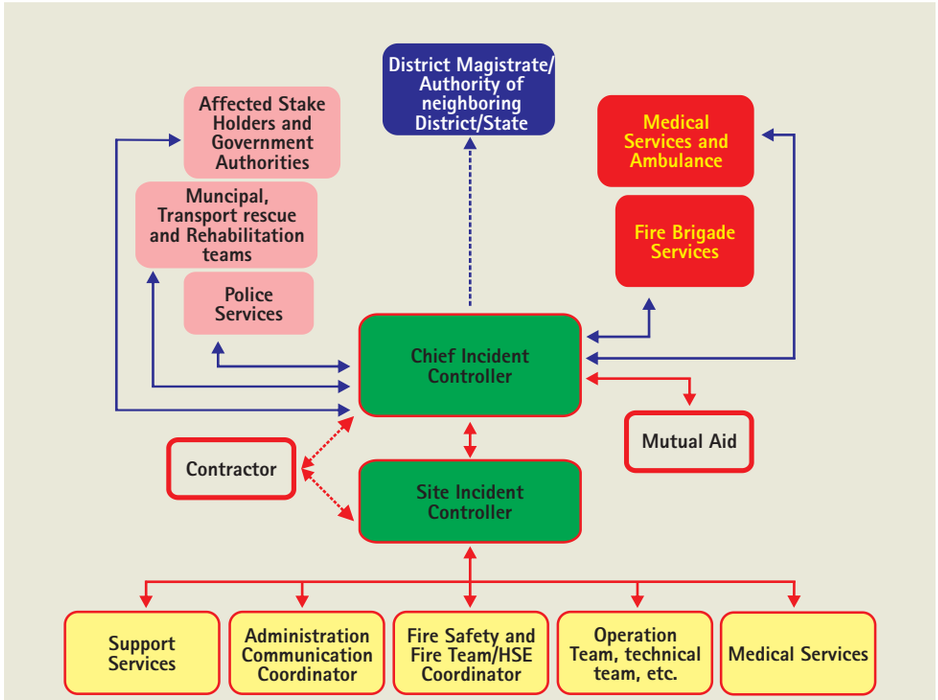
Theme -13

On-site Emergency Management Plan (OnSEMP)

industrial Disaster Risk Management



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gtz

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MoEF

The Ministry of Environment & Forests (MoEF) is the nodal agency in the administrative structure of the Central Government for the planning, promotion, coordination and overseeing the implementation of India's environmental and forestry policies and programmes.
The Ministry also serves as the nodal agency in the country for the United Nations Environment Programme (UNEP), South Asia Co-operative Environment Programme (SACEP), International Centre for Integrated Mountain Development (ICIMOD) and for the follow-up of the United Nations Conference on Environment and Development (UNCED). The Ministry is also entrusted with issues relating to multilateral bodies such as the Commission on Sustainable Development (CSD), Global Environment Facility (GEF) and of regional bodies like Economic and Social Council for Asia and Pacific (ESCAP) and South Asian Association for Regional Co-operation (SAARC) on matters pertaining to the environment.

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Disaster Management Institute (DMI) Bhopal

The Disaster Management Institute (DMI) was set up in 1987 by the Government of Madhya Pradesh (GoMP) as an autonomous organization in the aftermath of the industrial disaster in Bhopal.
Since inception, DMI has built vast experience in preparation of both On-site and Off-site Emergency Management Plans, Safety Audit, Risk Analysis and Risk Assessment, Hazard and Operability Studies (HAZOP), etc.
The National Disaster Management Authority (NDMA) constituted under the chairmanship of the Prime Minister selected DMI as a member of the Core Group for preparation of the National Disaster Management Guidelines- Chemical Disaster.
It is a matter of pride that NDMA has selected DMI for conducting Mock Exercises on chemical (industrial) Disaster Management at key industrial locations in the country.
The Ministry of Environment and Forests, InWEnt and gtz-ASEM Germany have recognized DMI as a Nodal Training Institutes for capacity building in industrial Disaster Risk Management.

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Contents

The main objective of emergency management plan (OnSEMP)
The objective in emergency management planning is to ensure that everyone knows:

- what are the hazards and risk in the plant
- what and how to do in the event of an emergency; and
- preparations for potential and unexpected incidents at the workplace.

The types of emergencies to plan for include fire, explosion, toxic releases, injuries and rescues in the hazardous events.

Plan improves local, district, state and national capacity to respond to disasters and public health emergencies, scaling up the actions with vulnerable communities in health promotion, disease prevention and disaster risk reduction.

As per our Indian regulations we have regulatory provisions that On-site Emergency Management Plan (OnSEMP) will be prepared by industrial units and Off-site Emergency Management Plan (OffSEMP) by District Collector for his/her District respectively. Both modules have some overlaying parts hence where we feel to highlight in the interest of readers the issues will be highlighted or repeated in both the modules i.e.13 and 14.

The present Module 13 deals the OnSEMP and module 14 will deal the OffSEMP.

1. On-site Emergency Plan (OnSEMP)

An occupier of major accident hazards (MAH) industry shall prepare and keep an up-to-date on-site emergency plan containing details specified in Schedule 11 of Manufacture, Storage and Import of Hazardous Chemicals (MS&IHC) Rules 1989 and detailing how major accidents will be dealt with on the site on which the industrial activity is carried on and that plan shall include the name of the person who is responsible for safety on the site and the names of those who are authorised to take action in accordance with the plan in case of an emergency. The occupier shall ensure that the emergency plan prepared takes into account any modification made in the industrial activity and that every person on the site who is affected by the plan is informed of its relevant provisions. The Schedule 11 is given as annexure I.

The occupier shall prepare the emergency plan required -

(a) in the case of a new industrial activity, before that activity is commenced;
(b) in the case of an existing industrial activity within 90 days of commencing into operation of these rules.

To protect company, employees, company business and local community during an emergency. Putting together a comprehensive emergency action plan that deals with all types of issues specific to the worksite is not difficult.

On-site emergency can be due to the following causes

Man-made causes	Natural causes	Extraneous
-Heavy Leakage -Fire -Explosion -Failure of Critical Control system -Design deficiency -Unsafe acts -In-adequate -maintenance	-Flood -Earth Quake -Cyclone -Outbreak of Disease -Excessive Rains -Tsunami	-Riots/Civil Disorder/ Mob Attack -Terrorism -Sabotage -Bomb Threat -War / Hit by missiles -Abduction -Food Poisoning/ -Water Poisoning

The OnSEMP makes the base of the OffSEMP, therefore the OnSEMP should be risk based.

