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ABOUT DGFASLI

DGFASLI

Telephone : PABX 91-22-4092203

Fax : 91-22-4071986

Email : CLIBOM@X400.nicgw.nic.in

PROCESS SAFETY IN FERTILIZER INDUSTRY

A SUMMARY OF THE STUDY

INTRODUCTION :

The fertilizer plants, particularly those manufacturing ammonia are amongst the most complex plants in the chemical industry. The processes involved in the production of ammonia, nitric acid, phosphoric acid, sulphuric acid and their conversion to various types of fertilizers involve handling of various hazardous substances and cover a wide range of technologies. The operating conditions are also severe and affect the safety of equipment and its material of construction, personnel involved and the environment.

As part of a national study on process safety and work environment in various types of fertilizer plants by the Central and the three Regional Labour Institutes working under the Directorate General Factory Advice Service and Labour Institutes, Mumbai, a study on process safety in fertilizer industry was undertaken during 1994-95. The objectives of the study were to (a) gain an insight into the hazards inherent in the processes of manufacturing fertilizers, (b) evaluate their safety and health implications and (c) recommend preventive measures for improving the standard of safety and health.

METHODOLOGY :

The study on "Process Safety" was conducted on 18 fertilizer units comprising nitrogenous, phosphatic and mixed fertilizer producing units. Information on the technology, process, built-in safety, etc., was obtained from technical literature and from various publications of the Fertilizer Association of India. Questionnaires on technical aspects were prepared and information obtained from the plants, P&I diagrams,

block diagrams, material balance diagrams, material safety data sheets, reactions, documents on detailed manufacturing processes, startup and shutdown procedures, safety manuals, emergency plans were studied and discussed with management personnel. The technique of hazard and operability study was also applied to search possible hazards and operational difficulties. Areas and activities were inspected. Personal interviews were conducted with management, supervisors and operators to derive the information regarding existing safety measures. Suggestions to improve the systems were discussed with the management and recommendations were compiled.

FINDINGS OF THE STUDY :

1. Many process vessels operate under pressure or vacuum and may also be accidentally subjected to these conditions. These vessels are required to be properly maintained in safe conditions and thoroughly examined by a competent person as per the provisions of Section 31 of the Factories Act and the Rules made thereunder. A report of every examination or test carried out should be kept available in the specific Form prescribed by the State Factories Rules. It has been observed that examination of some vessels is carried out.

2. The tubes of pre-heater carry natural gas at a higher pressure and the shell may contain steam at low pressure. Any leakage from tubes may increase the pressure at shell side of the pre-heater. Hence, the shell may be provided with a safety valve to avoid the risk of excessive pressure rise. The condensate may be periodically monitored for the presence of methane gas and records

maintained. It would be better if a continuous hydrocarbon monitor is provided.

3. The gases like carbon monoxide and carbon dioxide are harmful for catalyst in ammonia converter and the total content of these gases should be less than 5 ppm by volume. The presence of CO₂ may also create problem with synthesis gas compressor as excessive amount of CO₂ in the synthesis gas may result in the formation of highly corrosive ammonium carbonate in the compressor, the impeller may get damaged and also choke the process line, equipment and instrument tapplings. It was observed that the gas at the outlet of a methanator was analysed for CO-CO₂ by laboratory as the online CO-CO₂ analyser was out of order. The online analyser should be maintained in the working order and results compared with laboratory tests.

4. Air lines and other services tapplings were provided at various locations with a provision for connecting with rubber hose. There is a possibility of interchange of connection due to human error and hence needs attention.

5. Valves are used for isolating the piece of equipment in case of maintenance work but these are liable to leak. Such a leakage occurred in one of the plants resulting in death many plant personnel. Therefore, valves alone should not be used as the means of isolation. It was observed that a good system of double block and bleed with the provisions of spectacle blind was provided in some of the plants.

6. The instrumentation in the process industry is vital and a key factor in the safe operation. The logic followed in the instrumentation coupled with the trips and interlocks should have the

intrinsic safe features. But the field studies indicated that in some cases computer logic did not take care of domino effect of failure and many of the logics have been found to be inactivated/by passed. The quality of air must also be clean and free from moisture and oil to avoid malfunctioning of the instruments operated by air pressure. Hence, dew point monitors may be installed to get reliable performance of the instruments.

7. Erosion and corrosion can result in material damage, leading to failures and may cause serious accidents. This study reveals the inadequacies in this area.

8. Procedure for handling catalyst are available but not reviewed periodically. Neither the areas have been identified for keeping the used catalyst nor their disposal procedures were made available.

9. Ammonia plant has flare header to which all vents containing inflammable gases are connected. The height of flare and distance from plant/ammonia storage tank, provision of knockout drum, pilot burner, molecular sieve, smoke suppressor vary from unit to unit. In view of the high risk potential in this area, appropriate standard like A.P.I., etc. need to be followed in the design and operation of flare stack.

