
CODE OF PRACTICE FOR SAFETY MANAGEMENT SYSTEM FOR CHEMICAL INDUSTRIES

ELEMENT 1: SAFETY POLICY

To maintain a written safety policy, which spells out management's commitment to safety and the principles that govern safety and health decisions in the factory. Senior management shall ensure that the policy is communicated to all employees and relevant contractors; and shall establish a culture that safety and health are valued as basic and fundamental prerequisites for the business of the factory.

1.1 An effective Safety Policy shall demonstrate the factory's commitment on safety and health improvement, its objectives and directions, including goal setting. The Safety Policy shall address the following:

1.1.1 Accountability for the safety and health function by top management.

1.1.2 Allocation and delegation of duty and responsibility for safety and health from the top management to the staff.

1.1.3 Responsibility at all levels in preventing accidents.

1.1.4 Commitment of resources for safety and health.

1.1.5 Emphasizing the importance to protect the lives of every personnel.

1.2 The Safety Policy shall be signed by the Chief Executive Officer of the factory.

1.3 The Safety Policy must be effectively communicated to all employees and contractors in the factory.

1.4 The Safety Policy shall be reviewed at defined intervals and updated to ensure relevancy. Record of such review shall be maintained.

~~1.5 The Safety Policy shall comply with all relevant legal and other requirements.~~

ELEMENT 2: SAFE WORK PRACTICES

To establish a system to ensure safe work practices in the factory through procedural and administrative control of ~~non-routine~~ work, critical operating steps and parameters, pre-startup safety reviews for new and modified plant equipment and facilities, and management of change of plant equipment and process.

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- 2.1 Every factory shall establish and maintain safe work practices for its activities, which may include, but not limited to the list as specified in Appendix A.
 - 2.2 All safe work practices shall be established after a risk study of the work activities has been conducted using a structured model, including hazard identification and analysis of the factory's activities.
 - 2.3 All safe work practices shall be clearly written and communicated to all relevant employees and contractors. They shall be made readily available to all employees.
 - 2.4 Safe work practices, where appropriate, shall include a lock out system for energy sources including, but not limited to, hydraulic, electrical, pneumatic as well as mechanical isolation of pipelines and equipment.
 - 2.5 Depending on the complexity of factory's operation, a permit to work system shall be incorporated into the safe work practices to ensure all precautionary measures are taken before the commencement of work.
 - 2.6 Periodic review of all safe work practices to evaluate their relevance and adequacy shall be established. Lessons learned from incidents shall, where applicable, be taken into consideration in the review.
 - 2.7 The factory shall establish (please include a requirement on documentation of operating procedures).
 - 2.8 The factory shall maintain a Pre-Start-up Safety Review Policy for new equipment, facility or installation to confirm that all process safety elements of this Code are addressed and their areas of concern are all rectified before the initial commissioning of the new equipment, facility or installation. The Pre-Start-up Safety Review Policy shall also apply to new factory or process or factory /process which has major modification.
 - 2.9 The factory shall maintain and implement a Management of Change Policy to address all hazards/concerns that may be introduced by any "Change" of hardware, procedures or chemicals of the Factory's process/facility. The Policy shall institute a systematic evaluation of possible hazards or concerns arise from the "Change" and rectification in- placed before approving the "Change".

ELEMENT 3: SAFETY TRAINING

To equip employees and contractors at all level with the

knowledge, skills and attitudes relating to the operation or maintenance of facilities so as to work in a safe and reliable manner.

