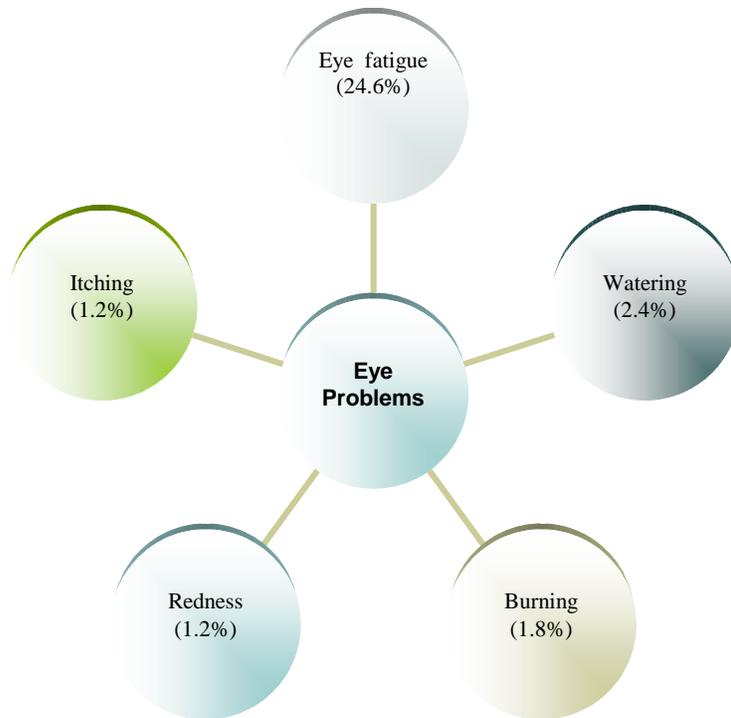


Fig 3: Eye stress among Office computer users (n=127).

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NOISE STUDY IN A PAINT INDUSTRY

This follow up noise study was carried out by Regional Labour Institute, Kanpur in a paint industry.

The factory is involved in the manufacture of industrial and decorative paints and employs about 225 persons. The survey was mainly focused on ball mill area and DG set room and also in ambient environment inside the industrial premises.

FINDINGS

Noise levels in Ball Mill area were within permissible limit of exposure of 90dB(A) for 8 hours at all work locations. In Diesel Generating Room, the noise levels were ranging from 99.3 dB(A) to 102.4dB(A), which were higher than permissible limits of noise exposure. In the ambient environment, the levels were measured in three selected locations and found to be within the limits as prescribed in Noise Pollution(Regulation & Control) Rule 2000.

RECOMMENDATIONS

Based on the findings of the study it is recommended to use suitable ear protectors at the time of work, sound proof cabin for the operator of DG area and periodic audiometric examinations of the workers involved in noisy area.

EVALUATION OF DUST LEVELS IN ASSEMBLY SHOP OF A COMPANY

This evaluation study was conducted by Regional Labour Institute, Chennai. The company is engaged in the production of wide range of dash board instruments e.g. Ammeter, Oil Pressure gauge, Speedometer, Oil Pressure switch and Sensors for four wheel automobiles. Assembly shop is divided into work stations where various operations are carried out to assemble the instruments.

OBJECTIVE

The study was conducted with the objective to assess the levels of airborne levels of SPM dust in the Assembly Shop and to suggest remedial measures wherever necessary to improve the work environment.

FINDINGS

The manufacturing plant was arranged on cell concept with each cell dedicated to produce a particular product. The Assembly Shop comprises various work stations where various operations e.g. soldering, fixing of instruments using adhesive, jointing, pressing, riveting, shaping, calibration, case fixing, rolling, axle fixing, magnetizing, etc.were performed .The entire shop was provided with air-conditioning system to maintain the ambient temperature between 26 to 30 °C.

Air samples of suspended particulate matter were collected with the help of battery operated personal sampler at the rate of 3 lpm over the eight hours shift period. The samples were collected on glass fibre filter papers and evaluated gravimetrically.