10. Two relief valves have one common inlet in some units. In case of any obstructions, the tank will be isolated from these relief valves and may result in over pressurisation of the tank. At least two pressure relief valves should be fitted independently and the isolation valve kept locked in open position provided between the tank and each relief valve.

11. Horton sphere and single walled ammonia storage tanks were not provided with bund walls in most of the

units. In the event of heavy spillage of tank contents, all the liquid ammonia may not evaporate instantaneously. In order to maintain minimum rate of evaporation of the left out liquid ammonia, a bund wall of adequate capacity should be constructed.

12. As a standard operating procedure, the valves of bund walls drainage system should be kept closed. In many units, they were kept open.

13. Most of the urea manufacturing units have a system of preventive maintenance based on predictive maintenance and follow permit to work system. The report on turn around for every year is brought out giving details of maintenance activities for that year but the history cards for failures, breakdown and replacement of parts, down time of equipment/machines are not being maintained in many of the units/plants. The permit system has also not been strictly followed for all identified hazardous jobs in the fertilizer plants manufacturing urea/complex fertilizer and superphosphate.

14. The employment of contractor workers is a persistent problem for safety of the plant and personnel in view of their poor safety awareness and temporary nature of work which exposes them to various hazards and increase the hazard potential in the plant.

15. There are chances of leakage/release of natural gas, hydrogen, carbon monoxide, hydrogen sulphide and ammonia from various locations and pose risk of fire and toxic release. It is recommended that the provision of continuous multipoint monitor with alarm at vulnerable locations, provision of ammonia sensor and CO. Monitor with alarm may be made at appropriate places. The leakage should also be

checked periodically with the help of instruments like explosimeter, dragger tubes, etc. Ammonia sensors set at threshold limit valve may be provided near the process/storage areas. Leaks in synthesis loop may pose serious risk of fire as hydrogen gas passes from high pressure to low pressure zone, it gets heated up exhibiting reverse Joules Thomson effect leading to spontaneous fires. The leakage particularly in this area may be monitored regularly and if any leakage is observed, it should be repaired promptly.

16. There is a possibility that liquid ammonia getting entrapped between two block valves in feed line from ammonia plant to storage and storage to urea plant or similar cases and may get over pressurised due to thermal expansion. Such lines may be protected by an expansion vessel between two block valves connected to flare/scrubbing unit.

17. The pipeline downstream the heater in ammonia storage area is not designed to withstand the cryogenic temperatures. Hence low temperature controllers with alarm at the exchanger may be provided to prevent cold material from getting into the warm ammonia pipeline.

18. In order to identify the pipelines and reducing the chances of error the standard colour codes may be followed. The colour code charts indicating the colour and the content may also be displayed at prominent places for general appreciation.

19. There are some parts in the system which may undergo fast deterioration and some may fail/ get damaged unexpectedly due to various deviations in the parameters. It is, therefore, desired that the list of failure prone areas like vena-contracta points developed due to restriction/orifice, bends, point of impact, T-joint in synthesis loops, area

of turbulence, gland nut of high pressure ammonia pump in the plant may be drawn out and as schedule can be prepared for non-destructive testing of such areas assigning periodicity of inspection.

20. There are certain temperature conditions existing during the start up phase of the operation which render the conversion of sulphur dioxide to sulphur trioxide inefficient. During this phase, there is a likelihood of release of sulphur dioxide gas from the chimney. It has been observed that very few industries have installed caustic scrubber to scrub the spent gases from the absorber before venting it out into the atmosphere through the high chimney but there has not been any indication of caustic circulation pump tripping/failure. The acid concentration monitor with high and low concentration alarms may be kept always in running condition.

21. Mixing of 98% sulphuric acid and D.M. water is exothermic reaction and lead to higher temperature which may cause damage to graphite cooler, rotameter and spillage of acid. A temperature indicator with high alarm and interlocking with sulphuric acid feed pump may safeguard the equipment from damage. The floor in graphite cooler area may be provided with acid resistant bricks. The direct dilution of sulphuric acid in two stages in cooler and mixer chamber can reduce excessive temperature. It may also be ensured that proper ratio of rock phosphate and sulphuric acid, scrub liquor may be maintained to avoid corrosion due to excess acid.

22. A digital indicator with alarm for hydrogen fluoride has been provided in a few units to indicate the HF concentration at the outlet of high stack and kept interlocked with feed of mixer.

23. Most of the Urea manufacturing units have their own HAZOP study and audit team but the procedure adopted by them in identifying the hazards were not effective. Other units manufacturing complex fertilizer or superphosphate have no such system.