- 3.1 An effective training program shall be established to train employees at all levels. A scheme shall be devised to identify the safety and health training needs for each level of employees and contractors.
- 3.2 Safety Instruction Courses, and those mandatory safety training courses, shall be provided to all relevant employees. Such courses shall cover the relevant safe work practices established in the factory, hazard identification in work areas and response to emergency situations.
- 3.3 All supervisors and workers shall be trained to a competent level expected of their tasks. Where appropriate, workers shall be certified in their skills such as for welding, handling of chemicals and gas testing.
- 3.4 All supervisory staff shall be thoroughly trained in the methods and skills required to perform their tasks such as the proper operation of instruments, tools and equipment, reading and understanding of the documentation provided and their respective role in accident prevention at the workplace.
- 3.5 Training shall be provided to all relevant management staff so that they are equipped with the proper understanding of the safety management system and their responsibilities and duties in safety in the factory. The training shall also provide them with the tools and techniques needed for managing safety and health effectively at the workplace.
- 3.6 Safety orientation or induction shall be conducted for all ~~new~~ contractors, including main and sub-contractors. Such orientation or induction programs shall include an understanding of the factory's safety and health policy as well as all its rules and regulations.
- 3.7 The training programs may include but not limited to the list as specified in Appendix B.
- 3.8 The training programs shall be conducted in languages understood by the trainees.
- 3.9 Training programs shall be documented and periodically reviewed. The effectiveness of such training shall be measured and reviewed based on feedback from the employees, supervisors, managers and the contractors.
- 3.10 The factory shall maintain a record of all the training

received by each employee.

ELEMENT 4: GROUP MEETINGS

To promote communication and co-operation between management, employees and contractors so as to achieve and maintain a safe and healthy work environment.

4.1 The factory shall establish the following level of group meetings:

4.1.1 Safety Committee

4.1.1.1. Safety Committee shall be formed for the purpose of improving, promoting and reviewing all matters relating to the safety and health of workers. It is also a channel for communicating and imparting knowledge and best practices.

4.1.1.2 The Safety Committee shall have a clearly defined charter ~~and terms of reference~~ with prescribed functions and responsibilities. The composition, functions and duties of the safety committee shall be in accordance with the Factories Act (Chapter 104) and the Factories (Safety Committees) Regulations.

4.1.2 Tool Box Meetings

4.1.2.1 Tool Box Meetings involving supervisors and workers shall be held daily before commencement of any work to provide opportunity for workers to discuss safety and health issues in relation to their work.

4.1.2.2 During the meeting, the supervisor shall review the work to be carried out with the view of highlighting potential hazards and necessary safety precaution to be taken such as the use of suitable PPE.

4.1.3 Safety Improvement Teams

Safety Improvement Teams should be established for the purpose of improving the work environment so as to provide a safer and more healthful workplace.

4.2 The management shall ensure that the personnel participating in the above meetings are:

4.2.1 competent for their tasks,

- 4.2.2 understand their roles and function in both Safety Committee and Tool Box Meetings,
- 4.2.3 committed to the improvement of safety and health in the workplace. It is important that all workers are inculcated with positive attitude towards safety and health promotional activities, and
- 4.2.4 given the necessary support so that they can effectively perform their duties.
- 4.3 The factory shall establish a mechanism whereby the decisions and actions proposed by the various groups are effectively communicated to persons responsible for their implementation. The mechanism shall also ensure that all outstanding actions are effectively implemented.

ELEMENT 5: INCIDENT INVESTIGATION AND ANALYSIS

To establish procedures for incident reporting and investigation so as to identify root causes of incidents and to prevent recurrence.

- 5.1 The factory shall establish written procedures to ensure that all incidents (accidents and near misses) are reported and recorded promptly. A mechanism shall be set up by the factory to report all ~~safety~~ incidents by all personnel including contractors.
- 5.2 The factory shall establish written procedures for the investigation of incidents. All incidents shall be investigated to establish the causes, circumstances and other indirect contributing factors.
- 5.3 Line managers, supervisors, safety personnel and safety committee members shall be included in the investigation team. They shall be adequately trained and equipped with the skills for their tasks.
- 5.4 A system shall be established to ensure that the findings and recommendations of the investigation are promptly addressed and action taken.
- 5.5 Procedures shall be established to ensure lessons learned from the incidents are disseminated to all relevant persons in the factory.
- 5.6 Analysis of all reported incidents shall be carried out to identify the types, frequencies and root causes of incidents. Such information is useful for drawing up safety and health promotional programs and training needs.

ELEMENT 6: IN-HOUSE SAFETY RULES AND REGULATIONS

To establish written safety rules and regulations for all personnel in the factory so as to inculcate a common understanding of their safety and health obligations and responsibilities. The rules & regulations shall conform to the relevant regulatory requirements.

