

1. RISK ASSESSMENT

Industrial accident results in great personal & financial loss. Managing these accidental risks in today's environment is the concern of every industry including distillery also, because either real or perceived incidents can quickly jeopardize the financial viability of a business. Many facilities involve various manufacturing processes that have the potential for accidents which may be catastrophic to the plant, work force and environment or public. The main objective of the risk assessment study is to propose a comprehensive but simple approach to carry out risk analysis and conducting feasibility studies for industries and planning & management of industrial prototype hazard analysis in Indian context.

1.1 Hazard Identification & Risk Assessment (HIRA)

Hazard analysis involves the identification and quantification of the various hazards (unsafe condition) that exist in the plant. On the other hand, risk analysis deals with the identification and quantification of the risk, the plant equipment and Personnel are exposed to accidents resulting from the hazards present in the plant.

Risk analysis involves the identification and assessment of risks to the population is exposed to as a result of hazards present. This requires an assessment of failure probability credible accident scenario, vulnerability of population etc. Much of this information is difficult to get or generate consequently, the risk analysis in present case is confined to maximum credible accident studies and safety and risk aspect related to molasses based distillery, sugar and power plant.

Activities requiring assessment of risk due to occurrence of most probable instances of hazard and accident are both onsite and off-site.

On-site

- Exposure to fugitive dust, noise, and other emissions
- Housekeeping practices requiring contact with solid and liquid wastes
- Emission/spillage etc. from storage & handling

Off-site

- Exposure to pollutants released from offsite/ storage/related activities
- Contamination due to accidental releases or normal release in combination with natural hazard
- Deposition of toxic pollutants in vegetation / other sinks and possible sudden releases due to accidental occurrences

1.2 Identification of types of Hazards in Sugar, Distillery & Co-Generation Plant (HAZID)

Disaster at sugar mill, distillery and co-generation plants may occur due to following hazards:

- Fire Electric Panels, Oil room and alcohol storage
- Explosion in Boiler house etc.
- Electrocutation
- Cleaning of barrels, which have held chemical substances

- Fall of material etc.

The potential hazardous areas and the likely accidents with the concerned area have been enlisted below.

Table - 1

Possible Hazardous Locations Onsite

S. No.	Hazardous Area	Likely Accident
1	Boiler Area	Explosion
2	Turbine room	Explosion
3	Electrocution	Lose fitting
4	Electrical rooms	Fire and electrocution
5	Transformer area	Fire and electrocution
6	Cable tunnel	Fire and electrocution
7	Storage yard (coal)	Sliding, fall of material
8	Coal/ fuel storage area	Fire and spillage
9	Distillery (ethanol storage tank)	Fire
10	Chimney	Air pollution
11	Lagoon Storage	Overflow, flooding
12	Spent Wash storage Tank	Odour

Fire

Fire can be observed in the boiler area, Coal storage yard, Fuel spillage, Electrical rooms, Transformer area etc. due to accidental failure scenario.

Explosion

Explosion may lead to release of heat energy & Pressure waves. Table 1 shows tentative list of Damages envisaged due to different heat loads.

Electrocution

Fatal Accident due to carelessness during working hours may lead to electrocution. Probable areas where chances prevail are enlisted in above table.

Table - 2

List of Damages Envisaged at Various Heat Loads

S. No.	Heat loads (kW/m ²)	Type of Damage Intensity	
		Damage to Equipment	Damage to People
1.	37.5	Damage to process equipment	100% lethality in 1 min. 1% lethality in 10 sec
2.	25.0	Minimum energy required to ignite wood	50% Lethality in 1 min. Significant injury in 10 sec
3.	19.0	Maximum thermal radiation intensity allowed on thermally unprotected equipment	--
4.	12.5	Minimum energy required to melt plastic tubing	1% lethality in 1 min
5.	4.0	--	First degree burns, causes pain for exposure longer than 10 sec
6.	1.6	--	Causes no discomfort on long exposures

Source: World Bank (1988). Technical Report No. 55: Techniques for Assessing Industrial Hazards. , Washington, D.C • The World Bank

1.3 Proposed Mitigation Measures

1.3.1 Preventive Measures for Electricity Hazard

- All electrical equipment is to be provided with proper earthing. Earthed electrode are periodically tested and maintained
- Emergency lighting is to be available at all critical locations including the operator's room to carry out safe shut down of the plant
- Easy accessibility of fire fighting facilities such as fire water pumps and fire alarm stations is considered
- All electrical equipment are to be free from carbon dust, oil deposits, and grease
- Use of approved insulated tools, rubber mats, shockproof gloves and boots, tester, fuse tongs, discharge rod, safety belt, hand lamp, wooden or insulated ladder and not wearing metal ring and chain.
- Flame and shock detectors and central fire announcement system for fire safety are to be provided.
- Temperature sensitive alarm and protective relays to make alert and disconnect equipment before overheating is to be considered
- Danger from excess current due to overload or short circuit is to be prevented by providing fuses, circuit breakers, thermal protection