24. Good administrative procedures as part of the total safety management system are essential to improve safety performance. Established procedures for incident investigation and follow up action are required to avoid recurrence of the undesirable incidents. Documentation of operating procedures, deviations, safety checks, maintaining P&I diagrams, modification procedures, etc., will improve the effectiveness of safety systems. Inadequacies were observed in fertilizer units producing superphosphate and complex fertilizers.

25. Review and updating of safety manual/orders/practices from time to time to meet the new statutory safety requirements and changed technology/operation are all necessary. The safety training imparted to process operators and supervisory staff in all types of fertilizers units was also inadequate particularly in the areas of built-in safety provisions.

NOISE DOSIMETRY STUDY IN A PHARMACEUTICAL FACTORY

A noise dosimetry study was conducted by the Safety Division, Central Labour Institute, Mumbai, in a pharmaceutical factory in May 1996. The objective of the study was to assess the percentage of noise dose to which the workers were exposed.

FINDINGS

The noise dosimetry taken on the selected workers revealed that at the end of the shift of eight hours, the workers working in the 0700-1500 hrs. shift were exposed to a noise dose of 85.0 dB(A) to 86.0 dB(A), whereas the workers working in the 1500-2300 hrs shift were exposed to 84.5 dB(A) at the end of the shift. However, the average exposure was 85.2 dB(A). As per the Maharashtra Factories Rules, 1963, framed under the Factories Act, 1948, this exposure is below the permissible continuous noise exposure of 90 dB(A) for eight hours per day.

ASSESSMENT OF AIRBORNE CONTAMINANTS IN A CHEMICAL PLANT

A study was conducted in a Chemical

Plant in New Mumbai for the assessment of airborne contaminants. There are twenty three reactors used in the manufacturing processes. The factory runs in three shifts with twelve workers engaged in each shift.

The reactors are made of M.S. with glass lining or stainless steel. The capacity of the reactors is ranging from 50 gallons to 800 gallons. The reactors have been provided with vapour column, condensers and receiver. The reactors have also been provided with supply of chilled water, brine steam compressed air and vacuum facilities.

It is also observed that arrangement has been made in the reactors for collection and scrubbing of the acidic gases like SO₂ and HCL generated therein.

Solvents are stored in underground storage tanks with nitrogen blanketing, whereas acid and alkalis are stored in over ground storage tanks with dyke/bund walls around it.

During the manufacturing processes, workers are exposed to the solvents like toluene, methanol, ethanol, carbon tetrachloride, petroleum-ether, methyl alcohol, acetonitrile, acetic acid, sulphuric acid, hydrochloric acid and sulphur dioxide. These solvents are toxic by inhalation and ingestion solvents like petroleum ether, carbon tetrachloride, toluene, methanol, ethanol which are also narcotic agents. The large dose may cause death. These solvents are poisonous by sub-cutaneous and intravenous route and may effect the liver and kidney.

OBJECTIVE :

The objective of the present study was to find out the (1) airborne level of these contaminants, (2) health hazard of the workers and (3) to suggest preventive and control measures if found necessary.

METHODOLOGY:

The airborne samples of these contaminants were collected from the breathing zone of the workers as well as in the general atmosphere at different locations in chemical plant (I) & (II). The samples of toluene, acetonitrile, carbon tetrachloride, methylene chloride and petroleum ether vapours were collected in activated charcoal using personal sampler as a source of suction. Vapours were eluted in carbon disulphide and estimated by using Gas Liquid Chromatography (GLC), whereas silica gel was used as an absorbent media for collection of various of methanol and ethanol. These vapours were eluted with fresh distilled water and analysed by GAS Liquid Chromatograph.

The airborne sulphuric acid mist was collected in diluted sodium hydroxide solution and treated with barium chloride to form insoluble salt of barium sulphide. The turbidity thus developed was measured spectrophotometrically, whereas airborne hydrochloric acid mist was trapped in dilute sodium hydroxide and acidified with nitric acid and then treated with silver nitrate solution. The resultant silver chloride suspension was measured spectrophotometrically. The air sample for sulphur dioxide was collected in sodium - tetrachloromercurate and analysed by the

West and Giese method using P-rosaniline methyl sulphonic acid. The red purple colour compound formed was determined spectrophotometrically.

The airborne vapours of acetic acid and sodium hydroxide were collected in water and treated with potassium iodide and were measured spectrophotometrically, whereas airborne ammonia was trapped in 0.02 NH₂SO₄ and Nessler's reagent was added, the colour developed was measured spectrophotometrically.

FINDINGS:

It is revealed from the study that airborne concentration of all the contaminants except that of sulphuric acid and acetonitrile were found well within their respective permissible limit of exposure as prescribed in the Second Schedule under Section 41 F of the Factories (Amendment) Act, 1997.

