

RISK ASSESSMENT, ITS MITIGATION & DISASTER MANAGEMENT PLAN

1.0 General

All projects, whether industrial or otherwise, do have some pitfalls. The gravity of such happenings depends on manufacturing process, quality of the materials used, man power utilized and general working environment. While small Industrial projects employ comparatively less number of employees some big projects deal with large number of persons. In both cases adequate measures have to be taken to reduce possible accidents and save human life. Keeping these factors in mind Risk Assessment and Disaster Management Plan for this project has been prepared.

2.0 RISK ASSESSMENT

Risk can be defined as possibility of harm, which can occur during the life time of a project and its anticipated severity. In absolute terms, 100% risk free projects cannot be achieved. Thus, the safety of a Plant is considered in terms of acceptability of the risk created. “Safety at any cost” is ideal and desirable but sometimes the cost involved in such a situation is prohibitive. Thus a crucial decision has to be taken on “safety-at-what-cost”. The need for safety provisions are felt only when the mishaps occur. It is rare that all the problems are anticipated and an answer is sought before a disaster occurs. The risk evaluation is, therefore, done within the prescribed limits fixed for a Unit to be safe enough. But when the risks in a process are greater than the acceptable limiting risk the project is termed as a ‘dangerous’ and appropriate measures have to be adopted to bring the risk within limits for the safety of the project.

Normally almost all Plants handle some materials and processes which are hazardous/ toxic in the Industry. All precautions have therefore, to be taken to handle such materials as per HWM Rules. The processes and layout of the machinery have to be regulated as per the norms fixed to minimize the risks involved.

Broadly, following types of possible risk/ hazards can be encountered in the Unit after expansion and their safeguards are suggested as under:-

(i) **Physical Hazards:**

(a) **Heat:** Heat is the most common hazards in the Industry especially from furnaces. Its continuous exposure causes heat strokes and heat cramps. Thus, for safety of the workers, reasonable temperature which is normally acceptable in working area will be maintained which is about 70° F to 80° F and could be achieved by proper ventilation.

(b) **Light:** Inadequate light or extreme glares can be big hazards in the Industry as they cause eye strain and headache etc. Thus, proper lighting with adequate distribution and steadiness will be maintained to reduce the risk factor.

(c) **Noise:** Noise is a big stress factor and annoyance to the workers. It can lead to accidents, if the worker is not relieved of the stress by having different measures to reduce noise in the area like mufflers, acoustics in the room and providing ear-plugs and ear muffs to the employees. All these PPEs are already provided.

(ii) **Electrical Hazards :**

Most electrical accidents occur from one of the following factors:

- a) Unsafe equipment
- b) Unsafe environment
- c) Unsafe work practices

Electrical accidents could, therefore be prevented through use of:

- Proper Insulation

- Guarding
- Earthing
- Electrical protective devices
- Safe work practices

➤ **Insulators**

Insulators such as glass, mica, rubber, or plastic used to coat metals and other conductors to stop or reduce the flow of electrical current. This helps prevent shock, fires, and short circuits. Before connecting electrical equipment to a power source, it's a good idea to check the insulation for any exposed wires for possible defects. Insulation covering flexible cords such as extension cords is particularly vulnerable to damage. No live wires shall be allowed to hang at any place, where persons can normally go.

➤ **Guarding**

Guarding involves locating or enclosing electrical equipment to make sure that people don't accidentally come into contact with its live parts. This should be done for equipments with exposed parts operating at 50 volts or more especially where it is accessible to authorized people, qualified to work with it. The recommended locations are room, vault or similar enclosure, a balcony, a gallery or elevated platform. Sturdy permanent screens also can serve as effective guards. Conspicuous signs shall be displayed at the entrances to electrical rooms and similar guarded locations to alert people to the electrical hazards and to forbid entry of unauthorized persons. These signs may contain the word "Danger", "Warning" or "Caution" and beneath that appropriate concise wording that alerts people to the hazard or gives an instruction such as, " Danger / High Voltage / Keep Out" should be given. These all are already in place for existing unit and will be maintained in case of expansion also.