2. Intention of the module

The intention of this module is to help entrepreneurs in developing an effective OnSEMP with following:-

(a) to develop an OnSEMP that should be concise and informative so that responsible person of the emergency control organisation should be able to quickly refer to the action plan to determine important functions that are being carried out;
(b) and not to use the OnSEMP just as telephone directory but should be able to manage an emergency and shall be made applicable -
  (i) to prevent casualties - both on-site and off-site;
  (ii) to reduce damage to property, machinery, public and environment;
  (iii) to develop a state of readiness for a prompt and orderly response to an emergency and to establish a high order of preparedness (equipment, personnel) to commensurate with the risk;
  (iv) to provide an on-site incident management organogram with clear missions and lines of authority (incident command system, field supervision, unified command);
  (v) to ensure an orderly and timely decision-making and response process (notification, standard operating procedures);

  (vi) to maintain good public relations;
  (v) to provide reliable and useful information in hazard and risk to civil authorities to help them in development of OffSEMP;
  (vi) to help district authority in development of response in off-site incident management organogram with clear missions and lines of authority (incident command system, field supervision, unified command);
  (vii) to disclose the information to local community

The on-site emergency plans prepared by the occupier of Major Accident Hazards installation will be the base for the preparation of the district off-site emergency plan.

3. Key elements of the OnSEMP

Emergencies can happen at any time in any types of industry, due to fire in a process area, tank form area, toxic gas/liquid release into the area from storage vessels or piping network, or a bomb threat. The approach of the plan is to eliminate or reduce the risk of injury or harm that may occur during an evacuation by undertaking following steps:-

(a) classification and identifying potentially hazardous situations;
(b) assessment of the risks;
(c) implementation and compliance of the regulatory provisions as per the Manufacture, Storage & Import of Hazardous Chemicals (MS and IHC) Rules 1989 and Chemical Accidents (Emergency Planning, Preparedness and Response) [CA(EPPR)] Rules 1996 schedule;
(d) consequences of defaults or non-compliance of regulations;
(e) statutory requirements;
(f) pre-emergency planning;
(g) emergency mitigation measures;
(h) emergency preparedness measures;
(i) emergency response procedures and measures;
(j) emergency organisation and responsibilities;
(k) infrastructure requirements;
(l) procedures for declaration of on-site and off-site emergency;
(m)resources for controlling emergency;
(n) demographic information;
(o) medical facilities;
(p) evacuation;
(q) public relations and information to public;
(r) reporting of the incident;
(s) emergency recovery procedures;
(t) emergency plans for tank, trucks and pipelines carrying hazardous products;
(u) integration of the OnSEMP with OffSEMP of the district and ultimately with Authority (NDMA) guidelines and action plan on Chemical (Industrial) Disasters;

(v) security threat plan and action plan to meet the eventualities;
(w) Provisions to disclose the information to the neighbouring communities and confidence building with the community for symbiotic living; etc.

The overall points can be integrated and reflected in the fig -1 which clearly indicates that good EMPs are based on the safety analysis, risk assessment, probabilistic analysis of scenarios, system modification for risk reduction, etc.

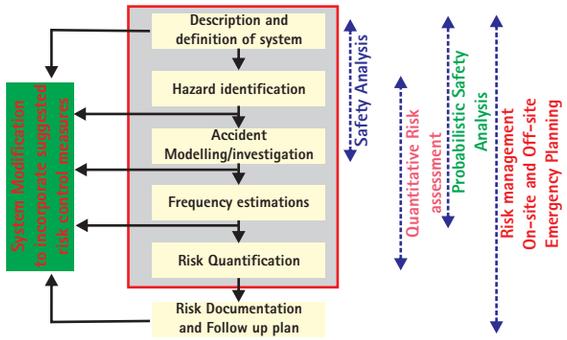


Fig-1 Basis of OnSEMP and OffSEMP

It should be ensured that a good plan must comply to the Schedule 11 of MS and IHC Rules 1989 and should have additional information on transport hazards and management while transporting the chemicals. The possibilities of security threats should also be evaluated along with the remedy.

3.1 Pre- emergency preparedness

This may have following components:
- -Information on the preliminary hazard analysis:
- -Type of accident
- -System elements or events that can lead to a major accident
- -Hazards
- -Safety relevant components
- -Details about the site:
  - -Location of dangerous substances.
  - -Seat of key personnel
  - -Emergency control room
- -Description of hazardous chemicals at plant site:

- -Chemicals (Quantities and toxicological data)
- -Transformation if any, which could occur.
- -Purity of hazardous chemicals.
- -Likely dangers to the plant.
- -Enumerate effects of :
  - -Stress and strain caused during normal operation:
  - -Fire and explosion inside the plant and effect if any, of fire and explosion outside, (To be added).

4. Emergency level classification

An MAH Industry should clearly make an effort and differentiate the type of emergencies. There are many near misses and small accidents at shop or floor level. To help industry the emergencies can be categorised into three broad levels on the basis of seriousness and response requirements, namely:

(a) Level 1 : This is an emergency or an incident which;
(i) can be effectively and safely managed, and contained within the site, location or installation by the available resources;
(ii) has no impact outside the site, location or installation.

(b) Level 2 : This is an emergency or an incident which;
(i) cannot be effectively and safely managed or contained at the location or installation by available resource and additional support is alerted or required;
(ii) is having or has the potential to have an effect beyond the site, location or installation and where external support of mutual aid partner may be involved;
(iii) is likely to be danger to life, environment or to industrial assets or reputation.

(c) Level 3: This is an emergency or an incident with off-site impact which could be catastrophic and is likely to affect the population, property and environment inside and outside the installation, and management and control is done by district administration. Although the Level-III emergency falls under the purview of District Authority but till they step in, it should be responsibility of the unit to manage the emergency.

Level-I and Level-II shall normally be grouped as on-site emergency and Level-III as off-site emergency. If the level II emergency if not dealt effectively or efficiently it may incubate as level III.

5. Duty of occupier

Under regulation the following points are important to an occupier who comes under the provisions of MS and IHC Rules 1989.

5.1 Information to be given to persons liable to be affected by a major accident

The occupier shall take appropriate steps to inform persons outside the site either directly or through District Emergency Authority who are likely to be in an area which may be affected by a major accident about, -

(a) the nature of the major accident hazard; and
(b) the safety measures and the "Do's and Don'ts" which should be adopted in the event of a major accident.

5.2 Collection, development and dissemination of information

The occupier while obtaining or developing a safety data sheet as specified in Schedule 9 in respect of a hazardous chemical handled by him shall ensure that the information is recorded accurately and reflects the scientific evidences used in making the hazard determination. In case, any significant information regarding hazard of a chemical is available, it shall be added to the material safety data sheet as specified in Schedule 9 as soon as practicable.
Every container of a hazardous chemical shall be clearly labelled or marked to identify-

(a) the contents of the container ;
(b) the name and address of manufacturer or importer of the hazardous chemical ;
(c) the physical, chemical and toxicological data as per the criteria given in Part I of Schedule 1.