RECOMMENDATIONS:

1. Control measure system for the reactors of sulphuric acid and acetonitrile are not properly adopted.
2. Control measures system for all other reactors have been properly and neatly adopted.

MAXIMUM CREDIBLE LOSS SCENARIO IMPACT ASSESSMENT STUDY OF A LPG STORAGE OF A HEAVY ENGINEERING PLANT

The study was carried out at the

request of the management of the factory to assess the damage zone due to accidental release of LPG from a 10 M.T. capacity storage vessel for a Maximum Credible Loss Scenario. In the event of the liquid LPG release, a scenario of Boiling Liquid Expanding Vapour Cloud Explosion (BLEVE) results if the vapour cloud is ignited. The effect of this explosion can cause damage to life and property due to :

- a) Thermal radiations from fireball; and
- b) Blast wave impact

The scenario involving maximum credible accidents were assumed to be -

- I) The LPG storage temperature in the vessel is 40°C.
- II) There is catastrophic failure of the LPG vessel.
- III) There is guillotine failure of 2" liquid LPG line.
- IV) Prevailing wind velocity is 2 m/s.
- V) Weather stability is 'D'.

The consequence analysis revealed that for the catastrophic failure scenario:

- a) The radius of the LPG fireball was found to be 50 metre and lasting for 7.7 seconds.
- b) The radial distance from LPG storage vessel for human and property damage from a target radiative flux of 40 and 12.6 kw/m² were found to be 345 and 180 meters; and
- c) For such a scenario glass windows shall be broken and minor structural damage shall be at a radial distance of 440 m. due to blast effect. Severe damage to property and skin laceration shall occur at a radial distance of 100 m.

In the event of guillotine failure of 2" pipeline the epicentre of the explosive cloud shall be at a distance of 149 m. from LPG release plant. The radial distance for 90% window glass breakage and severe damage to property and skin laceration were found to be 100 and 20 m. respectively.

INDUSTRIAL SAFETY DIVISION SAFETY MANAGEMENT

The manufacturing industry have registered an impressive growth during the last few years and is posed for further growth in the near future. Serious industrial accidents, which our country experienced in the recent past has given us sufficient warnings. Accidents bring in their tail, human misery and acute hardships. Rarely does the compensation, however liberal, adequately cover the loss of earning capacity of the victim. Lack of adequate emphasis on safety matters can be very costly for both the organisation and workers. Hence, the management has to treat safety as part of its overall responsibility. Keeping these in view, specialised training programme on safety management is designed.

CONTENTS:

- * Principles of Safety Management
- * Hazard Identification
- * Safety Audit
- * Important Statutory Provisions on Safety & Health
- * Major Accident Hazards
- * Physical Work Environment
- * Occupational Health
- * Industrial Hygiene
- * Ergonomics for Safety & Health
- * Motivation for Safety

PARTICIPANTS:

The programme is designed for managers, supervisors from

production/maintenance departments and safety offices from industry.

DURATION: 3-Days

INDUSTRIAL SAFETY DIVISION SAFETY ORIENTATION PROGRAMME (IN HINDI)

Since industrial activities are associated with risk, a general responsibility is statutorily placed on the occupier to ensure occupational safety and health of workers. Adoption of a self-regulatory approach by the management towards safety and health is very essential for this. Safety Committees constituted with equal number of representatives from workers effective role in helping the management to adopt safe practices. Acquainting the Safety Committee Members with related aspects on occupational safety and health will enable them to understand the issues in the proper perspective and play a constructive role. Keeping this objective in mind, a 5-day safety orientation programme on Industrial Safety and Health for Safety Committee Members is designed.

CONTENTS:

The following topics are included in the programme:

- * Important provisions under the Factories Act, 1948
- * Role of Safety Committee Members
- * Hazard identification & safety audit
- * Accident Investigations
- * Work Environment
- * Work Permit System

- * Industrial Hygiene
- * Occupational Health
- * Plant Housekeeping
- * Fire prevention & protection
- * Safety in handling and storage of chemicals
- * Motivation & Communication for promoting safety

* Personal Protective Equipment

* Emergency Preparedness

PARTICIPANTS:

The participation in the programme is open to Safety Committee Members representing management and workers from factories and ports.

DURATION: 5-days

International Occupational Safety & 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 86 affiliated National Centres and 23 CIS collaborating Centres. Central Labour Institute, Mumbai has been designated as the CIS National Centre for 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 : Toluene diisocyanate induced asthma: clinical findings and bronchial responsiveness studies in 113 exposed subjects with work-related respiratory symptoms.