- 6.1 A set of basic rules shall be formulated to regulate safety at the workplace. The rules shall cover aspects as specified in Appendix C.
- 6.2 All safety rules and regulations shall be documented and effectively communicated to all persons employed, including contractors. The rules shall be made available to all employees and contractors working in the factory.
- 6.3 All rules and regulations shall be enforced vigilantly.
- 6.4 The rules shall clearly state the consequences, such as disciplinary action in the form of warning or dismissal for failure to observe any of the rules.
- 6.5 All in-house safety rules and regulations shall be periodically reviewed.

ELEMENT 7: SAFETY PROMOTION

To raise and maintain safety and health awareness among all employees and contractors in the factory.

- 7.1 The factory shall develop promotion programs that would clearly demonstrate the commitment of the factory towards the safety and health of all workers.
- 7.2 Safety and health promotional activities shall include:-
 - 7.2.1 display of the factory's safety policy and commitment in the factory's premise and business plans,
 - 7.2.2 display of incident statistics,
 - 7.2.3 safety talks and screening of safety videos,
 - 7.2.4 in-house exhibitions and demonstrations,
 - 13.1.1 formation of safety improvement teams,
 - 13.1.2 display of signs, posters or other visual material aimed at increasing safety awareness or to draw attention to particular safety issues,
 - 13.1.3 issuance of safety handbooks or brochures to both employees and contractors aimed at increasing safety awareness, as part of personal safety training,

13.1.4 first-aid and emergency drills; and
13.1.5 participation in external safety campaigns.

- 7.3 Safety promotional activities shall be organized regularly. Factory shall ensure all contractor companies plan their own safety promotional activities regularly in line with the Factory's requirements.
- 7.4 All workers, including contractors shall be encouraged to make positive suggestions to improve safety at the workplaces. The factory shall set up a safety suggestion scheme with an attractive system to encourage workers' participation.
- 7.5 The factory shall establish an incentive program to encourage group safety effort. A measurable standard shall be developed to assess the group safety performance. Rewards, commendations and appropriate recognition for outstanding group safety performance shall be given by a top management staff.

ELEMENT 8: CONTRACTOR EVALUATION, SELECTION AND CONTROL

To establish a system to evaluate contractor's safety performance as part of the selection and control process so that only contractor who can meet the factory's safety performance standards and requirements are permitted to work in the factory.

- 8.1 The factory shall document a system for assessment and accreditation of contractors to ensure that only competent contractors are selected for the works to be carried out in the factory.
- 13.1 The factory shall subject every contractor's company to a safety management audit during which their policies and procedures are reviewed in detail prior to selection.
- 8.3 The factory shall maintain a written contract with every contractor in which the safety and health responsibilities and obligations of the contractor shall be clearly outlined.
- 8.4 The factory shall ensure that the contractor personnel working in the factory are given proper induction training before they start work. The induction training shall cover procedures for reporting and follow-up on incidents and injuries.

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- 8.5 The factory shall ensure that the contractor is briefed on the procedures for reporting and follow-up on incidents and injuries.
- 8.6 The factory shall maintain safety performance statistics for contractor companies working in the factory.
- 8.7 The factory shall document procedures for the inspection and checking of contractors' equipment before they can be brought into use in the factory.
- 8.8 The factory shall document a mechanism for monitoring and evaluating the performance of every contractor. The results of these evaluations shall be used as a criterion in the selection of the contractor.
- 8.9 The factory shall establish procedures to ensure that proper corrective action is effectively carried out by contractors whose safety performance is found unacceptable.
- 8.10 The factory shall document a written disciplinary policy to demerit contractors or their workers for breaches of safety rules and regulations.

ELEMENT 9: SAFETY INSPECTION

To establish a system to verify compliance with the relevant statutory requirements, in-house safety rules, regulations and safe work practices.
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- 9.1 The factory shall develop a written program for planned safety inspections to be carried out in the factory.
- 9.2 The factory shall develop a list of protocol or checklist for identifying workplace hazards and classifying the major ones. The safety inspections shall involve a systematic examination of the factory's workplace in general, equipment, tools, materials and work practices.
- 9.3 The factory shall clearly establish performance standards for the safety inspection. The standards shall specify the following:
- 9.3.1 The competency of the safety inspector - appropriate training shall be provided to personnel involved in the inspection;
- 9.3.2 The frequency of the safety inspection - shall commensurate with the factory's operational conditions; and
- 9.3.3 The scope and coverage of the safety inspection - An inspection checklist or guide shall be developed to

facilitate the inspection.