Label a chemical in view of the size of the container or the nature of the package, provision should be made for other effective means like tagging or accompanying documents.

Information about the chemicals' danger properties and location on the container have been shown in Fig on next page for the better compliance.

5.3 Notification of major accident –

Where a major accident occurs on a site or in a pipe line, the occupier shall [within 48 hours notify] furnish a report relating to the accidents in installments to the concerned authority.

The concerned authority on receipt of the report shall undertake a full analysis of the major accident and send the requisite information within 90 days to the Ministry of Environment and Forests through appropriate channel.

The concerned Authority shall in writing inform the occupier, of any lacunae which in its opinion needs to be rectified to avoid major accidents.

6. Consequence assessment

The hazardous chemicals, as notified in MS and IHC rules 1989, should be identified and listed along with the quantitity with their storage conditions. The possible credible scenarios should then be assessed to develop the behaviour model of the released chemicals. The behaviour of the released chemical depends on the physical property of chemicals and climatic conditions and ground topography. On getting the ignition source and depending on the inflammability of the chemicals along with availability of air, the chemicals may burn and explode. In case of non-flammable chemicals the toxic cloud may spread to various distance depending upon the climatic conditions and released height of the chemical. All different behaviour of chemicals in to the environment has been discussed in detail in module 12 as consequence analysis. However for quick reference the behaviour of released chemicals can be traced by using the Fig -2.

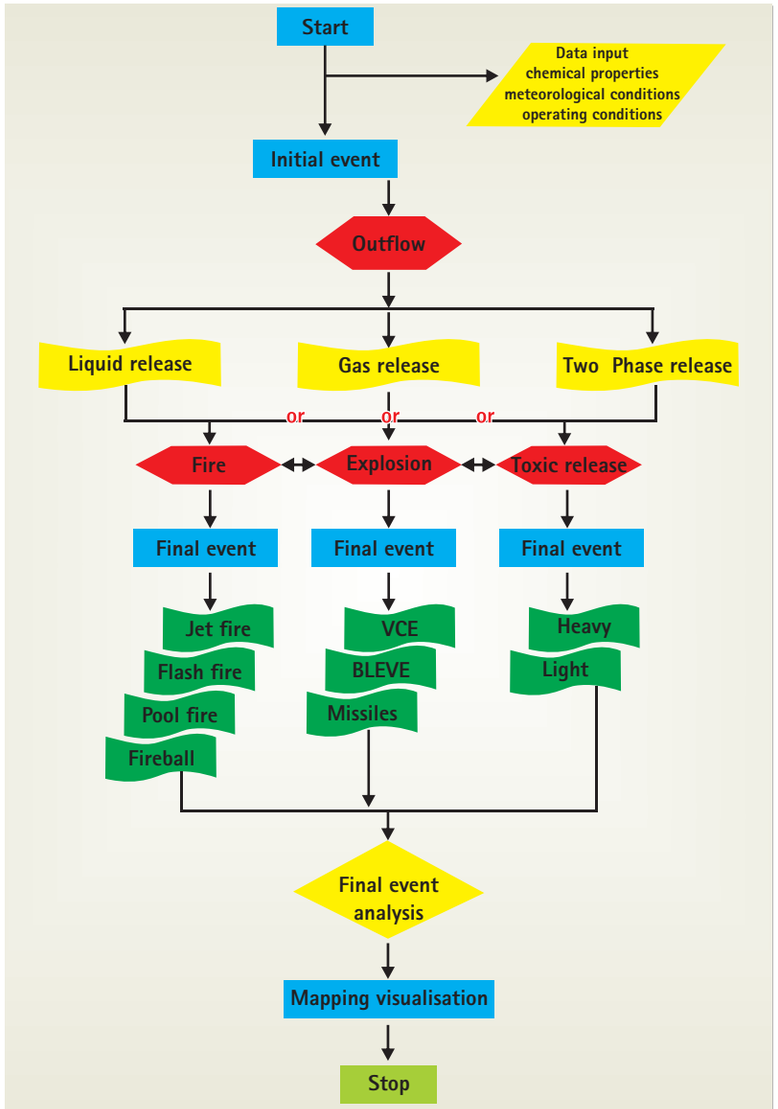


Fig-2 Behaviour of released chemicals

The various vulnerable limits (Fig-3) should be used as shown below to various types of the incidents. These all limits should be overlay on the map of the industry to project the impacts zones with in plant and outside the plant boundary. The overlay should be done preferably on local geographical map which is to the scale. This map must show all the physical facilities within the plant boundary and also the physical and environmental receptors out-side the plant to know the vulnerable area coming into the impacts zones (Fig 3). The module 10 provides information in detail on this issue.

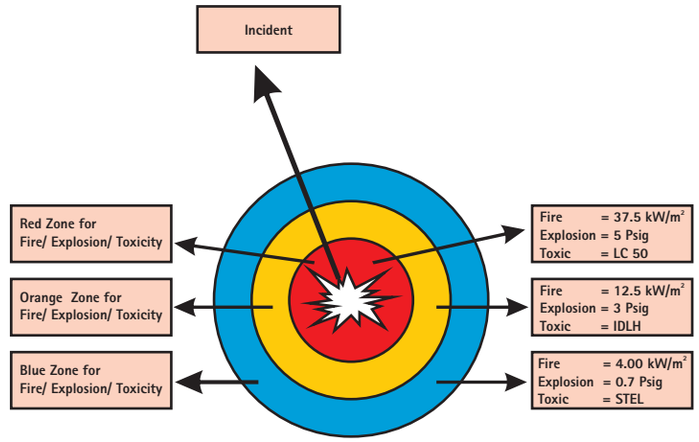


Fig-3 Limits of hazard zones for fire, explosion and toxic release

7. Overlays of the hazards zones

The overlays damage distances for following scenarios should be developed by using either mathematical calculations or by available computer models for consequence analysis:-

- Fire
- Explosion
- Toxic releases

The map should be used to the scale and also have blending of remote sensing to realise the real facilities. The overlays will have consequence maps as shown in Fig-4 and Fig-5 with various colour demarcations. Since the OnSEMP will be used by all stakeholders, hence the three colour (Table-1) should be used for the vulnerability mapping and people should be made aware by giving proper training or awareness programmes.

