

DISASTER MANAGEMENT PLAN

1.1 INTRODUCTION

A disaster is a catastrophic situation in which suddenly, people are plunged into helplessness and suffering and, as a result, need protection, clothing, shelter, medical and social care and other necessities of life. The Disaster Management Plan is aimed to ensure safety of life, protection of Environment, protection of installation, restoration of production and salvage operations in this same order of priorities. For effective implementation of the Disaster Management Plan, it should be widely circulated and a personnel training is to be provided through rehearsals/drills. To tackle the consequences of a major emergency inside the plant or immediate vicinity of the plant, a Disaster Management Plan has to be formulated and this planned emergency document is called "Disaster Management Plan".

The objective of the Industrial Disaster Management Plan is to make use of the combined resources of the plant and the outside services to achieve the following:

- Effect the rescue and medical treatment of casualties;
- Safeguard other people;
- Minimize damage to property and the environment;
- Initially contain and ultimately bring the incident under control;
- Identify any dead;
- Provide for the needs of relatives;
- Provide authoritative information to the news media;
- Secure the safe rehabilitation of affected area;
- Preserve relevant records and equipment for the subsequent inquiry into the cause and circumstances of the emergency.

In effect, it is to optimize operational efficiency to rescue rehabilitation and render medical help and to restore normalcy.

Disaster Management Plan should include Emergency Preparedness Plan, Emergency Response Team, Emergency Communication, Emergency Responsibilities, Emergency Facilities, and Emergency Actions.

1.2 ON SITE MANAGEMENT PLAN

The on- site management plan will be circulated to all concerned member of emergency team. It is essential that all concerned personnel familiar themselves with the overall on- site

emergency plan and their respective roles and responsibilities during emergency. Mock drill is an essential tool in a state of perpetual preparedness at all times to meet any emergency.

1.2.1 Objective Of On-Site Emergency Plan

1.2.1.1 Risk analysis and risk assessment should provide details on Quantitative Risk Assessment (QRA) techniques used world-over to determine risk posed to people who work inside or live near hazardous facilities, and to aid in preparing effective emergency response plans by delineating a Disaster Management Plan (DMP) to handle on-site and off-site emergencies. Hence, QRA is an invaluable method for making informed risk-specific for any plant is complex and needs extensive study that involves process understanding, hazard identification, consequence modelling, probability data, vulnerability models/data, local weather and terrain conditions and local population data. QRA will be carried out to serve the following objectives:

- Identification of safety areas
- Identification of hazard sources
- Generation of accidental release scenarios for escape of hazardous materials from the facility
- Identification of vulnerable units with recourse to hazard indices
- Estimation of damage distances for the accidental release scenarios with recourse to maximum credible accident (MCA) analysis.
- Assessment of risk on the basis of above evaluation against the risk acceptability criteria relevant to the situation
- Suggest risk mitigation measures based on engineering judgment, reliability and risk analysis approaches
- Delineation/up gradation of DMP
- Safety reports: with external safety report/occupational safety report

The risk assessment report may cover the following in terms of the extent of damage with resource to MCA analysis and delineation of risk mitigations measures with an approach to DMP.

- Hazard Identification- identification of hazardous activities, hazardous materials, past accident records, etc.
- Hazard quantification- consequence analysis to assess the impacts
- Risk presentation
- Risk mitigation measures

- DMPs

The overall objective of Emergency Planning is to maximize the resource utilization and combined efforts towards emergency operation in short time.