CIS ACCESSION NUMBER :
CIS 91-1871

ABSTRACT:

We report the clinical findings and results of inhalation challenges with toluene diisocyanate (TDI) and methacholine in 113 subjects with a history of exposure of TDI and work-related respiratory symptoms. Only some of the subjects (40.7%) had isocyanate asthma, diagnosed by a positive TDI inhalation challenge. Most reactors had a dual (30.4%) or a late (41.3%) response. The interval between the last occupational exposure and the specific challenge was significantly shorter in reactors, and lower among this group the number of immediate reactions to TDI decreased progressively with an increasing interval.

The reactors had a significantly higher proportion of positive responses to methacholine and a significantly lower than mean PD_{15} FEV1 (provocative dose of methacholine which provoked a 15% decrease in forced expiratory volume in 1 second): reactors 55 fbg, SEM 92.3; non-reactors 1346 mg, SEM 128, PL .01. Methacholine challenge could not identify subject with isocyanate asthma.

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

MATERIAL SAFETY DATA SHEET

IDENTIFICATION

Product Name: Ammonium Nitrate Fertilizer
Product Use: Agricultural Fertilizer
Chemical Formula: NH₄NO₃

Flammable Limits: (% By Volume)
Lower : Not Applicable
Upper : Not Applicable
Autoignition Temperature: Not Available

Extinguishing Media:

HAZARDOUS INGREDIENTS

Chemical Name	CAS #	WT%
Ammonium Nitrate	6484-52-2	96

LD50 (Species, Route of Entry):
4820 mg/kg (rat, oral)
>3000 mg/kg (rabbit, skin)
LC50 (Species, Route of Entry): Not Applicable

Flood and cool hot nitrate with straight stream nozzles. Do not use salt water. Water is effective in desensitizing molten or contaminated nitrate.

Special Fire Fighting Procedures:

Immediately ventilate structure to prevent pressure build up which will increase the possibility of explosion. Do not use spray or fog nozzles. Use straight stream nozzles to cool and desensitize molten nitrate. Respiratory protection required for fire fighting personnel. When any fire is burning out of control and water cannot safely be applied to desensitize nitrate fire crews should withdraw a safe distance and use unmanned fire lines.

REACTIVITY DATA

Stability (Normal Conditions):
(X) Stable () Unstable
Conditions of Reactivity:
Heat and fire. Can react with certain reducing agents under heat conditions. Acids decompose ammonium nitrate at any temperature.

Unusual Fire and Explosion Hazards:

Incompatibility (Materials to Avoid):
Acetic acids, metals (powdered), chlorides, organic matter, phosphorous, sodium, potassium, sulphur, inorganic zinc, and copper. Copper represents the greatest contamination hazard. Concentrated acids.

Decomposes into flammable and toxic nitrogen oxides. As an oxidizer, it yields nitrous oxide readily to stimulate the combustion of organic matter or other fuel. Detonation potential under confinement and high temperatures when heated with contaminants such as organic or carbonaceous material, metallic powders, acids or copper.

Hazardous Decomposition Products:
Ammonia, oxides of nitrogen, oxides of sulphur.

FIRE AND EXPLOSION HAZARD DATA

Flammability: Not Applicable
Flash Point (Test Method): Not Applicable

ENVIRONMENTAL PROTECTION DATA

Environmental Precautions:
Aquatic Toxicity Rating; TLm 96: 1000-100 ppm. Low toxicity to aquatic life. Keep out of all waterways and all bodies of water. Fertilizers may promote

eutrophication in waterways. Do not contaminate drinking water.

Steps to be Taken in Case Material is Released or Spilled: Advise police if substance has entered water course or sewer or has contaminated soil or vegetation. Take measures to minimize the effects on ground water.

Waste Disposal Procedures:

Salvage spilled material profitably and place in suitable containers for reuse locally or contact the appropriate local authority for guidance on acceptable waste disposal methods.

HANDLING & STORAGE PRECAUTIONS

Precautions to be Taken:

Avoid contact with incompatible materials (See Section 4). Avoid exposure to heat sources. Do not store near food stuff. Shipping regulations are restrictive in various parts of the world. Consult local authorities to ensure conformity to regulations.

HEALTH HAZARD DATA

Primary Routes of Entry:

Skin Contact () Skin Absorption ()
Eye Contact (X) Inhalation ()
Ingestion ()

Exposure Limits:

Short Term Exposure (Acute)

Ingestion: Oral toxicity is listed as slight to moderate. Large amounts taken by mouth may have serious effects from ammonia and nitrate salts. 10 ppm of nitrate ion is considered a safe upper limit.

Inhalation: Dust may cause respiratory irritation (nuisance dust 10 mg/m³).

Skin Absorption: Not Applicable

Skin Contact: May be irritating to skin.

Eye Contact: Causes eye irritation.

Long Term Exposure (Chronic)

Ingestion: Small repeated doses by mouth may cause headaches and mental impairment.