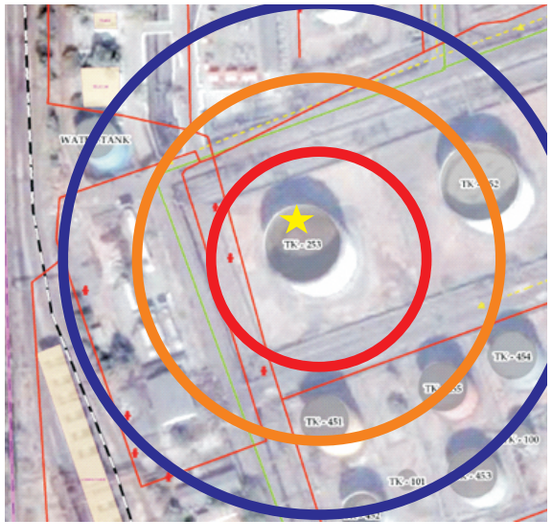
Table–1

Red Zone	Orange Zone	Blue Zone
Fire = 37.5 kW/m^2 Explosion = 5 Psig Toxic = LC 50	Fire = 12.5 kW/m^2 Explosion = 3 Psig Toxic = IDLH	Fire = 4.00 kW/m^2 Explosion = 0.7 Psig Toxic = STEL

The above zones for Fire, Explosion and Toxic concentration/zones should be used in Red, Orange and Blue colour for the benefit of the responders with in the plant and out side the plant. A few examples are shown in coming paragraphs.

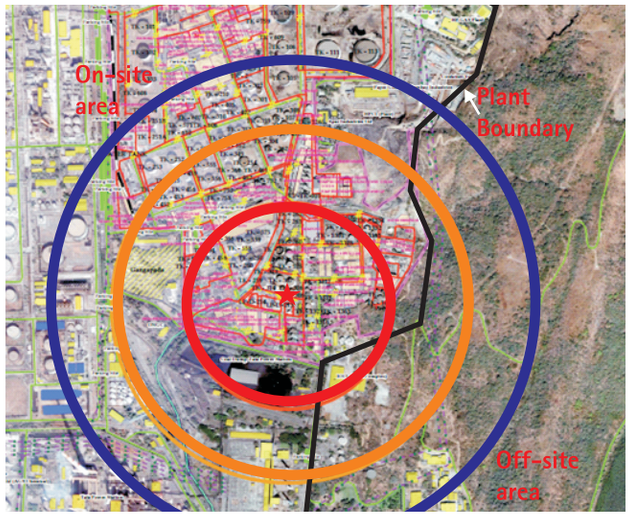
(a) Zoning and Maps.

The zones and maps shall be prepared highlighting the Incident prone areas of the unit so that in case of an emergency it serves as a basis for taking the action. This indicates the size of the area within which human life is seriously endangered by the consequences of incident. This should also indicate the location of assembly points and emergency control rooms. The map should also have marked 24 wind directions to facilitate easy access in case of emergencies. For example, contour for fire of red, orange and blue level is shown below (Fig - 4) due to fire in a flammable tank and situation is with in the plant boundry



Fig–4 An example how to show the consequence due to fire or explosion

Fig - 5 shows the vulnerable zones due to fire, for example, have impacts in off-site area in addition to the on-site. Such maps should be made in an OnSEMP for overall emergency planning.



Fig–5 An example how to show the consequence due to fire or explosion to highlight on-site and off-site scenarios

The zones help in identifying the various vulnerable areas in the plant premises and these zones should be used for the following:

- Development and evaluation of mitigation,
- Preparedness and readiness of fire fighting systems,
- Medical preparedness
- Evacuation and rescue operations
- Development of safety system
- Future expansion and development
- Development in Off-site emergency management plan
- Information to local community
- Accident investigation
- Development of assembly points and escape routes
- Mockdrills and resource mobilisation
- Human resource development by training and awareness activity

Fig-4 and 5, have been projected on overall layout plan of the industry, this type of information should be available in OnSEM (Fig-6).

(b) Layout/flow diagram –
Detailed layout and flow diagram for different activities such as product lines, filling system, emergency shutdown system, isolation valves, etc. should be detailed. The important control valves should be highlighted.
Layout plan should has emergency escape route, such as floor plans, workplace maps, and safe or refuge or assembly areas with signage which are legible. The location of hazardous locations, fire fighting systems, egress gates should also be highlighted to follow at the time of emergency. Symbol or signages which are popularly used should only be used. The signage should also be display prominently and the poor signage should not be displayed. A layout with vulnerable zones, escape routes, assembly point is shown as Fig - 6.

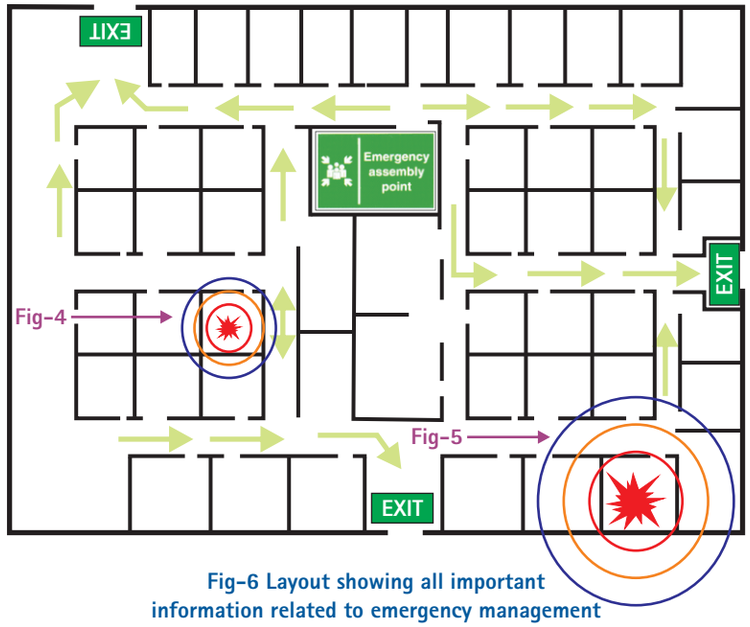


Fig-6 Layout showing all important information related to emergency management

8. Planning cycle

After knowing/ developing the vulnerability on the maps/layout as shown in Fig-4, 5 and 6 the emergency planning process begins and it consists of the following phases (Fig-7):-

i. Prevention and mitigation,
ii. Preparedness,
iii. Response, and
iv. Recovery

All these phases constitute the overall emergency management cycle

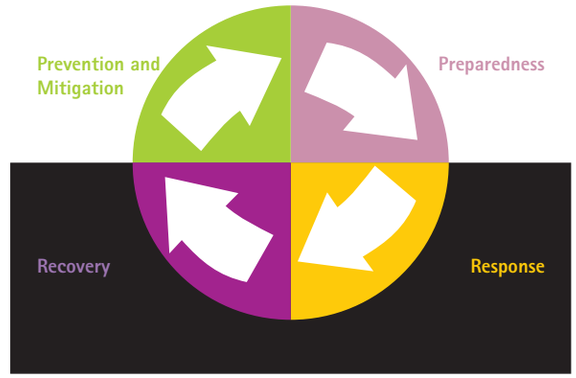


Fig-7 Planning cycle

Each of the phases (i.e. prevention and mitigation, preparedness, response, and recovery) should have broadly the following components (Fig-7) in turn to assess the level of overall perfection and it is a continuous cycle for improvement:

assessment: gaining an understanding of a situation in order to identify the hazards, their sources, risk and consequences;
planning/programming: organisation of emergency programme's activities;
implementation: actions taken to assist the desired operations by standard operationg procedures;
monitoring: continuous observation of the progress;
review: a comprehensive examination of progress of emergency management carried out by a relevant member of operational management;
evaluation: an independent, objective and thorough examination of a policy, programme, support service or emergency operation, including its design, implementation and impact by mock drills.