1.3.2 Coal Storage

- Coal storage unit is provided with paved approach with adequate traffic carrying capacity.
- Compound wall with adequate height is constructed around the coal storage area
- The unit has adequate water supply through pipe/ surface water before selection of the site. Coal storage unit is to be ensured for stacking of coal in heaps and care is taken that it does not get higher than the compound wall of premises of unit
- Adequate dust suppression measures are provided to prevent fugitive emission and also risk of fire. Similar measures are also adopted for loading/unloading operations.
- Coal ash transported in tankers is to be covered and closed and so that there is no chance of spillage during transportation.
- Fire fighting measures are provided to avoid any fire case
- Measures are taken to control the air pollution during loading/handling coal

1.3.3 Precautionary Measures for Falling material

- Safety helmets to be used to protect workers below against falling material
- Barriers like a toe boards or mesh guards is to be provided to prevent items from slipping or being knocked off the edge of a structure
- An exclusion zone is to be created beneath areas where work is taking place.

- Danger areas are to be clearly marked with suitable safety signs indicating that access is restricted to essential personnel wearing hard hats while the work is in progress.

1.3.4 Safety Measures for Storage & Handling of Alcohol

Handling and storage of alcohol is done as per prescribed norms. The alcohol is directly fed to the bottling unit mechanically and no manual handling will be involved which reduce the risk of spillage in the storage area. Following precautionary measures would be taken for safety:

(a) Handling and storage

Keeping away from heat, sparks and open flame, care will be taken for avoidance of spillage, skin and eye contact, well ventilation, Use of approved respirator if air contamination is above acceptable level will be promoted. For Storage and handling following precautions will be taken:

- Keeping away from oxidizers, heat and flames.
- Avoidance of plastics, rubber and coatings in the storage area.
- Cool, dry, & ventilated storage and closed containers.
- Grounding of the container and transferring of equipment to eliminate static electric sparks.

(b) First Aid Measures

For Skin contact, Eye contact, & Inhalation.

(c) Fire Fighting Measures

Use of extinguishing media surrounding the fire as water, dry chemicals (BC or ABC powder), CO, Sand, dolomite, etc.

Foam System for firefighting will be provided to control fire from the alcohol storage tank. The foam thus produced will suppress fire by separating the fuel from the air (oxygen), and hence avoiding the fire & explosion to occur in the tank. Foam would blanket the fuel surface smothering the fire. The fuel will also be cooled by the water content of the foam.

The foam blanket suppresses the release of flammable vapors that can mix with the air.

Special Fire Fighting Procedures; Keeping the fire upwind. Shutting down of all possible sources of ignition, keeping of run-off water out of sewers and water sources. Avoidance of water in straight hose stream which will scatter and spread fire. Use of spray or fog nozzles will be promoted, cool containers will be exposed to flames with water from the side until well after the fire is out.

Hazardous Decomposition Products: gases of Carbon Monoxide (CO) & Carbon Dioxide (CO₂).

(d) Accidental Release Measures

For Spill Cleanup well Ventilation, Shutting off or removal of all possible sources of ignition, absorbance of small quantities with paper towels and evaporate in safe place like fume hood and burning of these towels in a safe manner), Use of respiratory and/or liquid-contact protection by the Clean-up personnel will be promoted.

1.4 Need of Establishing a Fire Fighting Group

A small spark of fire may result into loss of lives, machines and the damage by fire may result in high economic losses. This type of losses can be avoided by preventing and controlling the fire instantly for which fire-fighting group will be established.

The fire fighting group would house and keep in readiness, the following types of equipment and arrangements.

- CO₂ extinguishers
- Dry powder chemical extinguishers
- Foam extinguishers
- 80 mm. spray hoses
- Fire brigade
- Fire hydrant
- Protocol (chemical to combat oil fires).

In order to avoid fire in cable galleries, all the power and control cables of FRLS type (Fire Resistant Low Smoke) will be used.

Inspection

Fire alarm panel (electrical) will cover the entire plant. The inspection group will periodically inspect fire extinguishers in fire stations and machines and other places.

The groups will display emergency telephone number boards at vital points. The group will regularly carry out general inspection for fire.

Procedure for Extinguishing Fire

The following steps will be taken during a fire accident in the system:

- As soon as the message is received about fire, one of the systems will be diverted to the place of the fire accident along with a staff member.
- Simultaneously plant fire station will be informed by phone walkie for fire brigades and fire stations of nearby area.
- In the meanwhile, the pipe system will be operated to obtain maximum pressure on output. In case cables are within the reach of fire, power supply will be tripped and the cables shifted.