1.2.2 Action Plan of on-site Emergency Plan

The action plan considered is given as follows:

- To constitute Disaster Management Committee under senior officer not below the rank of General Manager
- To identify potential hazards areas in the layout map
- To use model to predict hazards impact in the surrounding areas in form of pool-fire or gas leakage
- To predict degree of burns and distance of the risk zone by using model
- To evacuate the area within risk zone
- To localize the emergency and if possible eliminate it
- To minimize the effects of accidents on people and property
- To take remedial measures in the quickest possible time to contain the incident and control it with minimum damage
- To mobilize the internal resource and utilize them in the most effective way
- To get help from the local community and government official to supplement internal manpower and resources
- To minimize the damage in other sections
- To keep the required emergency equipment in stock at right places and ensure that they are in working condition
- To keep the concerned personnel fully trained in the use of emergency equipment
- To give immediate warning to the surrounding localities in case of emergency situation arising
- To mobilize transport and medical treatment of the injured
- To educate the public in the surrounding village regarding hazards
- To arrange treatment of casualties
- To safe guard the people
- To identify the casualties and communicate to persons known to them
- To render necessary help to concerned
- To rehabilitate area affected

- To provide information to media and government agencies

1.2.3 Scope Of On-Site Emergency Plan

The plan covers information regarding the properties of the industry, type of disasters and disaster/accident prone zones. The important elements considered in this plan are:

- Statutory requirement
- Emergency organization
- Roles and responsibility
- Communications during emergency
- Emergency facilities
- Important information

The primary purpose of the on- site emergency plan is to control and contain the incident and so to prevent it from spreading. To cover eventuality in the plan and the successful handling of the emergency will depend on appropriate action and decision being taken on the spot.

1.2.4 Emergency

A major emergency in any situation is one, which has the potential to cause serious injury or loss of life, which may cause extensive damage to the structure in vicinity and environment and could result in serious disruption to normal operation both inside and outside the industry premises. Depending on the magnitude the emergency, service of the outside agencies may also be damage.

The management has to take effective steps to assess, minimize and wherever feasible eliminate the risk to large extent. Accident may still occur and it is necessary to be fully prepared to tackle all such emergencies if and when they occur.

It is likely that the consequences of such emergencies will be confined to the units concerned or may affect outside. If the consequences are confined within the plant boundary, it will be controlled by **Chief Emergency Controller**. The most widely used techniques in practice is based on experience accumulated over many year and safety audits.

1.2.5 Type of Emergency, External and Internal Origin of Hazards

It is attempted to plan and construct the buildings following all safety norms. However, it is not always possible to totally eliminate such eventualities and random failures of equipment or human errors. An essential part of major hazard control has therefore, to be concerned with mitigating the effects of such emergency and restoration of normalcy at the earliest. Detailed Table showing activities during construction and operation phases along with mitigation measures are given in Table 1.1.

Table 1.1: Activities during Construction and Operation along with Mitigation Measures

Hazards Associated with Activities	Control / Mitigation Measures
Manual Handling Strains and sprains - incorrect lifting - too heavy loads -twisting - bending - repetitive movement - body vibration.	Exercise/ warm up-get help when needed-control loads-rest breaks/ no exhaustion-no rapid movement/ twisting/bending/repetitive movement - good housekeeping.
Falls - Slips - Trips Falls on same level - falls to surfaces below - poor housekeeping- slippery surfaces uneven surfaces -poor access to work areas climbing on and off plant-unloading materials into excavations wind - falling objects.	Housekeeping - tidy workplace - guardrails, handholds, harnesses, hole cover, hoarding, no slippery floors/trip hazards - clear/ safe access to work areas-egress from work areas - dust/water controlled - PPE.
Fire Flammable liquids/Gases like LPG, Diesel Storage area and combustible building materials - poor housekeeping - grinding sparks - open flames, absence of Fire hydrant network.	Combustible/ flammable materials properly stored /used -good housekeeping-fire extinguishers made available & Fire hydrant Network with reserve Fire water (As per NFPA Code) - Emergency Plan in case of Fire or collapse of structure.