Fig-8 Improvement cycle

9. Principles of capacity assessment to handle on-site emergency

Released chemicals into the environment have various types of the impacts both long term and short term hence action at on-site must be very fast so that the impacts should not be off-site.

Fig-9 Impact assessment cycle

The overall assessment is required to meet out these challenges by assessment of the coping capacity. After study of a number of the capacity assessments models of response mechanis, we suggest the flowchart as shown in Fig -10. Capacity/coping assessment should be done for the following to take challenges of the On-site emergency:

-emergency
-mitigation
-evacuation
-relief
-health
-livelihoods
-water, sanitation and hygiene promotion
-food and nutrition
-safety, security and protection
-shelter

Coping mechanisms also play an important role in capacity development. Coping mechanisms are the adapted/unusual strategies that industry choose as a way of operating through difficult times.

The outcomes of the assessment of all sector will improve the quality of On-site Emergency Management Planning. It is also important to identify the industries, local

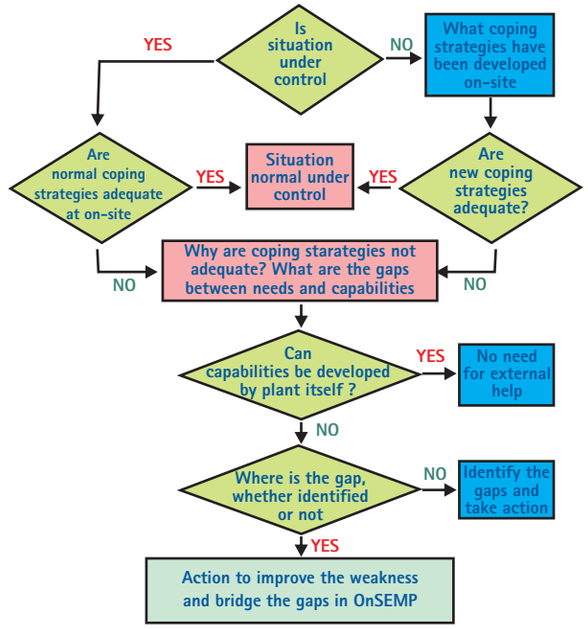


Fig-10 Response assessment cycle

and district governments' capacities and their roles at the times of shock/hazard/ emergency. When working on these aspects it is mandatory to assess the resources available in nearby industries. The mutual aid capacity should not be missed out in OnSEMP.

9.1 Emergency Mitigation Measures

After determining the hazard and risk level, the following actions shall be required for mitigation of emergency:-

-Basic requirement of OnSEMP.
-Basic requirement needs to be assessed prior to development of ONSEM.
-Resource mobilisation.

Resource mobilisation shall include manpower requirement, fire fighting materials, appliances or equipment, safety equipment, communication facilities, transport, list of emergency drugs and appliances, etc.

9.2 Incident preventing measures and procedures

The incident prevention measures and procedures at installation shall include the following:-

(i) health safety and environment (HSE) policy;
(ii) proper layout and inter facility distances (the layout should not have any criss-cross movement of men and materials);
(iii) safety committees with fair participation of Union leaders and workers;
(iv) safety audits and inspections shall be carried out with the help of prescribed BIS;
(v) work permit system (including confined space and entry permit);
(vi) early warning alarm system in the installation (gas monitoring system, heat detection, high level alarms, low pressure/high pressure alarms etc.) especially in the vicinity of storage tanks, filling station, delivery points and along with periphery with the indication in the central control room;

(vii) in-built safety interlocks system in design such as safety relief valves (SRVs), thermal safety valves (TSVs), non-returning valves (NRVs), remote operated valves (ROVs) and other various emergency trip systems in Installations;
(viii) fire protection (preferably automatic) and HSE Management system;
(ix) drill for visitors including assembly procedure and escape route, do's and don't's, written instructions before entry, etc;
(x) setting up of safety MIS system and sending Exception reports to the head of organisations or CEO;
(xi) all standby equipments should be tried and operated periodically and recorded. Similarly back up power for safety equipment and instrument should be checked periodically and observations be recorded;

Check points for incident prevention measures are given on next page:

S. No	Check points	Yes/No
1.	Whether Safety, Health and Environment Policy of the location is displayed	
2.	Whether the Safety Policy is documented and duly approved by the top management	
3.	Whether the Safety Policy is well structured to cover all elements of Safety, Health and Environment protection	
4.	Whether the layout is convenient from operation and safety aspects and meets minimum distance norms	
5.	Whether a duly constituted Safety Committee is functioning in the location with representation from workmen/staff	
6.	Whether all unsafe developments and likely risks are deliberated in the meetings and appropriate steps are recommended for eliminating such risks	
7.	Whether compliance status of recommendations of earlier Safety Committee meetings are discussed before taking up new issues.	
8.	Whether performance and shortcomings observed during recent mock disaster drills form part of the discussions in safety committee meetings	
9.	Are the safety committee minutes recorded and signed by all the attending members	
10.	Whether periodical safety audits and inspections by internal and external audit teams are conducted in defined intervals	
11.	Whether a system of regular monitoring of such audit compliances by controlling offices / HO are in place	
12.	What is the composition of external audit teams to ensure impartiality of audit findings	
13.	Whether Work Permit System has been implemented	

S. No	Check points	Yes/No
14.	Whether work permits are issued for hot work, cold work, electrical work and vessel entry jobs	
15.	Whether the location-in-charge or his authorised nominee remain the issuer for all hot work and vessel entry permits for enhanced safety and control.	
16.	Whether work permits are duly closed at completion of the stipulated jobs, duly certified by the supervising officer	
17.	Whether heat detectors in tank sprinkler systems, high level alarms of tank farm management system are provided and checked for regular functioning	
18.	Whether in-built safety interlocks provided	

9.3 Emergency preparedness and response measures

After detailing the prevention measures, preparedness measures to handle the emergency shall be explained in OnSEMP document.