Fire Fighting with Water

Adequate and reliable arrangement is required for fighting the fire with water such as:

- Provision for Fire brigade and Fire hydrant.
- Arrangement of pipelines along and around all vulnerable areas.
- Provision of valves at appropriate points to enable supply of water at the required place/area or divert the same to another direction/pipe line.
- Provision of overhead tanks which will be providing water during power failure and it would work by the gravitational force.

Sources of Water for Fire Fighting

The following two sources of water have been considered for firefighting:

- Overhead Tank
- Raw Water Reservoir

Fire Fighting with Fire Extinguishers

To deal with fire - other than carbonaceous fires, which can be deal with by water suitable fire extinguishers are required to do the job effectively. It is therefore necessary to keep adequate number of extinguishers in readiness at easily approachable places. Adequate number of fire stations would be provided.

- Further, other spray groups from the system will be diverted to the spot.
- In case of fire in the belt, belt will be cut near the burning portion to save the remaining parts.
- After extinguishing the fire, the area will be well prepared for reuse.
- Foam System for firefighting will be provided to control fire from the alcohol storage tank. The foam thus produced will suppress fire by separating the fuel from the air (oxygen) and hence avoiding the fire & explosion to occur in the tank. Foam would blanket the fuel surface smothering the fire. The fuel will also be cooled by the water content of the foam.
- The foam blanket suppresses the release of flammable vapours that can mix with the air.

1.5 Environment Health and Safety Cell

Shri Datta Sakhar Karkhana have fully fledged EHS cell (Environment Health & Safety Cell). Main function of EHS cell is to assess the potential risks/hazards to environment, health of employees & society and safety within the plant. Installation of fire fighting system, fire alarm, provision of safety/protective equipment to workers and regular medical check-ups has been taken up. Plant is maintained at zero discharge so no likely impact is likely to occur on environment and society. Also regular monitoring of different parameters is being carried out to ensure safety of environment and society. Trainings and Mock drills are also carried out in regular intervals for workers to ensure the safety in case of any accident or natural hazard.

HSE Policy of M/s. Dalmia Bharat Sugar and Industries Limited:

At Shri Datta Sakhar Karkhana, we have values which assist us in:

- Protecting the health and safety of our employees, our contractors, our customers and our neighbours
- Maintaining the security of our people and assets,
- Protecting the environment.

In addition to compliance with laws and regulatory requirements, our Company will pursue the following objectives:

- Ensure that all activities are conducted in a manner which is consistent with SDSK Health, Safety, and Environment Standards
- Ensure that business activities are conducted to prevent harm to employees, contractors, the public, other stakeholders and the environment.

- Develop, manufacture and market our products with full regard for HSE aspects.

To achieve this we will:

- Set targets and measure progress to ensure continuous improvement in HSE performance
- Provide safe and healthy workplaces for our employees and contractors.
- Provide information, instruction and training to enable employees to meet their responsibility to contribute to compliance with the Policy.
- Provide appropriate HSE information for all contractors and others who work for us.
- Protect the environment by preventing or minimizing the environmental impact due to our activities and products through appropriate design, manufacturing, distribution and by promoting responsible use and disposal practices.
- Develop products and processes that help preserve resources and the environment.

1.6 HSE Organisational Chart

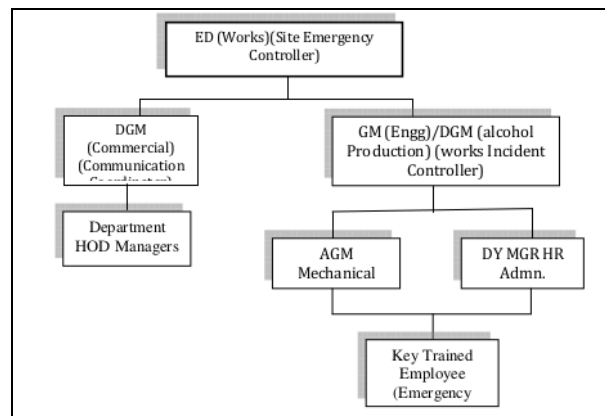


Figure 1: HSE organizational Chart

1.7 Emergency Planning & Procedure

Emergency Control Center

Emergency Control Centre (ECC) is cell from which emergency operations are directed and coordinated. This centre activates as soon as on-site emergency is declared.

General Description of ECC

The ECC is located in an area that offers minimal risk being directly exposed to possible accidents.

During an emergency, the Emergency Management Staff, including the site controller shall gather in the ECC. Therefore, the ECC shall be equipped with adequate communication systems in the form of telephones and other equipment to allow unhampered organizations and other nearby facility personnel.