Hazards Associated with Activities	Control / Mitigation Measures
Absence of Personal Protective Equipment Lack of adequate footwear- head protection hearing/ eye protection - respiratory protection- gloves-goggles.	Head / face- footwear- hearing / eye-skin- respiratory protection provided - training- maintenance.
Defective or wrong Hand Tools Wrong tool - defective tool - struck by flying debris- caught in or on -missing guards -carbon monoxide - strains and sprains - dust.	Right tool for the job - used properly - good condition/ maintenance guards- isolation- eye/ face protection - flying debris controlled.
Electricity Electrocution – overhead / underground services - any leads damaged or poorly insulated- temporary repairs -no testing and tagging- circuits overloaded-nonuse of protective devices.	Leads good condition and earthed - no temporary repairs - no exposed wires-good insulation-no overloading - use of protective devices - testing and tagging -no overhead/ underground services
Scaffolding Poor foundation-lack of ladder access insufficient planking-lack of guardrails and toe boards-insufficient ties or other means-all scaffolds incorrectly braced or stabilized to prevent overturning.	All scaffolds correctly braced and stabilized - 3:1 height to base ratio - firm foundation, plumb and level - ladder access provided and used - proper platform (3 planks/ 675 mm) - planks secured- guardrails and toe boards – 900 mm to 1100mm high, within 200 mm of working face, mid - rail.
Ladders Carrying loads - not secured against dislodgement - defective ladders– not sufficient length- wrong positions - incorrectly placed (angles, in access ways, vehicle movements.	Secured against movement or footed - ladders in good condition - regularly inspected - extend one (1 m) meter above platform - 4:1 angle - out of access ways, vehicle movements - climbing - no carrying loads - 3 points of contact - no higher than 3rd step down - use for access only, not working platforms.

Hazards Associated with Activities	Control / Mitigation Measures
Excavations Trench collapse - material falling in undetected underground services-falls-hazardous atmosphere struck by traffic and mobile plant.	Soil stability known-no water accumulation-existing services known - material 600 mm from edge - clear of suspended loads-hardhats/ PPE- ladders - public protection - atmospheric testing- traffic controls - Emergency Plan.
Gas Cutting and Welding Fire-welding flash, burns, fumes, electrocution in wet conditions- flashback in oxygen set, leaking cylinders, acetylene cylinders lying down-poorly maintained leads.	Welding flash and burns controlled with PPE and shields -fumes controlled with ventilation and PPE (in good condition and properly positioned),Gas cylinders be kept upright & secured position (properly tied) - combustible materials to be kept at secured place to avoid fire & Fire Extinguishers to be kept in fire prone area with training to people for its use.
Noise Unknown noise levels - known noise levels over 85 decibels	Levels below 85 decibels - proper protection.
Falling Material Fall during carrying/ Lifting materials-dislodged tools and materials from overhead work areas.	Materials to be secured-kept away from edge- toe boards -Use of hard hats.
Carnage& Lifts Display of carrying capacity i.e load (No. of person) incorrectly slung, defective lifting equipment, unsecured loads, craning in close proximity to building people and plant- falls-falling materials.	Periodic testing by competent authority-correctly slung/ secured loads, lifting equipment good condition-use of proper hand signals - falls while unloading controlled.

Hazards Associated with Activities	Control / Mitigation Measures
Visitors Presence at site Falls -struck by - dropped materials-road accidents -insufficient hoarding or fencing-pedestrian access past site-mechanical plant movement on and off site	Sufficient hoarding - fencing and barricades-safe pedestrian access past site traffic management for loading and delivery-construction separated from occupied areas of projects

1.2.6 Response team

Setup an **Emergency Organization**. Emergency Organization includes the senior executive (head of EO as a Site controller), Manager Safety (Incident controller), Shift in charge, Emergency Coordinators.

- All Incident control would be reporting to the Site Controller. Each Incident Controller organizes a team responsible for controlling the incidence with the personnel under his control.
- **Shift In-charge** would be the reporting officer, who would bring the incidence to the notice of the Incidence Controller and Site Controller.
- **Emergency Coordinators** would be appointed who would undertake the responsibilities like firefighting, rescue, rehabilitation, transport and provide essential and support services. For this purposes, security in-charge, personnel department, essential services personnel would be engaged. All these personnel would be designated as key personnel.
- In each shift, electrical supervisor, electrical fitters, pump house in-charge, and other maintenance staff would be drafted for emergency operations. In the event of power or communication system failure, some of staff members in the office/facility would be drafted and their services would be utilized as messengers for quick passing of communications. All these personnel would be declared as essential personnel.