➤ **Earthing**

Earthing a tool or an electrical system means intentionally creating a low resistance path that connects to the earth. This prevents the buildup of voltages that could cause an electrical accident. Earthing helps to protect the operator as it provides an alternative path for the current to pass through from the tool or machine to the ground and does not affect the operator. These all are already in place for existing unit and will be maintained in case of expansion also.

➤ **Safe Work Practices :**

Electrical accidents are largely preventable by adopting safe work practices such as:

- ❖ Checking Insulation of the equipment before installation
- ❖ Properly earthing the equipment
- ❖ De-energizing electrical equipments before inspection or repair
- ❖ Keeping electrical tools properly maintained.
- ❖ Using appropriate protective equipment such as:
 - a) Rubber insulating gloves
 - b) Hoods
 - c) Sleeves
 - d) Matting
 - e) Line Hose
 - f) Protective Helmets
 - g) Protective Eye Glasses

These all are already adopted in the existing unit and will be maintained in the future.

(iii) **Mechanical Hazards:**

Mechanical Hazards like protruding and moving parts of machinery are big Hazards/ risk factors in almost all Units. Proper fencing should be provided in such areas and sufficient space for proper movement should be avoided to avoid any accident. Proper fencing and sufficient space is provided and

will be provided as per the requirements.

(iv) **Lightening**

Tall buildings are prone to lightening strikes especially during rainy seasons which can not only damage the building but can result in fatal accidents for workers. It is, therefore, necessary that in order to avoid lightening strikes, causing any damage, lightening arresters should be provided with proper earthing as per the electricity rules in all the buildings individually. Lightening arresters are already provided and will be provided in future if required.

(v) **Fire**

In spite of all precautions taken, fires do break out in factories where furnace, electrical heaters and other equipments are used extensively. To meet such exigencies, adequate fire extinguishers shall be provided at suitable places with suitable hydrants. Underground tanks shall be provided and kept always full with water so that during emergency the same could be utilized. These tanks should be accessible by road for the fire tenders. Supervisory staff should be fully aware and given adequate training for meeting such exigencies. First aid shall be available nearby for affected persons. These all are already in place for existing unit and will be maintained in case of expansion also.

3.0 DISASTER MANAGEMENT PLAN

Despite of all efforts, accidents do occur which need immediate attention. The risks involved in this project have been identified and their mitigation measures have been delineated in earlier paras. But when serious accidents occur & negligence could result in loss of life the whole thing has to be handled in a systematic manner Accordingly following plan of disaster management has been evolved:-

3.1 Major Activities

Broadly Disaster Management Plan covers the following activities:

- Pre - Emergency Preparedness
- Emergency actions
- Post Emergency activities

These activities are aimed at facing any emergency so that at the required time there is no chaos and everything is handled in a very effective manner.

a. Pre-emergency Preparedness:

The activities falling in this category are carried out in a normal situation without any reference to any particular accident / hazard. They are of a precautionary nature. These normally include:

- i) Internal safety
- ii) Non-destructive testing
- iii) Fire fighting system testing
- iv) Mock drills
- v) Training
- vi) Protective equipment
- vii) Communication
- viii) Emergency lights
- ix) Emergency control Room

- x) Assembly points
- xi) Liaison with state authorities
- xii) Hospital activities
- xiii) Outside shelters

b. Emergency Time Activity:

During emergency the staff at various levels is expected to work in coordinated manner with pre-assigned duties to meet the emergency situation and bring normalcy with the help of the resources available within and outside the premises. Availability and correct use of different means of communication and control is very important during emergency time. Duties of the various persons shall be defined properly.

c. Post Emergency Procedures:

After the emergency is over investigations are required to be made to establish the reasons for emergency and preventative measures needed for future happenings. These activities include:

- i) Collection of records
- ii) Conducting enquiries
- iii) Making insurance claims, if any,
- iv) Preparation of enquiry report and suggestion
- v) Implementation of enquiry report and recommendations.
- vi) Rehabilitation of affected persons.

3.2 Emergency Plan

This includes the following :-

i) Site Layout:

Site plan of the Plant will be kept at a conveniently approachable place.