SPM largely constituted of nuisance particles and therefore principal health effects posed by SPM include aggravation of asthma or other respiratory or cardio respiratory symptoms, increased cough and chest discomfort and increased mortality. ACGIH had proposed a TLV of 10 mg/m³ for total particulate matter and 3mg/m³ for respirable SPM.

RECOMMENDATIONS

Certain remedial measures were suggested to further improve the environmental conditions which included isolation and shifting of soldering and tinning operations with proper arrangement to vent the fumes out of the shop, provision of an alternative arrangement of ventilation in the shop when the AC is switched off, use of good quality dust respirators among the workers engaged in soldering and tinning operations and periodic medical examination of workers.

On 15.2.2003, during the day shift, workers were detained for destuffing of containers for test and examination of the same at a Port. The workers were sitting on the roads on the footpath when a forklift truck which was parked on the footpath was driven by a FLT driver in the reverse, ran over the worker causing serious injuries. He later died on the way to hospital.

Investigation into the accident revealed that the accident had taken place due to the negligence of the FLT driver, breaching regulation 117 of the Dock Workers (Safety, Health and Welfare) Regulations, 1990. Further, the Port Trust did not report the accident as required under Reg. 91 and 91(6) of the said Regulations. The port authorities were warned for breach of regulation 1990 and the driver of the FLT was warned through his employer for breach of Regulation 117.

On 5.4.2003, at a Port, a block from the trailer was lifted towards the left side and placed in the space between two other blocks. When the block was being placed, a mazdoor entered the gap and the block hit him on his head and he got pressed against a stationary block resulting in bleeding in his nose and ears. He was taken to hospital, where he was declared dead.

Investigation into the accident revealed that the unloading work was being carried out in the absence of a responsible person and also the supervision was very poor. Prosecution has been initiated against the employer for violation of the Dock Workers (Safety, Health and Welfare) Regulation.

On 2.5.2003, during the day shift, containers were being loaded one on top of another on an open shed at a Port. A 20ft loaded container was stacked on a 20ft. empty container and while being lifted, the empty container toppled and rested on another 20ft container stacked behind it. A mazdoor belonging to a clearing handling agent who was riding a bicycle in the yard and passing between the two containers got trapped and

became unconscious with blood coming out from his ears and nose and was rushed to the hospital where he was declared dead.

Investigation into the accident revealed that there was no traffic regulation in the yard and further the driver of the top lift truck contravened regulation 53(1) of the Dock Workers (Safety, Health and Welfare) Regulations, 1990. The driver was warned for violation of the above regulation and the clearing and handling agent was advised not to allow their employees to move on bicycle.

On 28.10.2002, at a Port, in the early hours a driver of a pay loader was reported to have been hit /run over by another pay loader and met with serious injuries and succumbed to the same.

Investigation into the accident revealed that the accident had occurred due to negligence of pay loader operator leading to run over of the victim by the pay loader. Consequently, the operator of the pay loader was warned for violation of regulation 57(8)(b) read with regulation 7(5) of the Dock Workers (Safety, Health and Welfare) Regulations, 1990.

On 9.2.2003, during the 3rd shift at a Port, wooden logs were being discharged from a ship alongside a berth. At about 0430 hrs. when a sling load of logs was being removed from the hold, it hit a signal man who was giving signals to a winch driver. The signal man fell into the hold and received severe injuries. He died on the spot.

Investigation into the accident revealed that the employer contravened regulations 32(3), 36(5), 36(6) and 117 of the Dock Workers (Safety, Health and Welfare) Regulations, 1990 and the agents contravened Reg. 32 and 36 of the said regulations. Prosecution has been initiated against the employer and agents of the vessel for violation of the above Regulations.