- 9.4 The factory shall document procedures to ensure that corrective actions are taken to eliminate identified unsafe conditions/hazards and acts. The procedures shall define the following:
- 9.4.1 Time frame for implementation of corrective actions,
 - 9.4.2 Specific responsibilities of personnel involved in the follow-up action; and
 - 9.4.3 Method of verification and monitoring of corrective actions carried out.
- 9.5 The factory shall establish a feedback system to ensure that critical findings from safety inspections are effectively communicated to relevant personnel.
- 9.6 The factory shall establish an evaluation program to evaluate and check the safety inspection system to verify its effectiveness and to ensure that standards are met.

ELEMENT 10: MAINTENANCE REGIMES

To establish a system to maintain at all times the integrity of all equipment and machinery in the factory so as to prevent any failure of these equipment and machinery, which can result in unsafe situations.

- 13.1 The factory shall establish a maintenance system to ensure that the mechanical integrity of critical plant equipment is maintained on a continuos basis.
- 13.2 The maintenance system shall include the following:
- 13.2.1 Appropriate inspection program to monitor the condition of the equipment and machinery on a continuos basis;
 - 13.2.2 Corrosion control program to maintain the integrity of critical equipment and machinery and piping systems;
 - 13.2.3 Documented maintenance procedures and work practices that take into account the safety and health exposure of personnel, and risk to the environment when carrying out maintenance work (please refer to Element 2). Supplemental or special work procedures, which may include task risk analysis, shall be included when undertaking higher risk work activities;
 - 13.2.4 Relevant training of personnel involved in the maintenance procedures and work practices;

- 13.2.5 Procedure or system to ensure that the material used in the maintenance of critical equipment continue to meet design specification, and any changes in material shall be appropriately reviewed before use (such as consideration through a management of change review process); and
- 13.2.6A long-term maintenance plan shall be developed for periodic maintenance of major and critical equipment. The plan shall be reviewed annually to take into consideration the inspection findings, incident reports and regulatory requirements.
- 13.3 The factory shall establish a control system to ensure that critical safety devices, which control or monitor the safety of process equipment operation (such as safety alarms, control and shutdown equipment), are tested and maintained periodically.
- 13.4 The types of equipment, instruments or systems that may be considered as safety critical devices shall include the following:
- 13.4.1 Pressure Relieving Devices such as Safety valves;
- 13.4.2 Vacuum Relieving Devices;
- 13.4.3 Shutdown Systems - Automatic trips, cut-ins and cut-outs;
- 13.4.4 High Priority Alarms;
- 13.4.5 Compressor anti-surge systems;
- 13.4.6 Pump low-flow recycle loop;
- 13.4.7 Detectors and Alarms for accidental release of harmful and hazardous substances and fires; and
- 13.4.8 Critical temperature, pressure and level cut-out devices.
- 13.5 The control system shall include the following:
- 13.5.1 Identification of the list of safety critical devices;
- 13.5.2 Designation of responsibility and accountability for the approved list of safety critical devices;
- 13.5.3 The frequency and scope of testing of the devices;
- 13.5.4 Procedure for testing, acceptable limits and criteria for passing the test. The procedure may also include criteria for special testing exemption by designated management;
- 13.5.5 Relevant training of personnel involved in the testing and maintenance of the devices; and
- 13.5.6 Documentation of test records which shall be reported to the responsible person for acknowledgement and implementation of corrective action.

ELEMENT 11: HAZARD ANALYSIS (TO REDRAFT IN THE ENTIRETY)

To establish a system to apply and maintain recognised methods to identify, evaluate, control and mitigate hazards and potential hazards. These methods shall include elimination or reduction of the risk and consequence of the hazards to as low as is reasonably practicable.

11.1 A hazard analysis shall be applied to the following:

- 11.1.1 Factory and Process design,
- 11.1.2 Operations,
- 11.1.3 Equipment employed
- 11.1.4 Materials and Chemicals used

11.2 The factory shall establish and maintain a program for the identification and assessment of the hazards.

11.2.1 The program shall aim at:

- 11.2.1.1 identification and recording of known hazards,
- 11.2.1.2 identification and recording of new and potential hazards,
- 11.2.1.3 assessment of the hazards using qualitative or quantitative appropriate techniques,
- 11.2.1.4 analysis of the effects or potential effects,
- 11.2.1.5 development and implementation of the means to eliminate or to control and manage the hazard in a manner that is as low as reasonably practicable.
- 11.2.1.6 development and implementation of emergency or contingency plan.