The ECC provides shelter to its occupants against the most common accidents; in addition, the ECC's communication systems are protected from possible shutdown. The ECC has its own emergency lighting arrangement and electric communication systems operation. Figure 2 shows Team involved in Emergency planning & Table 3 shows names, details and contact no's of Emergency Task Force.

Only a limited and prearranged number of people are admitted to the ECC, when in use. This eliminates unnecessary interference and reduces confusion.

The ECC is always ready for operation and provided with the equipment and supplies necessary during the emergency such as:

- Updated copies of the On-site Disaster Management Plan.
- Emergency telephone numbers.
- The names, phone number, and address of external agencies, response organizations and neighbouring facilities.
- The adequate number of telephone (more than two).
- Emergency lights, Clocks, Personal protective equipment.
- List of fire extinguishers with their type no. and location, capacity, etc.
- Safety helmets - List of quantity & location.
- Status boards/message board.
- Material safety data sheets for chemicals handled at the facility.
- Several maps of the facility including drainage system for surrounding area showing:
 - Areas where hazardous materials are stored.
 - Plot plans of storage tanks, routes of pipelines, all water permanent lines etc.
 - The locations where personal protective equipment are stored.
 - The position of pumping stations and other water sources.
 - Roads and plant entrances.
 - Assembly areas & layout of Hydrant lines.

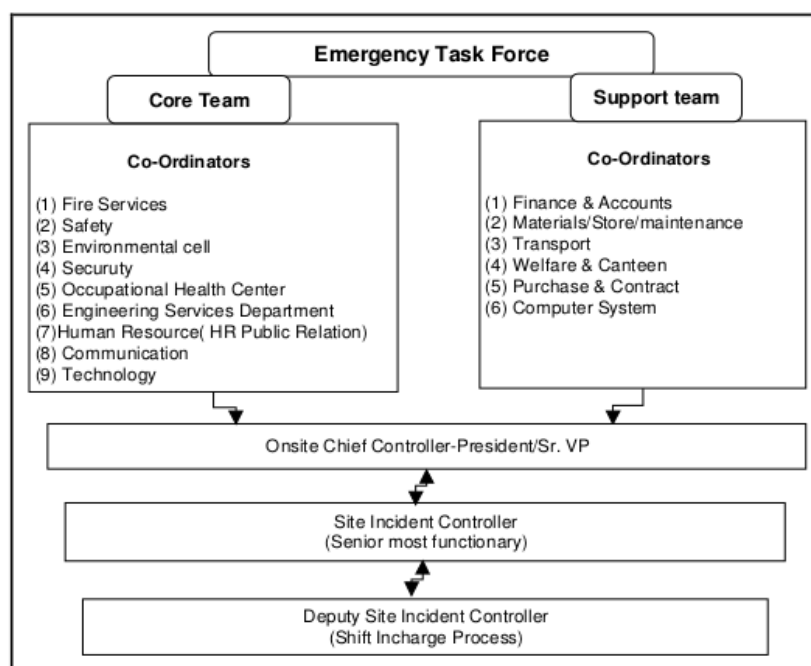


Figure 2: Emergency Team

Table - 3

Emergency Task Force

S. No.	Name	Name
Core Team Coordinators		
1.	Fire Services	Mahalaxmi Fire Service Kolhapur
2.	Safety Services	Capt. Bikram singh
3.	Environmental Cell	Sh. Shivaji Unnane
4.	Security Services	Rutu Security Services
5.	Occupational Health Center	Dr. Manoj Naik
6.	Engineering Services Department	Sh. TN Singh
7.	Human Resource (Public Relation)	Sh. Suhas Yadav
8.	Communication Services	Mr. Kuldeep Khobragade
9.	Technology/Technical Division	Mr. Santosh Dass
Support Team Co-ordinators		
10.	Finance & Accounts	Sh. Bhimagouda Khalute
11.	Material/Stores	Sh. Rakesh singh
12.	Transport	Capt. Bikram Singh
13.	Welfare & Canteen	Capt. Bikram Singh
14.	Purchase & Contract	Mr. Deepak Singh
15.	Computer system/Control room	Mr. Santosh Dass

1.8

Emergency Planning for Disaster due to Fire

Cable rooms, transformer, unit, auxiliary transformers, oil tanks, etc. within the plant are the likely areas for which disaster management plan is to be made to deal with any eventuality of fire. Stores, workshop, canteen and administrative building will be included.

2.0

DISASTER MANAGEMENT PLAN

Definition

A major emergency in an activity/project is one which has the potential to cause serious injury or loss of life. It may cause extensive damage to property and serious disruption both inside and outside the activity/project. It would normally require the assistance of emergency services to handle it effectively.