WORKSHOP ON ANTHROPOMETRY FOR BETTER WORKSTATION & POSTURAL CONFIGURATION FOR IMPROVING SAFETY, HEALTH & PRODUCTIVITY AT WORK”

PROGRAMME PERSPECTIVE

We are so used to seeing people of widely varying dimensions that unless a person of extreme height or girth appears, we take it all for granted. So, too, do we accept the dimensions of various things we use, down ways are always high enough (for most of us) chair and tables we accept and use, accepting too the not infrequent discomfort arising from their use. The assumptions unrecognized perhaps behind this acceptance is that it cannot be otherwise, it is up to us to adapt to suit the things we use, and that it is not really very important any way. The increasing amount of times that more and more people spending sitting, both at the office and motor vehicle, and the widespread incidence of low back pain in the population, have caused many to question this simple assumption regarding the unimportance of relating things more closely to people. Early studies in the field of ergonomics looked at the reaches needed for control panels and work place of many kinds, and seating was an early subject of study.

Anthropometry, previously study developed for classification, identification of racial differences and the effects of diet, living conditions, etc. on growth, was pressed into service to provide information about human dimensions around which workplace could be designed. Initially many of the decisions were simple, the length of a straightened arm from shoulder to clenched fist was the reach distance, the length of the forearm gave information about the areas of easiest reach, while the distance from the underside of the thigh to the ground, when the leg at the knee was bent to right angle, was the appropriate dimension for the height of a chair seat.

OBJECTIVE

To familiarize with

- Different body dimensions measurements for engineering application.
- Effects of overused, abused of physiological systems and its fitting the existing setup.
- Various remedial measures for Musculoskeletal disorders, engineering designs on population matrices.

HIGHLIGHTS

- Overused effects of physiological systems.
- Prevention of overuses of physiological systems for better performance, health and productivity through better design.
- Discussions of various problems encountered by participants during their day-to-day life on shop floor.
- Application of Anthropometry and Biomechanics for prevention effects

PARTICIPANT PROFILE

One and all those who are using computers, vdt etc at home and at office, Industrial physicians, ESIC doctors, Design & Production Engineers, Plant Medical Officers, Inspector of Factories, Academicians, Policy planners, Safety professionals, Design Engineers, Architect, all paramedical personals including laboratory technicians etc.

TECHNIQUES

- Discussion based on shop floor experience and case studies.
- Laboratory exercise/demonstration exhibits
- Technical films

FACULTY

Experts from the Central Labour Institute, Mumbai and a few guest speakers who have specialized knowledge and experience in the respective fields.

Conducted by:

Physiology & Ergonomics Div., Central Labour Institute, Sion, Mumbai.400022

INTERNATIONAL OCCUPATIONAL SAFETY AND HEALTH INFORMATION CENTRE (CIS)

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

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

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

EXCERPT FROM CIS DOC

Title: Effects of lead on immune parameters in occupationally exposed workers

CIS ACCESSION NUMBER

CIS 02-1339

ABSTRACT

To assess the immune competence of workers occupationally exposed to lead, several subsets of peripheral lymphocytes, i.e. T, TCD4⁺, TCD8⁺, B, NK Cells, serum immunoglobulin and complement protein concentrations, chemotaxis, and intracellular killing activity of neutrophils of 25 male storage battery workers were analysed and compared with those of 25 healthy males with no history of lead exposure. The results indicated that industrial exposure to lead resulting in group mean blood lead concentrations of 75±18µg/dL are associated with a significant depression of: T helper lymphocytes, IgG, IgM and C3, C4 complement levels, chemotaxis and random migration of neutrophils. No correlation was found between the duration of exposure and the altered immune parameters. In conclusion, the immune system can be a target for lead toxicity and elimination of lead hazard in working places is necessary.

Note:

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

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

PRODUCT NAME : HYDROQUINONE

HAZARDS IDENTIFICATION

Potential Acute Health Effects

Very hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion. Hazardous in case of inhalation. Non-permeator by skin. Severe over-exposure can result in death. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential chronic health effects

Carcinogenic effects: Classified A3 (proven for animal.) by ACGIH [quinol]. Classified 3 (not classifiable for human.) by IARC [quinol].

Mutagenic effects: Not available.

Teratogenic effects: Not available.

Developmental toxicity: Not available.