Inhalation: Not Applicable

Skin Absorption: Not Applicable

Skin Contact: May be irritating to skin.

Eye Contact: Not Applicable

EMERGENCY & FIRST AID PROCEDURES:

Eyes: Immediately flush eyes with running water for at least 15 minutes. If irritation persists, call a doctor.

Skin: Wash skin with mild soap and water.

Ingestion: No hazard in normal industrial use. If ingested, give 2-3 glasses of water and induce vomiting only if victim is conscious. Call a doctor immediately.

PERSONAL PROTECTION DATA:

Ventilation: Adequate to control dust.

Respiratory Protection: Approved respirator for normal nuisance dust respiratory protection.

Protective Clothing: Clean clothing and conventional work gloves.

Eye Protection: Safety glasses with side shields.

Other: Water in area for washing eyes or skin.

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 90,000 chemicals/materials are available with Central Labour Institute. Computer printout will be supplied on nominal charge basis.

LIBRARY-CUM-INFORMATION CENTRE

The library-cum-information Centre of Central Labour Institute has a unique collection of different rare publications in the field of occupational safety, health & management. It also has a good collection of different standards, codes, regulations and publications on allied subjects. In the current year the centre is subscribing to Indian & foreign journals, besides complimentary copies of different periodicals received 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 & Management. It also extends reading facilities to students, scholars attending different training programmes & courses conducted by Central Labour Institute. From January '96 till date a number of publications in the field of OSH have been added to library. Some of them are:

AIR SAMPLING INSTRUMENTS FOR EVALUATION OF ATMOSPHERIC CONTAMINANTS BY SUSANNE V. HERING

Publishers: American Conference of Governmental Industrial Hygienists, Inc., Ohio

This book is a guide to the sampling of airborne contaminants. It describes the available air sampling instruments and provides information for their use. In the seventh edition, three new chapters have been added : two covering sampling strategies for the workplace and the community and one describing diffusional collection.

The chapters are organised into five major sections. The first part gives the basic of air sampling, second part describes the method for size selective

particle. The last three sections describe the specific instruments including sampling system.

PRACTICAL CLINICAL BIO-CHEMISTRY BY HAROLD VARLEY

Publishers: CBS Publishers & Distributors, Delhi

This book is a survey of the whole field of biochemistry from the point of view of workers in hospitals, laboratories etc. Though the purpose of the book is essentially practical, it is felt that the summaries of the findings in health and disease would add considerably to its value. Workers in medical research laboratories would also find the book useful.

TRAINING & EDUCATION IN OCC. HYGIENE: AN INTERNATIONAL PERSPECTIVE BY MORTON CORN & JACQUELINE K. CORN

Publishers: American Conference of Governmental Industrial Hygienists

This is a collection of papers presented at a workshop to determine the current National procedures of professional practice in occupational hygiene, the workshop organized by W.H.O, the commission of the European

Communities, the International Commission on Occupational Health and the American Conference of Governmental Industrial Hygiene.

This volume also contains reports of the workshop, suitably modified by conference attendees and conclusions of the conference with attached recommendations.

MANUAL ON SAFETY AND HEALTH MANAGEMENT IN THERMAL POWER PLANTS

Energy is required for the economic growth without which objectives of the improvement of the quality of life, social security and national pride cannot be realised. Coal-fired Power Plants is the prime source of energy generation in the country. Energy development calls for the generation of Green Power, which refers to the efficient generation of electricity aiming to eliminate or minimise the pollutants - particulates (Fly ash and Coal dust), acid gases, green house gases, hydrocarbon and physical stresses such as noise, vibration, illumination and heat stresses at work environment. The power generating industry is listed as one of the hazardous industries in Schedule I under Section 2 (cb) of Factories (Amendment) Act, 1987. Hence safe operational methods/procedures as well as assessment of hazards and adopting preventive and control measures need sound technical literature to develop knowledge and skill of the Safety Professionals. This manual is designed and developed for the Safety Professional working in Thermal Power Plants.

The Manual covers the following topics:

- * Process Safety in Thermal Power Plants
- * Work-place climate and physical stresses- noise, vibration, illumination and heat stress
- * Occupational exposure to airborne pollutants
- * Monitoring in the workplace
- * Personal Protective Equipment
- * Health Surveillance
- * Safety Audit
- * Environmental Impact Assessment
- * Fly-ash utilization

For further reading references are given at the end of each Chapter. This manual is intended to help to achieve our objective of ensuring safety and health of workers, besides making the work environment more friendly in the Thermal Power Plants.