The plan will show the storage site of the various materials along with the details of the surrounding areas. This gives a layout of the Buildings and other facilities like roads, open and work areas etc.

i) Emergency Control Centre:

The Control Centre will be established within the premises which will be marked on the site plan. It will be the focal point from where all operations to handle the emergency will be directed and coordinated. It will have internal and external telephone communications along with list of essential telephone numbers and list of key persons and their addresses.

iii) Assembly Point:

Assembly area will be earmarked for the people to get together in case of emergency which will be away from material storage. A list of all the employees/ residents will be available at this site so that their roll call could be taken and missing person, if any, could be located.

iv) Emergency Alarm System:

An audible emergency alarm system will be installed in the premises. It will be operated from at least 4 different points spread over the entire area and clearly marked as "Emergency Area Switch". The system will be tested regularly. The alarm will signify to the persons & staff that the emergency has occurred and emergency services should be put in operation. The Public Address System will also be activated and specific instructions for eventualities will be passed on to the staff working in the colony.

v) Service & Control:

a) Emergency Services

This includes Fire fighting, First Aid and rescue teams. Alternative source of power supply for operating fire pumps and communication with local bodies and fire brigade etc shall be given.

b) Control Centre:

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The control centre could be either in Security room or Fire Station and shall have:

- i) Adequate No. of Internal and external telephones.
- ii) Layout Plan of the colony buildings showing:
 - a) Sources of safety equipment.
 - b) Fire hydrant system and alternate supply source
 - c) Stock of other fire fighting materials
 - d) Assembly points & first aid centers.
 - e) Surrounding habitation within ½ km distance.
- iii) Additional work plans which may illustrate during emergency
 - a) areas affected / endangered
 - b) deployment of emergency vehicles and personnel
 - c) Areas where particular problems arise e.g. fractured pipe-line.
 - d) Areas evacuated.

It would be useful if these plans be covered with plastic/glass sheets on which felt ink markings can be deciphered.

- iv) Normal roll of employees.
- v) List of key persons and their addresses with telephone numbers.
- vi) Note pads, pencils, etc to record messages received and instructions to be passed on through runners.
- vii) A tape recorder on which the incident and actions, being taken and progress could be recorded.
- viii) **Roll call** – Roll Call board listing the names of all persons department wise and shift wise should be placed in the allocated places called assembly points. All personnel including visitors should be including visitors should be included in this exercise.

- ix) Contractors except those who are detailed to fight emergency to man such services, shall proceed to such allocated points as soon as an evacuation is ordered over PAS or orally by the section in charge and roll call taken. Section incharge should see that these boards are always kept up-to-date. The assembly point incharge shall report to control room immediately any absentee/unaccounted person. He will also keep the group advised to move or return to work by the site controller or any other person pre-nominated by him.

3.3 Key Personnel and their Duties

Following persons will be designated for emergency situation.

1. Site Controller
2. Incident Controller
3. Personnel / Administrative Managers
4. Communication Officers
5. Telephone operator
6. Engineer Incharge
7. Fire pump attendants
8. First Aid

Their duties are given as under: -

1. **Site Controller:**

General Manager or his nominated deputy will retain overall responsibility for the premises and its personnel. As soon as he is informed of the emergency, he shall proceed to the control room and meet the communication officer. His duties shall be:

- i) Assess the magnitude of the situation and decide if people need to be evacuated from their assembly points.
- ii) Exercise direct operational control over areas other than those affected.

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- iii) Maintain a continuous review of possible development and assess, in consultation with incident Controller and other key personnel, as to whether evacuation of persons is required.
- iv) Liaise with senior officials of Police, Fire Brigade and on possible effects on areas outside the factory premises.
- v) Control rehabilitation of affected areas on discontinuation of emergency.
- vi) Issue authorized statements to news media, and ensures that evidence is preserved for enquiries to be conducted by statutory authorities.

2. Incident Controller:

Manager or Officer of similar rank nominated will act as Incident Controller. On hearing of an emergency he will rush to the incident site and take overall charge and report to site controller. On arrival he will assess the scale of emergency and decide if major emergency exists or is likely and inform the communication officer accordingly.

His duties will be:

- i) Direct all operations within the affected area with the priorities for safety of personnel minimize damage to property and environment and loss of materials.
- ii) Pending arrival of Site Controller, assume the duties of his post and in particular:
 - a) Direct the evacuation of the persons from areas likely to be adversely affected by the emergency and
 - b) Ensure that all key personnel and outside help is called in.
- iii) Provide advice and information to the Fire and Security officer and the local Fire Service as and when they arrive.