Repeated exposure to an highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

FIRST AID MEASURES

Eye Contact: Check for and remove any contact lenses. **IMMEDIATELY** flush eyes with running water for at least 15 minutes, keeping eyelids open. Get medical attention immediately.

Skin Contact : In case of contact, immediately flush skin with plenty of water. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Hazardous Skin Contact : Wash contaminated skin with soap and water. If irritation persists, seek medical attention.

Inhalation :If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Hazardous Inhalation: Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. **WARNING:** It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek medical attention.

Ingestion: Have conscious person drink several glasses of water or milk. **INDUCE VOMITING** by sticking finger in throat. Never give anything by mouth to an unconscious person. If the convulsions cease, turn the victim on the side or face down so that any fluid in the mouth will drain. Seek medical attention.

Hazardous Ingestion: Treat symptomatically. No specific antidote available.

Accidental Release Measures

Small Spill : Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill :Poisonous solid. Use a shovel to put the material into a convenient waste disposal container. Use non-sparking tools. Avoid creation of dusty conditions. Use water spray to reduce vapors. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Handling and Storage

Precautions: Keep locked up. Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. DO NOT ingest. Do not breathe dust. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents. Use non sparking tools. Dry powders can build static electricity charges when subjected to the friction of conveying, mixing or sliding. It is recommended that all dust control equipment and material transport systems involved in handling of this product contain explosion relief vents or explosion suppression system or an oxygen deficient environment. In addition, all conductive elements of the system that contact this material should be electricity bonded and grounded. This powder should not be flowed through non-conductive ducts or pipes. Use only appropriately classed electrical equipment.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls: Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection : Safety glasses with side-shields. Splash goggles. Gloves. Suitable long-sleeved clothing (i.e. shirts and pants). Consideration must be given both to durability as well as permeation resistance. Be sure to use a MSHA/NIOSH approved respirator or equivalent. Air-purifying (half-mask/full-face) respirator with cartridges/canister approved for use against dusts, mists and fumes.

Personal Protection in Case of a Large Spill: Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self-contained breathing apparatus should be used to avoid inhalation of the product.

NOTE

The above details constitute part information of MSDS taken from Canadian Centre for Occupational Health and Safety. For complete MSDS write to MIS division, Central Labour Institute, Sion, Mumbai.400022. MSDS on about 1,20,000 chemicals/materials are available with Central Labour Institute. Computer printout will be supplied on nominal charge basis.

VISHWAKARMA RASHTRIYA PURASKAR AND NATIONAL SAFETY AWARDS

The Awards distribution function for Vishwakarma Rashtriya Puraskar & National Safety Awards for the year 2001 & 2002 was held on 17.09.2003 at Vigyan Bhavan, New Delhi. The Awards were presented to the Awardees of Vishwakarma Rashtriya Puraskar & National Safety Awards by Hon'ble Union Minister for Labour, Dr. Sahib Singh. Out of 81 applications received for Vishwakarma Rashtriya Puraskar- (Awards Year- 2001) and 118 applications for the Vishwakarma Rashtriya Puraskar- (Awards year 2002), Awards were given to 38 nos of awardees for the Awards Year 2001 and 58 awards for the Awards year 2002. Out of 390 applications received for National Safety Awards – 2001 and 418 applications for National Safety Awards – 2002, 73 nos. of awards were given for the Awards year 2001 and 74 nos. of awards were given for the Awards Year 2002.

WORKSHOP ON “HIGHER PRODUCTIVITY AND A BETTER PLACE TO WORK”

The Intensive training workshop “Higher Productivity and a Better Place to work” for

the owners/managers of the small and medium scale enterprises of Vapi Industrial Estate, was conducted at the Vapi Industries Association Conference Hall in Vapi on 14.10.2003 by Central Labour Institute, Mumbai in association with the Factories Inspectorate Office, Valsad and the Vapi Industries Association and was attended by 70 owners/managers of Small & Medium Scale Units at Vapi . The workshop was inaugurated by the Director I/c(SSC) CLI. Shri Suman Bhavsar, President, Vapi Industries Association (VIA) welcomed the guests and the participants of the Workshop. Shri G.M. Patel, Dy. Chief Inspector of Factories of Gujarat, Baroda Region explained the objectives of the Workshop and also spoke on the importance of Safety in raising the productivity of the organization. Shri Rajneesh Anand, Chairman, Safety Committee, VIA described the threats to Indian Industry from global players due to liberalisation of our economy and said that only by raising the productivity and the quality of the product through improvement in working conditions can we sustain these threats. Useful discussions took place amongst the participants and the CLI faculty wherein many low cost solutions emerged for the improvement in the working conditions in the units of the participating entrepreneurs.