Emergency drills and mock exercises

To evaluate the thoroughness and effectiveness of an OnSEMP, it is necessary to conduct periodic table top exercises full-scale or announced and unannounced drills. Each site should hold drills in the night shifts, change shifts as well as during the day.

Drills should present a variety of Emergency scenarios and designed to challenge each segment of the organisation. Limited scale drills are useful and should be used by Chief of each Support Service to train his/her own team. Plans should be made to have periodic mass casualty exercises. These exercises should attempt to simulate as closely as \possible a fire, explosion, or toxic agent release and comparison of the prescribed time lines and the actual received.

Each Mock Drill should be recorded with observations and deficiencies to be rectified within 24 hours. To check the emergency preparedness and response mechanism through mock drills are given on next page.

To have better results it is suggested to involve all sections with in the industry, nearby industries, fire services, medical, police personals, arm forces and District Collector.

S. No	Check points	Yes/No
1.	Whether mock fire / emergency response drills are held	
2.	If yes, periodicity of emergency response drills	
3.	Mock drills cover all types of probable emergencies	
4.	Does the location have Mutual Aid Plan	
5.	If yes, the details of other members including names and contact nos. of concerned officials	
6.	List of fire fighting equipments available with each Mutual Aid members including District Fire Service	
7.	Compatibility of safety equipment of all Mutual Aid members including District Fire Services with said location has been tested and documented in the OnSEMP	
8.	Details of water storage available with Mutual Aid member including District Fire Service and mechanism to utilise the same in the said location well documented in the OnSEMP	
9.	Details of fire fighting foams concentrate/chemicals available with Mutual Aid members including nearest Fire Service has been incorporated	
10.	Details of lead time for response of Mutual Aid members including District Fire Service has been documented in the OnSEMP	
11.	Periodicity of safety training for officers, staff, contractor workers, and security personnel mentioned in the OnSEMP	

9.4 Emergency Organisation and Responsibilities

The OnSEMP shall identify the safe transition from normal operation to emergency operations and systematic shut down, if any, and the delegation of authority from operations personnel to emergency response personnel. For this purpose, the plan shall identify an emergency response organisation with appropriate lines of authority with succession planning and actuating the response management. Responsibilities for

decision making shall be clearly shown in an emergency organisation chart. The plan shall identify each responder's position, mission, duties and reporting relationship. Overall objectives of an emergency control organisation shall be:

(a) to promptly control problems as they develop at the scene.
(b) to prevent or limit the impact on other areas and off-site.
(c) to provide emergency personnel, selecting them for duties compatible with their normal work functions wherever feasible. The duties and functions assigned to various people shall include making full use of existing organisations and service groups such as fire, safety, occupational health, medical, transportation, personnel, maintenance, and security.
(d) Employees must assume additional responsibilities as per laid down procedure of OnSEMP whenever an emergency alarm sounds.
(e) In setting up the organisation, the need for round-the-clock coverage shall be essential. Shift personnel must be prepared to take charge of the emergency control functions or emergency shutdown of system, until responsible personnel arrive at the site of emergency. The organisation should have an alternate arrangement for each function.

A model organogram is shown here in Fig-13 for on-site emergency management. Industries should develop their own need based organograms to take the challenges of emergency.

Besides, industries should have the training and sigange Fig -11) at prominent places. The bulk storage should be taken care of to restrict impacts by building the wall against the disc end (Fig -12). Review of such sensitive facilities must be carried out in OnSEMP.

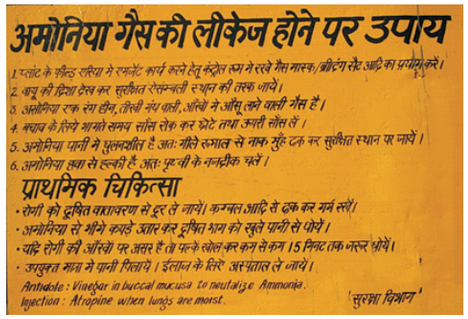


Fig-11

Fig-12

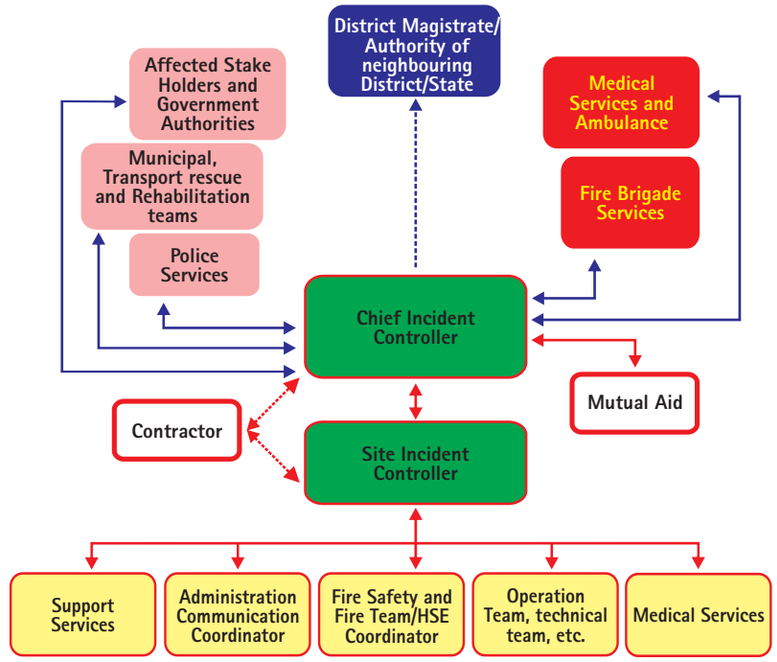


Fig-13 OnSEMP organogram

Roles and Responsibilities

Chief Incident Controller (CIC): The Chief Incident Controller (CIC) shall have overall responsibility to protect personnel, site facilities, and the public before, during, and after an emergency or disaster. The CIC shall be present at the main emergency control centre for counsel and overall guidance. Responsibilities of the Chief Incident Controller shall include the following:-

(a) preparation, review and updation of the OnSEMP as per Schedule 11 and here it is reflected as annexure I;
(b) assessment of situation and declaration of emergency;
(c) mobilisation of main coordinators and key personnel;
(d) activation of Emergency Control Centre;
(e) taking decision on seeking assistance from mutual aid members and external agencies like Police, Fire Brigade, Hospitals etc.;
(f) continuous review of situation and decide on appropriate response strategy;
(g) taking stock of casualties and ensure timely medical attention;
(h) ensuring correct accounting and position of personnel after the emergency;

(i) ordering evacuation of personnel as and when necessary;
(j) taking decision in consultation with District Authorities when an Off-site emergency to be declared.