Scope

An important element of mitigation risk is planning for emergency, i.e. identifying accident possibility, assessing the consequences of such accidents and deciding on the emergency procedures, both on site and off site that would need to be implemented in the event of an emergency.

Objective

The overall objectives of the emergency plan will be:

- To localize the emergency and, eliminate it; and
- To minimize the effects of the accident on people and property.

Elimination will require prompt action by operations and works emergency staff using, for example, fire-fighting equipment, water sprays etc.

Minimizing the effects may include rescue, first aid, evacuation, rehabilitation and giving information promptly to people living nearby.

2.1 Phases of Disaster

There are various phases of Disaster including pre and Post Management of Hazardous Event that may or has occurred.

Warning Phase

Emergencies /disasters are generally preceded by warnings during which preventive measures may be initiated. For example uncontrollable build-up of pressure in process equipment, weather forecast give warning about formation of vapour cloud, equipment failure etc.

Period of Impact Phase

This is the phase when emergency /disaster actually strike and preventive measures may hardly be taken. However, control measures to minimize the effects may be taken through a well-planned and ready-to-act disaster management plan already prepared by organization. The duration may be from seconds to days.

Rescue Phase

This is the phase when impact is almost over and efforts are concentrated on rescue and relief measures.

Relief Phase

In this phase, apart from organization and relief measures internally, depending on severity of the disaster, external help are also to be summoned to provide relief measures (like evacuations to a safe place and providing medical help, food clothing etc.). This phase will continue till normalcy is restored.

Rehabilitation Phase

This is the final and longest phase. During which measures required to put the situation back to normal as far as possible are taken. Checking the systems, estimating the damages, repair of equipment and putting them again into service are taken up. Help from revenue/insurance authorities need to be obtained to assess the damage, quantum of compensation to be paid etc.

2.2 On-Site Emergency Plan

The onsite emergency is an unpleasant situation that causes extensive damage to plant personnel and surrounding area and its environment due to in operation, maintenance, design and human error. Onsite plan will be applied in case of proposed expansion. Following points are to be taken into consideration:

- To identify, assess, foresee and work out various kinds of possible hazards, their places, potential and damaging capacity and area in case of above happenings.
- Review, revise, redesign, replace or reconstruct the process, plant, vessels and control measures if so assessed.
- Measures to protect persons and property of processing equipment in case of all kinds of accidents, emergencies and disasters
- To inform people and surroundings about emergency if it is likely to adversely affect them

2.2.1 Disaster control Management system

Disaster Management group plays an important role in combating emergency in a systematic manner. Schematic representation Emergency Control Management system for Shri Datta Sakhar is shown in figure below & list of team onsite is given in table below.

Table - 4

Disaster Control Management System

S. No.	Particulars	Name
1.	Onsite Chief Controller (Executive Director)	Sh KP Singh
2.	Site Incident controller	Sh TN Singh
3.	Deputy Site Incident Controller	Sh Gyandera Mishra
4.	Plant Manager	Sh TN Singh
5.	H.O.D (Personal & Administration)	Sh Suhas Yadav
6.	Section In charge (unit wise)	Sh Gaurav DS
7.	Maintenance Team	Mr Naveen Babu
8.	Medical Coordinator	Dr Manoj Naik
9.	Govt liasen team coordinator	Sh Bhimagouda Khalute
10.	Maintenance Team coordinator	Mr Manish Agarwal
11.	Fire & Security coordinator	Capt Bikram Singh
12.	Communication Coordinator	Mr Kuldeep Khobragade
13.	Emergency coordinator	Sh Suhas Yadav
14.	Personal& Administrative Manager	Capt Bikram Singh
15.	Transport coordinator	Capt Bikram Singh

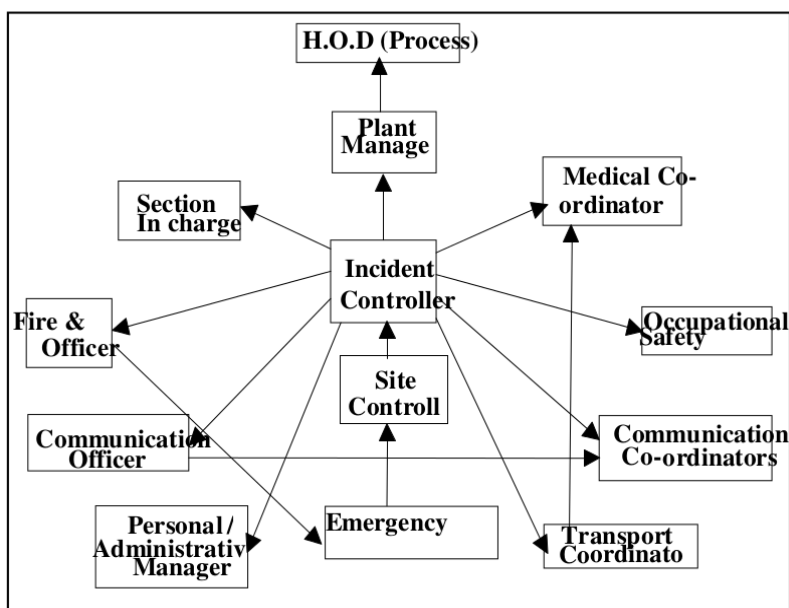


Figure 3: Onsite DMP - Disaster Control / Management System

2.2.2 Control Room Facility

Following are the facilities to be provided at the control room of Dalmia Bharat Sugar & Industries Ltd to tackle the emergency failure scenarios:

- Fire Detection System is to be installed in the control room
- VHF base station with a range of 25 km and VHF handsets of range 5 km is to be installed for ready communication in emergency
- Public address System (PAS) is to be installed to ease the communication to various corners of the site
- The duties and responsibilities of different co-ordinators of Onsite Disaster Management Plan are to be displayed in the Control Room.

2.2.3 Alarm System

A siren shall be provided under the control of Security office in the plant premises to give warning. In case of emergencies this will be used on the instructions to shift in charge that is positioned round the clock. The warning signal for emergency shall be as follows:

- Emergency Siren: Waxing and waning sound for 3 minutes.
- All clear signal: Continuous siren for one minute.

2.2.4 Communication

Walkies & Talkies shall be located at strategic locations; internal telephone system EPBX with external P&T telephones would be provided.

2.2.5 Fire Protection System

The fire protection system for the unit is to provide for early detection, alarm, containment and suppression of fires. The fire detection and protection system has been planned to meet the above objective an all-statutory and insurance requirement of Tariff Advisory Committee (TAC) of India. The complete fire protection system will comprise of the following.

Fire Fighting Facility: Available in existing unit and will be maintained in future System Description of Fire Fighting System

The entire fire safety installation shall be compliant with the most stringent codes / standard for the entire complex to ensure the highest safety standard and uniformity of system. Further, before property is operational, the fire protection shall be fully operated and tested under simulated conditions to demonstrate compliance with the most stringent standards, codes and guidelines.

A) Fire pumping system

The fire pumping system shall comprise of independent electrical pumps for hydrant and sprinkler system, diesel engine driven pump & jockey pump for hydrant & sprinkler system.

Electrical pump shall provide adequate flow for catering requirement of hydrant system. Diesel engine driven fire pumps shall be provided for ensuring operation & performance of the system in case of

total electrical power failure. Jockey pumps shall compensate for pressure drop and line leakage in the hydrant and sprinkler installation. Provision of PRS/ orifice plate shall be made in sprinkler riser to restrict pressure on sprinkler system.

Individual suction lines shall be drawn from the fire reserve tanks at the basement level and connected to independent fire suction header. The electric fire pumps, diesel engine driven fire pumps and the jockey pumps shall all draw from this suction header.

Delivery lines from various pumps shall also be connected to a common header in order to ensure that maximum standby capacity is available. The sprinkler pump shall be isolated from the main discharge header by a non return valve so that the hydrant pump can also act as standby for the sprinkler system. The ring main shall remain pressurized at all times and Jockey pumps shall make up minor line losses. Automation required to make the system fully functional shall be provided.

B) Fire hydrant system

Internal and external standpipe fire hydrant system shall be provided with landing valve, hose reel, first aid hose reels, complete with instantaneous pattern short gunmetal pipe in the Complex.

The internal diameter of inlet connection shall be at least 80 mm. The outlet shall be of instant spring lock type gunmetal ferrule coupling of 63 mm dia. for connecting to hose pipe. Provision of flow switch on riser shall be made for effective zone monitoring. The flow switch shall be wired to FAP and shall indicate water flow on hydrant of the identified zone.

Recessed cupboard/ fire hydrant cabinet shall be strategically located for firefighting requirement. Location of cabinets shall be accessed as per compartmentation plan in consultation with the Architect. Provision of fire man's axe shall be made for internal hydrant.

External hydrant shall be located within 2 m to 15 m from the building to be protected such that they are accessible and may not be damaged by vehicle movement. A spacing of about 45-50 m between hydrants for the building shall be adopted. Details of fire hydrant system are as follows:

Piping: Mild Steel pipes (heavy class) as per IS: 1239 shall be provided throughout the complex. Pipes buried below ground shall be suitably lagged with 2 layers of 400 micron polythene sheet over 2 coats of bitumen.

External Hydrants: External hydrants shall be provided all around the Complex. The hydrants shall be controlled by a cast iron sluice valve or butterfly valve. Hydrants shall have instantaneous type 63mm dia outlets. The hydrants shall be double outlet with CI duck foot bend and flanged riser or required height to bring the hydrant to correct level above ground.