ESTABLISHMENT OF NEW REGIONAL LABOUR INSTITUTE AT FARIDABAD

During the VIII Plan period, the establishment of new Regional Labour Institute near New Delhi was approved by the Government of India. Subsequently, a temporary accommodation has been hired at Faridabad wherein the nucleus office has started functioning. The objective of the Institute is to serve the Northern States of Punjab, Haryana, Himachal Pradesh, Jammu & Kashmir and Delhi in the areas of safety and health. Construction work would commence by the end of this year and full-fledged working of the Institute is likely to start within about two years. The Institute will have the following disciplines:

- i) Safety
- ii) Industrial Hygiene
- iii) Occupational Health
- iv) Unit for assisting small scale establishments
- v) Cell for providing advice on Major Accident Hazard Control and Chemical Safety
- vi) Policy Planning Cell
- vii) Management Development and Information Cell

The activities in these areas will be supported by laboratories for Environmental Engineering, Industrial Hygiene, Industrial Psychology and Occupational Health, a Computer Room, an Occupational Safety, Health & Welfare Exhibition Centre, one Mobile Safety Exhibition Van, a Library, three Conference Rooms, one Auditorium and Hostel which will cater to the need of imparting safety and health education.

OBJECTIVES

The objectives of the Scheme is to cater to the needs of the Northern Region in the areas of Safety & Health which at

present due to heavy workload of Regional Labour Institute at Kanpur is not being effectively met. In addition, the Institute is proposed to be equipped with facilities and capabilities in the areas of risk analysis with software like RISKET, WHAZAN, FETI, etc., so as to enable the assessment and evaluation of risk in the locational aspects of industries as well as to enable this Institute to provide advice on the safe operation and enhancement of safety preparedness level of MAH units as well as chemical process industries, and district administration to meet any major emergency. For this purpose, the Institute would be assisting such industries to scrutinise the emergency plans and disaster control plans and to provide guidance and help in the preparation of the comprehensive safety reports.

The Institute will specialise in the areas of chemical safety, setting up of information systems and improving working conditions and productivity in the small and medium scale units. In addition, the main activities of the Institute will be :

1. Conducting Post Diploma Course in Industrial Safety for Safety Officers.
2. Conducting 3-months Post-graduate Certificate Course in Industrial Health (AFIH) for medical officers.
3. Conducting refresher course in Occupational Health for Medical Officers.
4. Conducting six weeks' Certificate Course in Industrial Hygiene.
5. National Study on the priority areas identified in the States of the region.

6. Conducting training programmes for the target groups as identified by the training strategy approved by the working group and emphasised under the amendment to the Factories Act.

7. Providing technical guidance and help in the assessment of risk while considering the locational safety aspects of MAH units using computer software.

8. Providing technical guidance in the preparation of Safety Reports to such of

those factories which are required to prepare the same as per the provisions of the manufacture, Storage and Import of Hazardous Chemicals Rules, 1989 made under the Environment (Protection) Act, 1986 as well as the MAH Control Rules under the Factories Act.

9. Providing technical guidance in the preparation of emergency plans, on-site as well as off-site, to all factories which are required to provide the same.

TRAINING PROGRAMMES

OCTOBER-DECEMBER 1997

CENTRAL LABOUR INSTITUTE , SION, MUMBAI - 400 022

Course Title	Date	Venue
Diploma Course in Industrial Safety 1997-98	1st Oct. - 31th Oct., 1997	C.L.I., Mumbai (Ind. Safety Division)
Managing Occupational Stress at Work	13th Oct. - 17th Oct., 1997	C.L.I., Mumbai (Ind.Psychology Division)
Training programme on Work Environmental Safety for Managers/Supervisors	22nd Oct. - 24th Oct., 1997	C.L.I., Mumbai (Ind. Safety Division)
TQM & Business Process Reengineering	3th Nov. - 7th Nov., 1997	C.L.I., Mumbai (Productivity Division)
Adv. Training Programme on Occupational Health & Environmental Medicine	17th Nov. - 28th Nov., 1997	C.L.I., Mumbai (Ind. Medicine Division)
Evaluation & Control of Health Hazards in Chemical Industry	17th Nov. - 21th Nov. , 1997	C.L.I, Mumabi (Ind.Hygiene Division)
Team Building	24th Nov., - 28th Nov., 1997	C.L.I., Mumbai (Staff Training Division)
Safety Orientation Programme (for Safety Committee Members)	24th Nov., - 28th Nov., 1997	C.L.I., Mumbai (Ind.Safety Division)
Industrial Heat in Evaluation & Control	*(25th Nov., - 28th Nov., 1997) 10th Nov. - 13th Nov., 1997	C.L.I., Mumbai (Ind.Physiology Division)
Leadership Effectiveness for Safety, Health & Productivity	17th Nov. - 21st Nov., 1997	C.L.I., Mumbai (Ind. Psychology Division)
Wage & Salary Administration	8th Dec. - 12th Dec., 1997	C.L.I, Mumbai (Productivity Division)

