

Emergency Planning – Application of HIRA

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Introduction:

Much of the concern of industries is on reducing the scale and frequency of hazards. Nevertheless there remains for any hazard a finite possibility that it will be realised. It is necessary, therefore, to plan for such emergencies. Emergency Planning is an integral and essential part of safety and loss prevention strategy. Its objective is to mitigate the consequence of any incident, which may occur.

There is in fact plenty of practical experience to show the value of pre-planned and practiced procedures for handling industrial emergencies, both in preventing an escalation of the original incident and in minimizing the exposure of people.

Regulatory requirement:

The Ministry of Environment and Forests (MoEF) is the nodal Ministry for management of chemical accidents in the country. The Ministry has formulated rules for ensuring safety from hazardous chemicals – The Manufacture, Storage and Import of Hazardous Chemical Rules, (MSIHC) 1989 and the Chemical Accidents (Emergency Planning, Preparedness and Response) Rules 1996 under The Environment (Protection) Act 1986. These rules have made mandatory the Preparation of On-site Emergency Plan by the Industry and Off-site Emergency Plan by the District collector and the constitution of four-tier Crisis Management Group at the Centre, State, District and Local level for management of chemical accidents.

Ministry of Environment and Forest has issued guidelines for preparation of off-site emergency management plans.

Emergency scenario:

The basic of an emergency plan, whether on site or off-site is a suitable set of accident scenarios. The emergency plan must be capable of dealing with largest incident that can be reasonably foreseen, but detailed planning should concentrate on those events that are probable. The range of events to be considered may vary, depending on material and activities on-site.

The on-site emergency plan should be flexible. There will a basic plan covering a range of scenarios, with variation to adopt for a particular scenario, which can be scaled up or scaled down, depending on the level of the incident. Similarly, it is normal for there to be a basic off-site emergency plan but this plan also should be flexible and capable of being scaled up or down, as the case may require.

The HSE guidance UK gives a classification of scenarios, for flammable, it distinguishes four types of event

1. A fire with no threat of escalation.
2. A fire with a threat of escalation after some delay.
3. A fire with a threat of imminent escalation and
4. A sudden event.

For toxic also, it distinguishes four types of event

1. A slow leak
2. A containment under threat
3. A trousinet leak brought quickly under control and
4. A sudden massive release.

1 On-Site Emergency Plans

4.1 Components of on site emergency plan:

- a. hazard analysis
 - identification of hazard
 - risk analysis
- b. accident prevention procedure
- c. accident/emergency response procedure
- d. recovery procedure

4.2 Elements of planning

Charts and zones indicating hazardous zones should provided by the industry. The data collected include

- i. Chemicals used
- ii. Total storage
- iii. Method of storage
- iv. Maximum unit storage
- v. Storage condition

Charts and maps should highlight

- i. Location of factory
- ii. Accident prone areas
- iii. Assembly point
- iv. Control room
- v. Arrangements of fire fighting
- vi. Ambulance room

4.3 Appointment of key persons:

Emergency personals responsibility during normal working hours

- **Site controller(GM of industry)**

- i. Assess the magnitude of situation
- ii. Evacuation of people
- iii. Shutdown requirement
- iv. Liaisons with senior officer of police, fire
- v. Advice local authority
- vi. Rehabilitation of affected persons
- vii. Authority statement to newsmedia.

- **Incident controller (production manager or shift manager)**

- i. Direct all operations to stop within the affected area
- ii. provide advise and information to the fire and security officer and local fire service
- iii. staff/workers of affected area are searched for casualty
- iv. significant development reported to higher authorities
- v. provide evidence for further enquiry

- **Administrative manager (liaison officer)**

- i. to se that casualty receive adequate attention
- ii. control traffic movement
- iii. to arrange relief catering facility

- **Communication officer**

- i. Inform site controller about situation.
- ii. Maintain contact with assembly point, canteen, etc.
- iii. Maintain log of incidents.
- iv. In case prolonged emergency involving risk to outside area by wind etc. then contact meteorology office for further changes.

- **Fire and security officer.**

- **Telephone operator**

- i. Arrange for local fire brigade and mutual aid scheme members.

- **Department heads**

- i. Will ask incident controller for any assistance required.

- **Manager electrical and engineering.**

- i. Will ask incident controller for any assistance required.

- **Fire pump attendant(Two persons identified in each shift)**

- i. Will take instruction from fire and security officer

1. Responsibility of emergency personnel outside normal working hours of the factory:

- Shift executive in charge - responsibility is similar to incident controller including the scale of hazard.

- Fire and security officer- will call on incident controller, engineering and service manager.

2. First aid team to be made and the description to be given in DMP.

3. Infrastructure to be included in any plant is ECR, assembly point, operational system, warning system, service and control, mutual aid.