11.3 The Factory shall ensure that persons responsible for the Hazard Analysis and for determining the means of eliminating, reducing and controlling the risks are:

- 13.1.1 technically competent
- 13.1.2 given the management support to effectively perform their duties
- 13.1.3 given the authority to implement the approved procedures.

ELEMENT 12: CONTROL OF MOVEMENT AND USE OF HAZARDOUS CHEMICALS

To establish a system to identify and manage all hazardous chemicals in the factory through the provision of Material Safety Data Sheets and procedures for proper use, storage, handling and movement of the hazardous chemicals.

- 13.1 The factory shall establish a control program for the management of hazardous chemicals. The program shall include and incorporate the following:
- 13.2 The maintenance of a register of hazardous chemicals in use in the factory. Each hazardous chemical shall be accompanied with the appropriate Material Safety Data Sheet (MSDS) to facilitate the risk assessment process and training of employees on proper handling techniques and precautionary measures to observe during its use, handling and storage.
- 13.3 The establishment of procedures for proper receipt, storage, issue, distribution, handling and safe use of the hazardous chemicals.
- 13.4 The appointment of competent persons to administer the control of the hazardous chemicals.
- 13.5 The prohibition of purchase or trial use of all hazardous chemicals until its chemical, physical and toxicological properties have been reviewed in a risk assessment to determine whether the chemical can be used, handled and disposed without undue risk to employee's safety and health or to the environment.
- 13.6 The maintenance and update of Hazard Communication Manuals at the factory. These manuals shall contain the Approved Chemical List and its respective MSDS.
- 13.7 All containers used to store or contain the hazardous chemicals shall conform to the following:
- 13.7.1 Provision of proper labels and MSDS on the containers with information such as the name of the chemical contained therein and the hazards associated with the chemicals;
- 13.7.2 The use of appropriate and suitable containers for each chemical. The inventory of the hazardous chemicals stored at the process area or at other storage areas shall not be in excess of the capacity necessary for optimum production requirements; and
- 13.7.3 Periodic inspection on the containers for mechanical wear and integrity.
- 13.8 The hazardous chemicals shall be stored in designated areas, which shall be suitable for the chemicals and secured against unauthorised access. The chemicals shall be returned to the designated areas when not in use.

- 13.9 Incompatible hazardous chemicals shall not be stored in the same storage areas. If this is not practicable, they shall be stored in areas separated from one another by physical barriers such as walls and floors or by other suitable means.
- 13.10 Adequate training such as Hazard Communication Training shall be provided to all employees and contractors who may be exposed to the hazardous chemicals. Training shall also be provided to these personnel whenever a new hazardous chemical is introduced into the process.
- 13.11 Periodic exposure assessment on related employees and contractors shall be carried out. Appropriate environmental monitoring shall be followed up based on the exposure assessment results. Suitable measures shall be implemented to prevent or minimise exposure based on the environmental monitoring results and the permissible exposure limits.
- 13.12 Regular medical surveillance for employees and contractors exposed to the hazardous chemicals shall be performed.
- 13.13 Establishment and implementation of procedures for disposal of hazardous chemicals, which shall be carried out in accordance with statutory requirements or manufacturer's recommendations.

ELEMENT 13: EMERGENCY PREPAREDNESS

To establish written emergency response plans to mitigate consequences arising from potential emergency situations.

- 13.1 The factory shall establish procedures to:
- 13.1.1 Identify emergency situations and their impacts;
 - 13.1.2 Implement emergency response plans for each level of the organization, with clear scope, roles and responsibilities; and
 - 13.1.3 Maintain an up-to-date emergency response plan
- 13.2 The emergency response plans shall be documented and effectively communicated.
- 13.3 The emergency response plans shall include the following:
- 13.3.1 Capability of in-house resources
 - 13.3.2 Capability of nearest government response agency, their roles and the response time
- 13.4 The factory shall establish a program of drills and exercises to test and evaluate the preparedness for emergency actions.
- 13.5 The factory shall establish effective first-aid programs to provide first-aid and emergency treatment to victims of an

accident. This would include provision of adequate first-aid facilities and trained first-aiders.