1.2.7 Emergency Facilities

- Emergency Control Center – with access to important personnel, telephone, fax, telex facility, safe contained breathing apparatus, hand tools, emergency shutdown procedures,

duties and contact details of key personnel and government agencies, emergency equipment, etc.

- Assembly Point – with minimum facilities for safety and rescue
- Emergency Power Supply – connected with diesel generator, flame proof emergency lamps, etc.
- Fire Fighting Facilities – first aid fire-fighting equipment, fire alarms, etc.
- Location of Wind Stock – located at appropriate location to indicate the direction of wind for emergency escape
- Emergency Medical Facilities – Stretchers, gas masks, general first aid, emergency control room, breathing apparatus, other emergency medical equipment, ambulance
- The medical centre should display poster for treating burns and first aid. Some medicines and facilities to be kept in the medical centre are suggested. The list is indicative and the qualified doctors of the medical centre will be deputed in professional judgment for medical treatment.

1.2.8 Health and Safety Measure for the workers

All workmen employed in working conditions will be provided with adequate personal safety equipment as applicable to the work lies:

- Industrial safety shoes
- Industrial helmets
- Hand gloves
- Ear muffs
- Welder screen

1.2.9 Methodology

The considerations in an emergency planning include the following:

- Identification and assessment of hazards and risks
- Hazard consequences analysis
- Alarm and communication procedures

- Identification and equipping emergency control centre identify assembly, rescue points, medical facilities
- Emergency preparedness plan, procedure, steps to be taken before during and after emergency
- Formulation of plan and emergency sources
- Training rehearsal, evaluation and updating the plan
- Regularly examined the machinery
- Medical examination for every employee shall be examined by doctors at least 3 months in a calendar. Health register should be maintained by the individual industry coming in the project site

Structure of Emergency Management

- Mock drills
- Noticing the accidents
- Informing declarer of emergency
- Declaration of emergency (Public information and warning)
- Evacuation of Personnel
- Functions of declarer
- Interaction with outside agencies
- All Clear Signal
- Mutual aid

1.2.9.1 Emergency Action plan for LPG leakage

1. Evacuate the area to a minimum of 200 metres from the cylinder.
2. Advice neighbours within the 200-metre hazard zone area about the danger.
3. Shutdown the main valves in the gas bank.
4. Personnel in the nearby building to close all doors and windows to prevent entry of the leaked gas.
5. Cylinders which are not directly involved in the fire and have not become heated should be moved as quickly as possible to a safe place, provided this can be done without risk to personnel. Make sure the cylinder valves are closed.

6. Source of leakage to be traced and isolated from all the other areas and if required use pedestal fans to bring down the gas concentration.
7. The fire service arrives; explain the location and number of gas cylinders directly involved in the fire and the names of the gases they contain.
8. Never move or use cylinders that have been exposed to a fire until the fire service or BOC has declared it safe to do so.

Dissolved Acetylene (DA) Cylinders

- Once the fire has been extinguished, dissolved acetylene cylinders which have been involved in the fire need to be cooled for a total of 24 hours.
- The fire service will impose a cordon while the cylinder is cooled.
- Ensure nobody tampers or interferes with the DA cylinder during this period. The fire service will inform you when it is safe to handle the cylinder.
- BOC will arrange for the collection of the DA cylinder after the 24-hour cooling period.

1.2.9.2 Emergency Action Plan for Office Fire

- In case of Fire the immediate plan of action will be “**RACE**” that stands:

R - Rescue: When you discover a fire, rescue people in immediate danger if you can do so without endangering yourself. Exit via fire exit. Never use elevators.

A - Alarm: Sound the alarm by pulling a fire pull station and call 911, from a safe distance, notify security of precise location of fire

C - Confine: Close all doors, windows and other openings

E - Evacuate: Evacuate the building

- Alert people in the immediate area to begin evacuation. Assist those with disabilities.
- Immediately informed the response team. Response team moves to the point of fire and take all necessary steps to stop the fire. If the fire is not controllable and spreads then the manager in charge should inform the district authorities and call for external help. Complete an Incident/Accident Report within 24 hours.