Course Title	Date	Venue
Industrial Ergonomics for Augmenting Safety Health & Productivity at work	8th Dec. - 12th Dec., 1997	C.L.I., Mumbai (Ind. Physiology Division)
Managing Industrial Conflict & Frustration	15th Dec. - 19th Dec., 1997	C.L.I., Mumbai (Ind. Psychology Division)
Selection & Quality Assurance for Effective use of PPE	17th Dec. - 19th Dec., 1997	C.L.I., Mumbai (Ind. Hygiene Division)
1-Day Workshop on Testing & Examination of Lifting Machines & Tackle & Pressure Vessels (for Managers/Tech. Officers)	*(12th December, 1997) (5th December, 1997)	C.L.I., Mumbai (Ind. Safety Division)
Monitoring of Work Environment & Control of Harmful Exposures	22nd Dec. - 24th Dec., 1997	C.L.I., Mumbai (Ind. Hygiene Division)
Construction Safety	3rd Dec. - 5th Dec., 1997	C.L.I., Mumbai (Const. Safety Division)

**TRAINING PROGRAMMES
OCTOBER - DECEMBER , 1997**

REGIONAL LABOUR INSTITUTE, SARVODAYA NAGAR, KANPUR - 208 005

Course Title	Date	Venue
Workshop on HAZOP	13th Oct. - 17th Oct., 1997	R.L.I., Kanpur
Specialised Course on Chemical Safety for Safety Officers	13th Oct. - 17th Oct., 1997	R.L.I., Kanpur
Training Programme on Chemical Safety for Safety Committee Members	3rd Nov. - 7th Nov., 1997	R.L.I., Kanpur
Training Programme Safety Audit	26th Nov. - 28th Nov., 1997	R.L.I., Kanpur

Training Programme on Safety Engineering and Management 8th Dec. - 12th Dec., 1997 R.L.I., Kanpur

Training Programme on Industrial Safety & Health 15th Dec. - 19th Dec., 1997 R.L.I., Kanpur

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

Course Title	Date	Venue
Safety in Chemical Industries	13th Oct. - 15th Oct., 1997	R.L.I., Chennai
Identification, Assessment & Control of Major Accident Hazards in Chemical Industries	5th Nov. - 11th Nov., 1997	R.L.I., Chennai
Management of Hazardous Substances	24th Nov. - 28th Nov., 1997	R.L.I., Chennai
Productivity Techniques for Effective Participation of Employees	8th Dec. - 12th Dec., 1997	R.L.I., Chennai

REGIONAL LABOUR INSTITUTE, LAKE TOWN, CALCUTTA - 700 089

Course Title	Date	Venue
Safety, Health & Environment at workplace	1st Week of November, 1997 (5 Days)	R.L.I., Calcutta
Training Programme on Major Accident Hazards Control	24th Nov. - 28th Nov., 1997	R.L.I., Calcutta
Workshop on Monitoring of Work Environment	3rd & 4th Week of November, 1997 (10 Days)	R.L.I., Calcutta
Training Programme on Safety Audit	2nd Week of December, 1997	R.L.I., Calcutta

Course Title	Date	Venue
Advanced Action Oriented Programme on Safety, Productivity & a better place to work	3rd week of December, 1997 (5 Days)	R.L.I., Calcutta
Safety Engineering and Management	4th & 5th Week of December, 1997	R.L.I., Calcutta

INDOSHNET

Government of India, Ministry of Labour is developing a national network on occupational safety and health information system known as INDOSHNET. Directorate General Factory Advice Service & Labour Institute (DGFASLI), an attached office of the Ministry of Labour, will act as facilitator of the network system. The objective of the network is reinforcement and sharing of national occupational safety & health (OS&H) information on no-profit and no-loss basis with a view to pool our information resources for mutual benefit. The sharing of information will not confine to the national level but also include international sources. The communication of information will through E-mail (NICNET) as well as postal/courier service. We invite industrial organisation, institutes, industries association, trade unions, professional bodies and non-governmental organisation having information on OS&H and willing to share the same with others at the national and international level to participate as member in the network interested agencies, may please write for proforma of organisational profile to Shri S.K. Saxena, Director General, Directorate General Factory Advice Service & Labour Institute, N.S. Mankikar Marg, Sion, Mumbai 400 022.

Note: Those who responded to our earlier communication have been enrolled and need not write again.

**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, Govt. of India. DGFASLI organisation was set up in 1945 under the Ministry of Labour, Govt. 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 work place. 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, Mumbai
- * Regional Labour Institutes at Madras, Kanpur, Calcutta and Faridabad

The Central Labour Institute at 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 25 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 regions. It also functions as a National Centre for C.C.S. (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 on Safety and Health. The Regional Labour Institutes are a scaled-down version of 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 tasks of protecting safety and health of employees 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.