Site Incident Controller (SIC): The Site Incident Controller shall be identified by the Chief Incident Controller and will report directly to him. SIC should be nominated by the entity in each shift 24 hrs. Responsibilities of the Chief Incident Controller shall include the following:-

(a) The SIC shall maintain a workable emergency control plan, establish emergency control centers, organise and equip the organisation with OnSEMP and train the personnel;
(b) The SIC shall be capable of making quick decisions and taking full charge;
(c) The SIC shall communicate to the Emergency Control Centre where it can coordinate activities among groups;
(d) The SIC shall be responsible for ensuring that appropriate local and national government authorities are notified, preparation of media statements, obtaining approval from the CIC and releasing such statements once approval received;
(e) The SIC shall also ensure the response to the incidents or the emergencies, as the case may be, is in line with entity procedures, coordinating business continuity or recovery plan from the incident. He must ensure next of kin are notified in a timely manner;
(f) The SIC shall also co-ordinate if any specialist support is required for the above purpose; and
(g) The SIC shall decide on seeking assistance of mutual aid members and external agencies like police, fire brigade, hospital etc.

Administration and Communication Coordinator: Responsibilities of the administration and communication controller shall include the following:-

(a) to activate the medical centre and render first aid to the injured, arrange ambulance and coordination with hospitals for prompt medical attention to casualties;
(b) to ensure head counts at assembly points;
(c) to arrange procurement of spares for fire fighting and additional medicines and drugs;
(d) to mobilise transport to various teams for facilitating the response measures;
(e) to monitor entry and exit of personnel into and out of premises;
(f) to ensure only authorised personnel enter into the premises;
(g) to provide administrative and logistics assistance to various teams;
(k) to arrange evacuation as directed by the chief incident controller, and in coordination with the civil authorities like police, panchayat/municipal authorities etc., if required.

Fire and Safety Coordinator: Responsibilities of the Fire and Safety Coordinator shall

include the following:-

(a) to activate emergency sirens as per the practiced codes;
(b) to take charge of all fire fighting and rescue operations and safety matters;
(c) to ensure that key personnel are called in and to release crew of fire fighting operations as per emergency procedure;
(d) assess functioning of his team and communicate with the CIC and or administrative controller for any replenishment or, replacement of man power or fire fighting equipment;
(e) direct the fire brigade personnel and mutual aid members to their desired roles and also proper positioning of the manpower and equipment;
(f) to decide the requirement of mutual aid and instruct fire station, who, in turn will contact mutual aid members;
(g) to coordinate with outside fire brigades for properly coordinated fire fighting operation;
(h) to ensure that casualties are promptly sent to first aid centre / hospital;
(i) to arrange requirement of additional fire fighting resources including help from mutual aid partners;
(j) ensure empty and loaded trucks are removed to safer area to the extent possible so as not to affect emergency handling operations;
(k) continually liaise with the SIC and or CIC and implement the emergency combat strategies as communicated by him; and
(l) ensure adequate hydrant pressure in the mains and monitor water level in the reservoir.

Support and auxiliary services: The following additional coordinators may be nominated and delegated the specific responsibilities falling under the basic functions of SIC and or CIC: -

-Human Resources and Welfare Services Coordinator
-Transport and Logistics Services Coordinator
-Media and Public Relations Coordinator
-Operations and Technical Coordinator
-Security Coordinator

SIC and CIC can define their role depending upon the situation and scenarios, but it should be documented in OnSEMP.

10. Emergency operation centers (EOC)

Each of the MAH installation shall have the provision of EOC preferably with a backup arrangement.

(a) The EOC must be away from potential hazards and provide maximum safety to personnel and equipment.
(b) Preference should be given to a non-combustible building of either steel frame or reinforced concrete construction.

(c) The EOC should have at least two exits and adequate ventilation.

Following certain basic supplies and dedicated equipment shall be made available at the EOC.

(a) A copy of the OnSEMP.
(b) Maps and diagrams showing buildings, roads, underground fire mains, important hazardous material and process lines, drainage trenches, and utilities such as steam, water, inflammable/toxic gases and electricity are required.
(c) Arial photographs, if possible, and maps showing the site, adjacent industries, the surrounding community, high-ways, rivers, etc., help determine how the disaster may affect the community so that the proper people can be notified, adequate roadblocks established, and the civil authorities advised.
(d) Names, addresses, and telephone numbers of employees.
(e) Names, addresses, and telephone numbers of off-site groups and organisations that might have to be contacted should be available. All telephone lists should be reviewed for accuracy on a scheduled basis and updated, as necessary.
(f) Dedicated and reliable communication equipment should be provided at the EOC. Enough telephones and one fax line to serve the organisation for calls both on- and off-the-site. Two-way radio equipment shall be provided to maintain continuity of communications when other means fail and also provides an excellent way of keeping in contact with field activities.
(g) All EOC should have emergency lights so that operations can continue in the event of power failure.
(h) Facilities for recording the sequence of events should be provided to assist in investigating causes, evaluating performance, and preparing reports. This can range from a pan board, logbook to a tape recorder with a person assigned to record pertinent information.
(I) EOC should also have dedicated computer with LAN/ internet facility to access the installation data and also it should have the latest and updated soft copies of all standard operating practices (SOP) etc.

11. Security threat plan

We recommend the provisions for security threat plan in OnSEMP. With increase in terrorist activities, installations having significant role in national economy, sabotage and bomb threats to such installation should also be considered in the disaster management plan, though there are no provision for security threats in OnSEMP in Schedule 11 of MS and IHC rules such as high level of alertness measures, strengthening security measures by security gadgets, mechanical and electronic security gadgets. In any of such situation, city police/ administration should be informed immediately and their help should be sought.

Emergency Action in case of Bomb Threat :

(a) The persons inside the Plant should be evacuated as soon as possible.
(b) All the vehicles in the plant premises should be evacuated to safer places.
(c) Plant personnel should contact district authorities immediately.
(d) Any new or doubtful thing should not be touched.
(e) All pipeline and tank valves should be closed and all the operations inside the Plant should be stopped.
(f) In case of fire, firefighting equipments shall be operated and city fire brigade should be called immediately during emergency.