For each external fire hydrant two numbers of 63mm dia. 15 m long controlled percolation hose pipe with gunmetal male and female instantaneous type couplings machine wound with GI wire, gunmetal branch pipe with nozzle shall be provided.

Each external hydrant hose cabinet shall be provided with a drain in the bottom plate.

Each hose cabinet shall be conspicuously painted with the letters "FIRE HOSE".

Internal Hydrants: Internal hydrant shall be provided on each landing and other locations as required by NBC with double headed gunmetal landing valve with 100 mm dia inlet, with shut off valves having cast iron wheels. Landing valve shall have flanged inlet and instantaneous type outlets.

Instantaneous outlets for fire hydrants shall be standard pattern and suitable for fire hoses.

For each internal fire hydrant station two numbers of 63 mm dia. 15 m long rubberized fabric lined hose pipes with gunmetal male and female instantaneous type coupling machine would with GI wire, fire hose reel, gunmetal branch pipe with nozzle shall be provided.

Standard fire hose reels of 20mm dia high pressure rubber hose 36.5 m long with gunmetal nozzle, all mounted on a circular hose reel of heavy duty mild steel construction having cast iron brackets shall be provided. Hose reel shall be connected directly to the wet riser with an isolating valve. Hose reel shall be mounted vertically.

Each internal hydrant hose cabinet shall be provided with a drain in the bottom plate. The drain point shall be led away to the nearest general drain.

Each internal hydrant hose cabinet containing items as above shall also be provided with a nozzle spanner and a Fireman's Axe. The cabinet shall be recessed in the wall.

Each hose cabinet shall be conspicuously painted with the letters "FIRE HOSE".

Hose Reel: Hose reel shall be heavy duty, 20 mm dia, length shall be 36.5 metre long fitted with gun metal chromium plated nozzle, mild steel pressed reel drum which can swing upto 170 degree with wall brackets of cast iron finished with red and black enamel complete.

C) Sprinkler system

Elaborate automatic sprinkler system shall be provided. The system shall be suitably zoned for its optimum functional performance.

The sprinkler system shall be provided with control valves, flow and tamper switches at suitable location and shall be connected to control module of the fire alarm system for its monitoring and annunciation in case of activation.

Sprinkler type along with its Quartzite bulbs rating shall be selected based on the requirement of the space and shall be specified accordingly. Inspector's test valve assembly with sight glass shall be provided at remote end with discharge piped to drain outlet / pipe.

D) Fire Extinguishers

Portable fire extinguishers of water (gas pressure), Carbon-di-oxide, foam type, Dry Chemical Powder and FM-200 or Clean agent type shall be provided as first aid fire extinguishing appliances. These extinguishers shall be suitably installed in the entire areas as per IS: 2190.

The appliances shall be so installed over the entire sections, that a person is not required to travel more than 15 m to reach the nearest extinguisher. These shall be placed or hanged on wall in a group on several suitable places.

E) Fire Pump

The fire pump shall be horizontally mounted, variable speed type. It shall have a capacity to deliver and developing adequate head so as to ensure a minimum pressure at the highest and the farthest outlet. The pump shall be capable of giving a discharge of not less than 150 per cent of the rated discharge, at a head of not less than 65 per cent of the rated head. The shut off head shall be within 120 per cent of the rated head.

The pump casing shall be of cast iron and parts like impeller, shaft sleeve, wearing ring etc. shall be of non-corrosive metal like bronze/brass/gun metal. The shaft shall be of stainless steel. Provision of mechanical seal shall also be made.

Bearings of the pump shall be effectively sealed to prevent loss of lubricant or entry of dust or water. The pump shall be provided with a plate indicating the suction lift, delivery head, discharge, speed and number of stages. The pump casing shall be designed to withstand 1.5 times the working pressure.

F) Foam System for Fire Fighting

Aqueous Film-Forming Foams (AFFF) based on combinations of fluoro-chemical surfactants, hydrocarbon surfactants, and solvents will be used as foam agent. These agents require a very low energy input to produce a high quality firefighting foam.

Foam concentrate will be stored in a bladder tank system. In AFFF systems a bladder tank containing a nylon reinforced elastomeric bladder is used to store the foam concentrate. System water pressure is used to squeeze the bladder providing firefighting foam concentrate, at the same pressure, to the proportioner.

An aqueous film will be formed on the surface of the alcohol by the foam solution as it drains from the foam blanket.

This film is very fluid and floats on the surface of most alcohol. This gives the AFFF unequalled speed in fire control and control the spill fire.

First Aid

A first aid centre with adequate facilities shall be provided. It shall be maintained round the clock by a compounder cum dresser and a doctor. An Ambulance shall also be provided at site to carry affected people to hospital.