- **ECR:** It should be marked on the plan. It should have external and internal phone lines, list of key personals with telephone numbers and addresses and copy of DMP.

- **Assembly point:** It should be located at the farthest point of likely hazardous event, nearer to communication site and controlling equipment available near it.

- **Operational system during emergency:**

1. Communication system: different types of alarm.

2. Fire and gas alarm-normal fire alarm.

3. Emergency/evacuation-high pitched wailing siren.

4. All clear continuous- fire siren.

- **Service and control:**

For promptness and efficiency the factory site may be divided into any no. of zones and are clearly marked.

1. **Emergency services:** (fire fighting facilities, first aid, etc.)

2. **Telephones:** (internal and external telephones to be provided in adequate numbers)

3. **Location plan:**

- a. Areas of large inventories.

- b. Location of Radioactive sources.

- c. Sources of safety requirement.
- d. Fixed hydrant system.
- e. Fixed Fire fighting system
- f. Assembly point.
- g. Survey of neighbouring habitation.
- h. Availability of first aid.

● **Mutual aid scheme :**

To make mutual aid plan following points are considered.

- a. Written procedures, which spell out how to call for help, will be made.
- b. Responsibility of persons should be clearly stated.
- c. The types of equipment which would be needed and procedure for making replacement
- d. Hotline method of communication.
- e. A brief mention of the types of hazard in the plant.
- f. Operation and joint training program.
- g. Joint inspection and drills.

4. Declaring off site emergency :

The persons responsible for declaring the emergency(site controller) and hand over the charge to district collector.

5. Other details to be furnished:

- i. Salient features of the factory.
- ii. Verification by occupier.
- iii. List of local authorities with their telephone numbers.
- iv. Past accident history.
- v. Material safety data sheet(as per M.P. factories rules)
- vi. Dispersion models.
- vii. Description of process.
- viii. Process flow charts.
- ix. P& I diagram.
- x. Training arrangements
- xi. List of technical experts available in the vicinity
- xii. Names address and telephone no. of directors.
- xiii. Rehearsal schedule for DMP updating.
- xiv. List of social organisation.

5. Off-Site Emergency Plans

An off-site emergency management plan is a document that:

- assigns responsibility to organizations and individuals for carrying out specific actions at projected times and places in an emergency that exceeds the capability or routine responsibility of any one agency, e.g. the fire department;
- sets forth the line of authority and organizational relationships, and shows how all actions will be coordinated;
- describes how people & property will be protected in emergencies and disasters;
- identifies personnel, equipment, facilities, supplies and other resources available within the jurisdiction or by agreement with other jurisdictions, for use during response and recovery operations;
- identifies steps to address mitigation concerns during response and recovery activities.

An off-site emergency plan may have following components

| | |
|-----|-------------------------------|
| 1. | Introduction |
| 2. | Basic information of district |
| 3. | Organizational Structure |
| 4. | Hazard analysis |
| 5. | Risk Analysis |
| 6. | Mitigation Strategy |
| 7. | Preparedness |
| 8. | Response |
| 9. | Recovery & Rehabilitation |
| 10. | Interface with Media |

1. Organizational Structure

The Local Crisis Group is responsible not only for preparing the emergency plan but also for coordinating and directing the response

Composition of Local Crisis Group

| | | |
|-----|------------------------------------|------------------|
| 1. | Sub Divisional Magistrate. | Chairman |
| 2. | CSP | Vice-chairman |
| 3. | Assistant Director | Member Secretary |
| 4. | In charge community Health centre, | Member |
| 5. | In charge Police Fire Brigade. | Member |
| 6. | Station House Officer | Member |
| 7. | Community Coordinators | Member |
| 8. | Two person nominated by collector | Member |
| 9. | Representative of NGO | Member |
| 10. | Representatives of MAH units | Member |
| 11. | Newspaper representative | Member |

2. Mitigation Strategy

2.1 At the core of the mitigation strategy outlined for physical development, is the identification of hazard and the quantification of risk outside the boundaries of a potentially hazardous development, and the assessment of that risk in terms of the nature of land uses in the vicinity. This provides the basis for compatible safety land use planning.

2.2 Land use planning is considered to be the most effective mitigation measure against the failure of technology in dealing with the risk from chemical process industries and transportation of hazardous chemicals. Through an effective land use planning, communities are separated from the identified hazards.

2.3 The land use planning decisions are based on the nature of the risk, the available response time in case of an emergency and capability of the community to deal with the risk.

2.4 The mitigation strategy for industrial townships involves the following components:

(i) For risk from LPG storing units

The community located in the red zone won't have sufficient time to run for safety and are likely to suffer heavy casualties. Development in the red zone must be frozen immediately and the settlements must be relocated outside the impact zones.