ELEMENT 14: OCCUPATIONAL HEALTH PROGRAMS

To identify, evaluate and control occupational health hazards to protect all personnel from developing occupational diseases or illnesses arising from their exposure to specific occupational health hazards present in the work environment.

To establish policies and programs to protect all workers from specific occupational health hazards.

14.1 The factory shall ensure that for every hazardous chemical used, produced or otherwise encountered in the operations, there is available:

14.1.1 Information to identify and evaluate the related safety and health hazards. The factory shall ensure that appropriate Material Safety Data Sheet (MSDS) is provided for each chemical used;

14.1.2 Precautionary advice for the safe transport, storage, use and disposal of the hazardous chemicals;

14.1.3 Safe working procedures in relation to the hazardous chemicals;

14.1.4 Adequate training to employees and contractors so that they shall understand the nature of the hazards, safe handling procedures, personal protection and emergency actions for all hazardous chemicals that they are likely to encounter at the workplace; and

14.1.5 Expertise to conduct the necessary occupational health program.

14.2 The factory shall establish a Hearing Conservative Program, which shall include the following:

14.2.1 Regular monitoring of noise levels;

14.2.2 Reduction of noise levels through engineering and administrative control measures;

14.2.3 Selection, provision and maintenance of suitable hearing protectors and supervision of their usage;

14.2.4 Pre-employment and annual audiometric examinations of all exposed workers; and

14.2.5 Training and education of workers.

14.3 The factory shall establish a Respiratory Protection Program, which shall include the following:

14.3.1 Regular monitoring of air contaminants;

14.3.2 Reduction of air contaminant levels through engineering and administrative control measures;

14.3.3 Selection, provision and maintenance of suitable respirators and supervision of their usage;

14.3.4 Training in the proper use of respirators and education on the health hazards; and

14.3.5 Ensuring there is proper fit of respirators.

APPENDIX A

SAFE WORK PRACTICES

A1 Every factory shall establish and maintain safe work practices for its activities, which may include, but not limited to the following:

- a) Hot work;
- b) Work which involves the use of any hazardous, volatile, corrosive or flammable chemical, material or solvent in significant quantities;
- c) Dismantling of any pipe or equipment that contains or has contained any flammable or toxic substance;
- d) Entry into any confined spaces;
- e) Spray painting;
- f) Grit-blasting work;
- g) High pressure jetting;
- h) Pressure testing of pipelines and equipment;
- i) Functional testing of pipelines and valves (mechanical; electrical; pneumatic or hydraulic);
- j) Erection and dismantling of scaffolds;
- k) Installation of equipment;
- l) Demolition of equipment;
- m) Radiography work;
- n) Hot tapping;
- o) Chemical cleaning;
- p) Electrical work;
- q) Cartridge operated tools;
- r) Crane and lifting operation;
- s) Excavation; and
- t) Diving operation.

APPENDIX B

SAFETY TRAINING

- B1 Every factory shall establish training programs which may include, but not limited to the following:
- a) Refresher training of experienced workers to highlight the specific changes and issues;
 - b) Training of safety committee members to familiarize them with the basic understanding and knowledge of the roles and functions of safety committee;
 - c) Training on Basic First Aid;
 - d) Training for Fire Watchmen or attendant;
 - e) Training for Safety Inspector, in particular Hot Work Certification;
 - f) Training for Safety Officers; and
 - g) Instruction for requirements and the effective use of Personal Protective Equipment.

APPENDIX C

IN HOUSE RULES & REGULATIONS

C1 A set of basic rules shall be formulated to regulate safety at the workplace. The rules may include; but not limited to the following:

- a) adherence to safe work practices and permit-to-work system;
- b) injury reporting;
- c) incident and hazard ~~and near-miss~~ reporting;
- d) the safe use and handling of materials; and
- e) use and maintenance of machinery, tools and equipment;
- f) use of Personal Protective Equipment;
- g) housekeeping and cleanliness;
- h) fire prevention; and
- i) forbiddance of horseplay and misuse of equipment.