To initiate the security management the passages and boundary should be reviewed immediately for appropriate plan to be implemented in future. A detailed action plan on bomb threat to be prepared by each installation and should be vetted by the Police Authority. The above photos show weak security boundaries and such points should be reviewed by management

12. Na-Tech scenarios

Natural catastrophic events may be able to affect the integrity of industrial structures and possibly lead to loss of control of production processes. Consequently, if industrial

facilities store large amount of hazardous materials, accidental scenarios as fire, explosion, or toxic dispersion can be triggered, thus possibly involving population living in the close surrounding or in the urban area where the industrial installation is located. Eventually, the analysis of natural-technological (Na-Tech) mutual interaction is necessary for the development of methodology for risk management practice, for risk assessment and for emergency planning. On the other hand, simplified tools are mandatory because the number of possible scenarios is often dramatically high when large installations or areas are considered. Despite these considerations, a recent analysis showed that none of the European countries has specific Na-Tech risk and emergency management programs in place. In India the situation is like to Europe on Na-Tech scenarios.

13. Programme management

Leadership and Commitment

The industry leadership shall demonstrate commitment to the OnSEMP by constituting a programme committee to look after the overall following important components:-

-Policies, plans, and procedures to develop, implement, and maintain the safety programme.
-Resources to support the emergency.
-Reviews and evaluations to ensure effectiveness of emergency planning.
-Correction of deficiencies.

Programme Coordinator. The programme coordinator shall be designated by the industry and authorised to develop, implement, administer, evaluate, and maintain the emergency management programme considering the following points:-

-The programme shall follow a planning process that develops strategic crisis management, prevention, mitigation, emergency operations/response, continuity, and recovery plans
-Strategic planning shall define the vision, mission, and goals.
-Crisis management planning shall address issues that threaten the strategic, reputational, and intangible elements of the entity.
-The entity shall include key stakeholders in the planning process.

Business Impact Analysis should be the core responsibility of the coordinator to convince the top management why safety and emergency management is important and it can be done by highlighting the following points:-

-business impact analysis (BIA)
-the BIA shall evaluate the potential impacts resulting from interruption or disruption of individual functions, processes, and applications.

-the BIA shall identify those functions, processes, and applications that are critical to the entity and the point in time when the impact(s) of the interruption or disruption becomes unacceptable to the entity.
-the BIA shall evaluate the potential loss of information and the point in time that defines the potential gap between the last backup of information and the time of the interruption or disruption.

Programme management will develop following vital plan immediately:

-Communication system and plan to ensure flow of information from floor level to top level management and vice versa
-Alarm and Public Address sytem and plan
-Evacuation procedures
-Fire fighting plan
-Mutual aid programme with neighbouring industries
-Medical and first aid plan
-Community involvement and dialogue plan
-Enforcement of PPE as company policy plan
-Spill containment plan
-Security threat plan
-Mock-drills and documentation of the drills with time bound implementation of deficiencies observed in mock-drills

Critical Operations Shutdown

Review the operations to determine which critical operating systems may require continuing attention or shutdown during an evacuation or other emergency condition. Certain equipment and processes must be shutdown in stages or over time. Examples of this might be laboratory experiments, processes or equipment that if left unattended, would create an additional hazard. In addition, certain equipments or facilities (such as power backup) may need to be secured prior to evacuating. Develop a procedure to ensure that requisite actions are taken during an emergency to prevent additional hazards/worsening conditions or to maintain proper security. OnSEMP should ensure that a person has been designated to address these issues and he has been provided with proper training and SOPs (safe operating procedures) to use when required.

Complete the Critical Operations Shut Down Procedures and Personnel Assigned these Responsibilities as shown below:

S.No.	Critical Operation areas	Likely hazards	Control measures	In charge person	Special need required in emergency

Annexure-1
Details to be furnished in the on-site emergency plan

1. Name and address of the person furnishing the information.
2. Key personnel of the organisation and responsibilities assigned to them in case of an emergency
3. Outside organisation if involved in assisting during on-site emergency:
   a)Type of accidents
   b)Responsibility assigned
4. Details of liaison arrangement between the organisations.
5. Information on the preliminary hazard analysis:
   a)Type of accident
   b)System elements or events that can lead to a major accident
   c)Hazards
   d)Safety relevant components
6. Details about the site:
   a)Location of dangerous substances.
   b)Seat of key personnel
   c)Emergency control room
7. Description of hazardous chemicals at plant site:
   a)Chemicals (Quantities and toxicological data)
   b)Transformation if any, which could occur.
   c)Purity of hazardous chemicals.
8. Likely dangers to the plant.
9. Enumerate effects of :
   a)Stress and strain caused during normal operation:
   b)Fire and explosion inside the plant and effect if any, of fire and explosion out side.
10. Details regarding:
    i) Warning, alarm and safety and security systems.
    ii) Alarm and hazard control plans inline with disaster control and hazard control planning, ensuring the necessary technical and organisations precautions;
    iii) Reliable measuring instruments, control units and servicing of such equipments.
    iv) Precautions in designing of the foundation and load bearing parts of the building.
    v) Continuous surveillance of operations.
    vi) Maintenance and repair work according to the generally recognized rules of good engineering practices.
11. Details of communication facilities available during emergency and those required for an off-site emergency.
12. Details of fire fighting and other facilities available and those required for an off-site emergency.

14. Glossary

Incident Response System: The combination of facilities, equipment, personnel, procedure and communications operating within a common organisational structure, with responsibility for the management of assigned resources to effectively accomplish stated objectives pertaining to an incident.

Incident Response Team: The incident commander and appropriate general or command staff personnel assigned to manage an incident.

Risk: Risk is the likelihood that a harmful consequence (death, injury or illness)

Risk assessment: The value judgement of the significance of the risk, identified by a risk analysis.

Risk Management: Action taken or required to achieve or improve the safety of the facility and its operation.

Site Incident Controller: means the person who goes to the scene of the emergency and supervises the actions necessary to overcome the emergency at the site of the incident;

15. References

1. Manufacture, Storage And Import Of Hazardous Chemical Rules, 1989.

2. Petroleum and Natural Gas Regulatory Board (Codes of Practices for Emergency Response and Disaster Management Plan (ERDMP)) Regulations, 2010.

3. Off-site Emergency Management Plans of Districts of India.

4. Information from www.hrdp-idrm.in

5. National Disaster Management Guidelines Chemical Disasters (Industrial), National Disaster Management Authority Government of India 2007.

6. Center for Process Safety of the American Institute of Chemical Engineers (AIChE). Guidelines for Use of Vapor Cloud Dispersion Models, Second Ed. New York: AIChE, 1996.

7. Center for Process Safety of the American Institute of Chemical Engineers (AIChE). International Conference and Workshop on Modeling and Mitigating the Consequences of Accidental Releases of Hazardous Materials, September 26-29, 1995. New York: AIChE, 1995.

8. Technical background document for offsite consequence analysis for anhydrous aqueous ammonia, chlorine, and sulphur dioxide , Chemical emergency preparedness and prevention office, U.s. Environmental protection agency, April 1999

Notes