The settlements which are located in the orange zone will also have very little time to run for safety in the event of an emergency and will suffer casualty on a significant level and serious injuries. Development in the orange zones should also be frozen immediately and attempts should be made to relocate the settlements outside the impact zones.

The settlements located in the blue zone are likely to suffer injuries and damage but the casualties are not expected to be high. The development in the blue zones should be regulated. The vulnerable institutions like schools and hospitals should not be located in the blue zones.

The Industrial units which have human settlements in the orange / red zones should be advised to immediately prepare and implement an appropriate risk management programme to reduce the risk to the people living in the respective red / orange zones.

(ii) For risk from Chlorine storing units

Since chlorine is heavier than air and does not disperse easily, after release it drifts along the wind in the downwind direction. Hence the areas likely to be affected from chlorine greatly depends on wind direction. However, chlorine does not cause total rupture of container and it's easy to control the leakage as well.

About half the population coming under the red zone has severe risk of life. Although the affects from the chlorine greatly depends upon the wind direction but it is recommended that the development in the red zone should be completely frozen as well as the vulnerable land uses with high occupancy rate, such as residential pockets, schools. Hospitals etc. must be relocated from this zone.

The area coming under the orange zone will face permanent damage to the eyes. The fluids can buildup in the lungs (pulmonary edema) which is a medical emergency. Hence, the settlements coming under this zone should also be relocated as well as the future development should also be frozen. Alternatively, a well laid out evacuation plan may also

The settlements coming under the blue zone will have less effect in comparison to red and orange zone. The minor injuries such as coughing, irritation in nose, eyes and throat etc. may occur. Hence community under this zone should be made aware about the actions to be taken during the toxic release of chlorine.

(iii) For risk from transportation of chemicals

In order to mitigate the risk from transportation of chemicals, development must be freeze within a width of 100 meters from the roads used for transportation of chemicals. Further, regulation of the development within the width of further 100 meters from the roads through which the LPG tankers or vehicles carrying the hazardous chemicals are passing is also needed. The informal commercial activities must be checked and shifted, away from the roads through which these vehicles are passing. All the existing roadside commercial and residential activities viz. restaurants, hotels, shops, residences etc. should also be shifted 100 meters away.

(iv) For risk from storage of other chemicals

A proper risk management program should be run by the industry as a mitigation tool.

3. Hazard Analysis

Study of hazard analysis for the district is mainly concerned with the potential fire/ explosion hazards due to release of flammable material, or the release of toxic material causing various degree of health hazard to the people around the Major accident installations.

4. Risk analysis

Risk analysis of the area should consider the following aspects:

- ❖ Assessment of the Hazards
- ❖ Vulnerability analysis of the area and the people
- ❖ Capability Assessment
- ❖ Risk Management arrangement in place

5. Preparedness

The preparedness strategy provided in the plan should incorporate the following components:

- i Operational readiness of facilities, equipment, stores and transport especially with regard to fire-fighting, and treatment of large number of burn cases and chlorine exposure cases.
- ii Maintaining resource inventory of equipment & materials required for response operations
- iii Assignment of responsibilities to agencies / organizations
- iv Management training of Crisis Group members and officers of respective department likely to be assigned management duties.
- v Specialized training through seminars and workshop
- vi Raising of the community awareness.
- vii Conduct of mock-drills and simulation exercise.
- viii Updating of Plan.

5.1 Emergency Control Room (ECR)

The need for directing the operations at the affected site, coordination at the site and the need for interaction with other agencies is responsibility of Local crisis group. LCG will be responsible for directing the operations at the affected site control and coordination with all other support agencies for the effective management of disaster. The details of Local Crisis Group have already been discussed in chapter dealing with organisational structure. This Plan provides operation of an Emergency Control Room to help the LCG to respond effectively. This control room will facilitate the following.

- ◆ Collection and compilation of information from the affected area

- ◆ Decision making regarding evacuation.
- ◆ Allocation of task to different resource organization

Base hospital: The hazard and risk analysis indicates the possibility BLEVE involving LPG and release of chlorine. BLEVE is likely to result in large number of burn cases requiring immediate medical care. Therefore, Community Health Centre must be equipped in terms of equipments and stores to deal with large number of burn cases. self-protection Equipments: Release of chlorine gas may require evacuation of affected people from the environment having significant level of toxic chlorine. The response agency charged with evacuation will need breathing apparatus / equipment for evacuating people from the impact zone / affected area.

5.2 Facilities available in ECR

The facilities and amenities available in ECR would include a telephone and wireless communication. The ECR as a data bank would keep local action plans and maps. A vehicle with Public address system will be available with the ECR during normal times.