LABOUR BODY TO DISCUSS LAW RATIONALISATION

The Indian Labour Conference will meet for three days between October 16 and 18 to discuss the touchy question of rationalizing labour laws.

Apart from this issue as defined in the report of the Second National Commission on Labour, the conference – this is for the first time that it is being held for three days – will also debate the employment generation in the light of the SP Gupta report on employment generation and social security benefits for the unorganized sector.

A GoM headed by Deputy Prime Minister LK Advani recently gave an in-principle nod) to tapping the exchequer at least for a portion of the proposed Rs.1,000 crore central social sector fund for the unorganized sector. However, not only has its size not been decided but a proposal by the Labour Minister that a petrol and diesel cess be levied to beef up the fund was shot down by Ram Naik. Amendments to the key Industrial Disputes Act in the light of recommendations of the NCL is still under consideration by the Ministry which has been unable to cull out a consensus between industry and workers on proposed changes.

As for amendments to the contract labour legislation, the relevant labour legislation, the relevant GoM has thus far expanded the number of sectors to be opened up to it. Most of these are activities not directly related (non-core) to the main production activity, such as horticulture, canteen services, housekeeping, maintenance, loading, unloading, etc. Relaxation of service laws to allow contract labour in these areas even in SEZs was

approved of. The Centre, though, expressed some apprehensions over the labour exploitation in main areas of activity in SEZs at the State level. A GoM also showed the thumbs down sign to the Labour Ministry's argument in favour of a Workers' Participation in Management Bill which would allow worker representation at the top levels in industry.

And although the Centre recently proposed a hike in the minimum wages national floor level, no concrete progress has been made on the implementation and penalty fronts, nullifying any perceived gains to workers in the unorganized sector. In fact, only a very small number of cases where irregularities were detected actually resulted in recovery of dues and deterrent penalty to the offending industry heads. The NLC had recommended framing of a new unified law on wages to include provisions of wage related Acts including the Minimum Wages Act, 1948, Payment of Wages Act, 1936, Payment of Bonus Act, 1965 and the Equal Remuneration Act, 1976.

That apart, the NLC recommended a law for workers in SSI units, simplification of forms, returns and registers under various labour laws, and an umbrella legislation on occupational safety.

Source : Economic Times

**TRAINING PROGRAMMES
JANUARY TO MARCH 2004
CENTRAL LABOUR INSTITUTE, SION,
MUMBAI-400 022**

Programme title	Contact person
Diploma in Industrial Safety	Director (Safety) & Incharge Indl. Safety Division
Training Programme on Industrial Safety for National Safety Council - Maharashtra Chapter	Director (Safety) & Incharge Indl.Safety Division
Safety, Health & Environment Management in Chemical Industry	Director (Indl.Hygiene)&Incharge Indl.Hygiene Division
Training workshop on Hazard & Operability(HAZOP) studies	Director (Indl.Hygiene)&Incharge Major Accident Hazard Control Advisory Division
Industrial Ergonomics – its application in Industries for promotion of Safety, Health & increased Productivity at work	Director (Physiology) & Incharge Indl.Ergonomics Division
Compensation Management for Global Competition	Director (Productivity) & Incharge Productivity Division
Industrial Heat Stress & Heat disorders -its evaluation & management for ensuring Safety, Health, Productivity at work	Director (Physiology) & Incharge Indl.Ergonomics Division
Basic Course for Inspectors of Factories	Director (Safety) & Incharge Indl. Safety Division
Occupational Health Hazards of VDT Users in Office & work places- its remedial measures through Ergonomics – Approach	Director (Physiology) & Incharge Indl.Ergonomics Division
Occupational Physiology-its application in Industry for Promotion of safety, health & productivity at work	Director (Physiology) & Incharge Indl.Physiology Division