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- iv) Ensure that all non-essential workers / staff of the areas affected are evacuated to the appropriate assembly points and the areas are searched for casualties.
- v) In the event of failure of electric supply and PAS and Internal telephones, set up communication point and establish contact with Emergency Control Centre.
- vi) Report on all significant developments to the communication officer.
- vii) Have regard to the need of preservation of evidence so as to facilitate any enquiry into the causes and circumstances which caused or escalated the emergency.

3. Personnel / Administrative Manager:

He will also work as Liaison Officer and will be stationed at the main entrance (Gate House) during the emergency. He will under the direction of the site controller, handle police, press and other enquiries, receive reports from roll-call leaders from assembly points and pass on the absentee information to the incident controller. His responsibilities shall include.

- i) To ensure that casualties receive adequate attention / to arrange additional help, if required, and inform relatives.
- ii) To control traffic movements into the premises and ensuring that the alternate transport is available when need arises.
- iii) When emergency is prolonged, arrange for the relief of personnel and organize refreshments / catering facility.

4. Communication Officer:

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He will, on hearing the alarm, proceed to Control Centre and maintain communication with the Incident Controller. He will:-

- i) Advise the Site Controller of the situation, recommending (if necessary) evacuation of persons from assembly points.
- ii) Recruit suitable staff to act as runners between the Incident Controller and himself if the telephone and other system of communication fail due to whatsoever reasons.
- iii) Maintain prior agreed inventory in the control centre.
- iv) Maintain a log of the incident on tape.
- v) In case of prolonged emergency involving risk to outside areas by wind-blown materials – contact local meteorological office to receive forecasting of changes in weather conditions.

5. Telephone Operator: -

On hearing the emergency alarm, he will immediately contact site controller and on his advice call the local Fire Brigade or mutual aid scheme members. In case the PAS, Internal / external telephone system becomes inoperative he shall inform the Communication Officer through a messenger / runner. In case fire is detected and the alarm is not in operation, he shall receive information about location from the person who detected the fire and thereafter immediately consult the Incident Controller and make announcement on PAS or telephone telling the residents about location of the incident and to evacuate to their assembly points. He will

continue to operate the switch board advising the callers that staffs are not available and pass all calls connected with the incident to the Communication Officer.

6. Engineer In-charge and Electrician: -

They will report to the scene of the incident and shut down the services as requested by the Incident Controller.

7. Fire – pump Attendants: -

Two identified persons will work as fire-pump attendants. On hearing the fire alarm, they will immediately proceed to pump house to ensure that pumps are operating and stand by to maintain them. At the end of emergency they will be relieved of their duty by the Fire and Security officers.

8. First Aid Teams: -

The Manager shall keep the roll call lists for the Fire and First-aid team on duty. Roll call leaders shall check their rolls as members of the services and report for emergency duty. Names of any unaccounted for absentees will be informed to the Fire and Security Officer. Members of the First – aid teams will report to the Incident Controller on hearing of the alarm and follow his directions.

9. Factory Fire Brigade Personnel: -

The duty Fire – Brigade personnel under the command of the Fire and Security Officer shall be responsible for fire fighting and rescue. On hearing the alarm, they shall proceed to the place of incident, if known, otherwise to the Fire station. The men at Fire station shall find out the location of the emergency, the equipment and proceed to the site of occurrence. At the site, all the squad members will respond to the direction given by the Incident Controller.

4.0 TRAINING

The promoters shall ensure that everyone employed on the premises is made aware of the risks involved and has been given adequate training on the action to be taken in case of any emergency and that provision has been made for other people also, for example, visitors and contractors who may also be on the premises. Such training shall ensure that those people, who are not involved in dealing with the emergency, leave the vicinity of the incident and go to a place of safety. So that those people needed to carry out the emergency plans shall be capable of carrying out their specified tasks. They shall be thoroughly trained, given the correct personal protective & other equipment and be adequately supervised.

Further, it shall be ensured that the plan is thoroughly tested and rehearsed. It will also be reviewed and revised on a regular basis.