In addition to above ECR should be equipped with:

- ◆ Map of the area indicating following information:
 - Industries,
 - Transport network
 - important places like Fire station, Medical facilities,
 - impact zones for various accident scenarios.
- ◆ Inventory of manpower resources, particularly address, telephone no. of key contact persons
- ◆ Inventory of material resources
- ◆ List of experts
- ◆ Important phone numbers which are frequently required are displayed on the wall so that they can be seen easily referred, while other phone numbers, names and addresses etc., are on the computer to facilitate easy retrieval and cross-referencing.

ECR Staffing

The police station is manned 24 hours of the day. There is no provision of additional manpower to be stationed there. The Police Officers may be trained in operation of ECR.

For operational readiness of facilities equipment and stores and transport of people a prior arrangement with industries has been done as a part of planning. The transport facilities available with each industry and number of drivers are made available to the ECR. The operational readiness of response agency like Fire and Police is assessed as apart of mock drill.

5.3 Community Awareness

The vulnerability analysis indicates that there is a need to organize public awareness on two major topics i.e. safety from Fire and Explosion involving LPG and Propane and Safety from Chlorine exposure.

6. Response

The objective of the response plan is to provide immediate response activities in the event of an industrial disaster in Industrial Area, to the people who are living around the industries. The Plan aims at identifying the various response functions and assign responsibilities to the various stakeholders

The response functions which are to be carried out in the event of disaster in the area are given below:

- Operational Direction and coordination.
- Emergency warning
- Wind direction.
- Communications
- Immediate protection from fire
- Logistic arrangements.
- Evacuation of people
- Medical relief
- Management of the deceased.
- Quick assessment of the damage.
- Investigation
- Decontamination.

Trigger Mechanism:

Fire involving LPG, storage facility may result into BLEVE in hardly 10 to 15 minutes. Therefore, the entire response has to be organized within minutes of the starting of fire in the facility. Similarly a catastrophic rupture of chlorine tonner gives a response time of hardly 10 to 15 minutes for saving human life. This requires the implementation of the response plan through a reliable and prompt trigger mechanism.

The officials responsible for notifying the incident, which has potential off-site consequences, have all been identified and listed in the Annex no.... These officials will have to immediately notify the Emergency Control Room about the nature of incident and its potential off-site consequences.

The officials will also notify the identified officials of the neighbouring industrial units, which may get affected because of the potential off-site consequences.

The staff on duty in the Emergency Control Room will immediately inform fire service, the local hospitals and other organizations about the situation. He / She will also immediately inform Collector and S.P. about the situation through District Control Room.

The local emergency control room officials will immediately notify the communities which may get adversely affected through the identified community coordinators so that the community can take actions to protect their life and property.

6.1 Immediate protection from fire:

Fire fighting is the key response function required for limiting casualties in industrial fires. In case of industrial fires/ explosion prevention of secondary fires and subsequent cooling of structures will be main response. Police Fire Brigade will do the Fire-fighting with help from the industries.

6.2 Logistic Arrangement

Various logistic arrangements are needed during the response phase. This includes arrangements for communication, transport arrangements for evacuation of the people affected by the disaster etc.

6.6 Evacuation of people

Fire and explosion at any of the MAH industry may necessitate evacuation of the community residing in the red and orange zone. The information for evacuation will be passed on from the industry control room to the identified community coordinators and the emergency operation centre. The Emergency Controller will take the decision for Evacuation.

7.0 Recovery & Rehabilitation

The Public Liability Insurance Act, 1991 provides for public liability insurance for the purpose of providing immediate relief to the persons affected by accident occurring while handling any hazardous substance and for matters connected therewith or incidental there to.

The rehabilitation programme, as planned shall consist of the following components.

- (a) Medical rehabilitation of the people physically affected by the disasters.
- (b) Psychological rehabilitation of the people who are affected by the disasters.
- (c) Rehabilitation of the families of the deceased.
- (d) Rehabilitation of the children who are orphaned.
- (e) Reconstruction / repairs of community facilities/social infrastructure
- (f) Reconstruction / repairs of the private residential buildings and relocation of the residential areas sufficiently away from impact zones of the industry.
- (g) Restoration of the small-scale business establishments in the locality.

8.0 Interface with the Media

Media plays an important role in the entire gamut of disaster management starting with the preventive and mitigation measures to recovery phase. Keeping this in mind the plan outlines the role of the media as follows:

The nature of the likely hazards, which may effect the lives of the people of Industrial area and the ways to protect their lives and properties from the hazards;

Increasing community awareness about the mitigation measures that can protect the live and properties from the hazards identified for the area;

The arrangements made by the administration for the relief of the disaster victims;

The media can help in making the people aware of the off-site emergency management and the various other preparedness measures undertaken by the Government.

Keeping a watch of the relief operations and to keep the Government and the people informed about the same.