General Instructions For Occupants In Case Of Fire

- Get out of buildings as quickly and as safely as possible.
- Use the stairs to escape. When evacuating, stay low to the ground.
- If possible, cover mouth with a cloth to avoid inhaling smoke and gases.
- Close doors in each room after escaping to delay the spread of the fire.
- If smoke is pouring in around bottom of the door or if it feels hot, keep the door closed
- Open a window to escape or for fresh air while awaiting rescue.
- If there is no smoke at bottom or top and the door is not hot, then open the door slowly
- If there is too much smoke or fire in the hall, slam the door shut.
- Stay out of damaged buildings.
- Check that all wiring and utilities are safe.

Fire fighting system is proposed to prevent and control fire outbreaks for the project. The fire fighting system will consist of portable fire extinguishers, hose reel, wet riser, yard hydrant, automatic sprinkler system, and manual fire alarm system. The project will also be provided with automatic fire detection and alarm system.

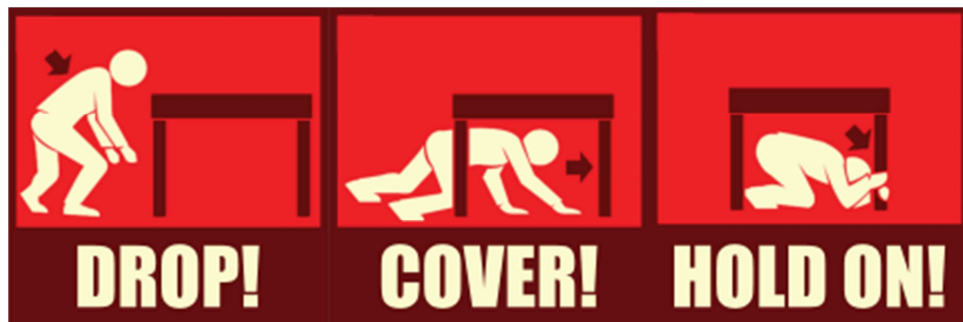
1.2.9.3 Emergency Action Plan for Electric Fire

- Disconnect the affected areas electric supply
- If fire is small scale than NAHCO_3 or Sand will be effective.
- Attempt to extinguish fire with the help of CO_2 based extinguisher

1.2.9.4 Emergency Action Plan For Natural Hazard

Earth Quake If Indoors

1. Take cover under a piece of heavy furniture or against an inside wall and hold on.



2. Stay inside: The most dangerous thing to do during the shaking of an earthquake is to try to leave the building because objects can fall on you.

If Outdoors

Move into the open, away from buildings, streetlights, and utility wires. Once in the open, stay there until the shaking stops.

If In A Moving Vehicle

Stop quickly and stay in the vehicle. Move to a clear area away from buildings, trees, overpasses, or utility wires. Once the shaking has stopped, proceed with caution. Avoid bridges or ramps that might have been damaged by the quake.

After The Quake

1. After the quake be prepared for aftershocks.
2. Although smaller than the main shock, aftershocks cause additional damage and may bring weakened structures down. Aftershocks can occur in the first hours, days, weeks, or even months after the quake.

Help Injured Or Trapped Persons

1. Give first aid where appropriate. Do not move seriously injured persons unless they are in immediate danger of further injury. Call for help.
2. Remember to help those who may require special assistance-infants, the elderly, and people with disabilities.
3. Stay out of damaged buildings.
4. Use the telephone only for emergency calls.

Response Procedure for Emergency Team

1. Formulate an Emergency Response Team for earthquake response. Using the public address system, inform residents of response procedures discussed above.
2. Inform the necessary authorities for aid.
3. Ensure no person is stuck beneath any debris, in case of a structural failure.
4. Ensure that all occupants standing outside near the buildings are taken to open areas.

5. Ensure that the first aid ambulance and fire tender vehicles are summoned if necessary.
6. Inform the nearby hospitals if there are any injuries.
7. Check the utilities and storage tanks for any damage.