Programme title	Contact person
Effective participative skills for Safety Committee Members	Director (Incl.Psychology) & Incharge Incl.Psychology Division
Training Workshop on Occupational Health Nursing for Nurses, Health Assistant, etc.	Director (Medical) & Incharge Incl.Medicine Division
Productivity & Quality Improvement through Effective Employees Participation	Director (Productivity) & Incharge Productivity Division
Personal Growth & Group Dynamics	Director (Staff Trg.) & Incharge Staff Training Division
Industrial Fatigue-its evaluation & management for ensuring Safety, Health & Productivity at work	Director (Physiology) & Incharge Incl.Physiology Division
Occupational Health Hazards of VDT users in Office & work places -its remedial measures through Ergonomics approach	Director (Physiology) & Incharge Incl.Ergonomics Division
Safety, Health & Environment in Pesticide Industry	Director (Incl.Hygiene)&Incharge Incl.Hygiene Division
Workshop for Safety Committee Members	Director (Safety) & Incharge Incl.Safety Division
Occupational Back pain –its Evaluation & Management for enhancing Safety, Health & Productivity	Director (Physiology) & Incharge Incl.Physiology Division
Physiological basis of Manual Material Handling operation for Accident Prevention & Productivity	Director (Physiology) & Incharge Incl.Physiology Division

**TRAINING PROGRAMMES
JANUARY-MARCH 2004
REGIONAL LABOUR INSTITUTE , LAKE TOWN
KOLKATA-700 089**

Programme title	Contact person
Diploma Course in Industrial Safety	Director Incharge
Training Programme on Safety and Health for workers	Director Incharge
Safety, Health & Environment at work place	Director Incharge
Chemical Safety for Worker Members of Safety Committee	Director Incharge
Advanced Training Programme on Environmental Hazards & their control in Industries	Director Incharge

**TRAINING PROGRAMMES
JANUARY-MARCH 2004
REGIONAL LABOUR INSTITUTE , NO.1,SARDAR PATEL ROAD
ADYAR, CHENNAI-600 113**

Programme title	Contact person
Diploma Course in Industrial Safety	Director Incharge
Safety in Chemical Industries	Director Incharge
Seminar on Relevance & Role of Safety Professionals in Industries	Director Incharge
Refresher Course on Occupational Health	Director Incharge
Training Programme on Occupational Safety & Health in Sugar Industries	Director Incharge

**TRAINING PROGRAMMES
JANUARY-MARCH 2004
REGIONAL LABOUR INSTITUTE, SARVODAYA NAGAR
KANPUR- 208 005**

Programme title	Contact person
Diploma Course in Industrial Safety	Director Incharge
Training Programme on Major Accident Hazards & Chemical Safety	Director Incharge
Training Programme on Monitoring of Work Environment	Director Incharge
Workshop on Safety Audit	Director Incharge
Workshop on Industrial Noise	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.

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

- 1. Manuscripts for publication should be typed in double space within 3 to 4 A4 size sheets only on one side of the paper and sent in duplicate to the Editor-in-Chief. No photographs can be published.**

- 2. Once the manuscripts are accepted for publication, publisher reserves the right to make editorial changes as may be necessary to make the article suitable for publication; and publisher reserves the right not to proceed with publication for whatever reason.**

- 3. Authors should take care to ensure the accuracy of data and reference.**

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

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

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

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

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

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

The organisation is poised to grow further, and meet the increased demands on it. In a developing country with a large number of industries having diverse and complex nature, the task of protecting safety and health of workers is an uphill task. Armed with the technology, good-will of the industrial society and the strength of the dedicated staff, the organisation is well prepared to meet the challenges of tomorrow. It is committed to the goal of making the workplace safer.

Visit us at : www.dgfasli.nic.in