Security

The security requirements of the company premises shall be taken care of by CSO assisted by a Fire In charge. The team, apart from the normal security functions will manage the role required during a disaster management operation as a part of the crisis control team.

Safety

The safety wing led by a Safety Manager will meet the requirement of emergencies round the clock. The required safety appliances shall be distributed at different locations of the plant to meet any eventualities. Poster/placards reflecting safety awareness will be placed at different locations in the plant area.

Evacuation Procedure

As the major hazard is only due to fire, which has more or less localized impact no mass evacuation, procedures are required. Evacuation would involve only the people working very close to the fire area.

Personal Protective Equipments (PPE)

This equipment is used mainly for three reasons; to protect personnel from a hazard while performing rescue/accident control operations, to do maintenance and repair work under hazardous conditions, and for escape purposes. The list of Personal Protective Equipment provided at the facility and their locations shall be available in ECC.

Effective command and control accomplish these functions necessitates personal trained in this On-site Disaster Management Plan with adequate facilities and equipments and equipment to carry out their duties and functions. These organizations and the facilities required to support their response are summarized in the following subsections.

Personal protective equipments play a vital role in overcoming major disastrous situation saving life during onsite emergency. List of recommended Personal Protective equipment (PPE) is given below in Table.

Table - 5

Summary of Recommended Personal Protective Equipment According to Hazard Onsite

Objective	Workplace Hazards	Suggested PPE
Eye and face protection	Flying particles, molten metal, liquid chemicals, gases or vapors, light radiation	Safety glasses with side-shields, protective shades, etc.
Head protection	Falling objects, inadequate height clearance, and overhead power cords	Plastic helmets with top and side impact protection
Hearing protection	Noise, ultra-sound	Hearing protectors (ear plugs or ear muffs)
Foot protection	Falling or rolling objects, points objects. Corrosive or hot liquids	Safety shoes and boots for protection against moving and falling objects, liquids and chemicals
Hand protection	Hazardous materials, cuts or lacerations, vibrations, extreme temperatures	Gloves made of rubber or synthetic material (Neoprene), leather, steel, insulation materials, etc.
Respiratory protection	Dust, fogs, fumes, mists, gases, smokes, vapors	Facemasks with appropriate filters for dust removal and air purification (chemical, mists, vapors and gases). Single or multi-gas personal monitors, if available
	Oxygen deficiency	Portable or supplied air (fixed lines). Onsite rescue equipment
Body / leg protection	Extreme temperatures, hazardous materials, biological agents, cutting and laceration	Insulating clothing, body suits, aprons etc. of appropriate materials
Contact with HSD	Fuel Oil storage and Fuel Handling	Canister type gas mask. PVC or Rubber. Goggles giving complete protection to eyes. Eye wash fountain with safety
Fly Ash	Fly ash handling and storage	Wear dust-proof goggles and rubber or PVC gloves. When using large quantities or where heavy contamination is likely, wear: coveralls. At high dust levels, wear: a Full-face Class P3

		(Particulate) or an Air-line respirator where an inhalation risk exists, wear: a Class P1 (Particulate) respirator.
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Mock Drill

As per the Industrial Major Accident Hazard Rules,

- Mock drills of the on-site emergency plan are conducted every month.
- A detail report of the mock drill conducted is to be made immediately available to all the concerned authority
- Also, Major Fire and Minor Fire mock drills are conducted once in three months and one month respectively.

Training

On job training to the engineers on various stages of risk analysis and preparedness during emergency to reflect in the operation of terminal, especially from the safety stand point The fire team belonging to the fire fighting department are to be intensively trained for the use of all equipment and in various fire fighting methods for handling different types of fires.

Details of Training facilities for	
• safety	Monthly
• Fire Fighting	Monthly
• Occupational Health & safety	Monthly

Procedure for Testing & Updating the Plan

Simulated emergency preparedness exercises and mock fire fighting exercises including mutual aid scheme resources and in conservation with district emergency authority to be carried out time to time.

Disclosure of Information to Worker & Public Awareness System in Existence & Anticipated

- Safety awareness among workers by conserving various training programs and Seminars, competition, slogans etc.
- Practical exercise.
- Distribution and practices of safety Instructions.
- Safety Quiz contests.
- Display of Safety Posters & Safety Slogans.
- Developing Safety Instructions for every Job and ensuring these instructions/booklets or manuals by the workers.

2.3 Off-Site Emergency Planning

The off-site emergency plan is an integral part of any hazard control system. It is based on those accidents identified by the works management, which could affect people and the environment outside the works. Thus, the off-site plan follows logically from the analysis that took place to provide the basis for the on-site plan and the two plans therefore complement each other. The roles of the

various parties that may be involved in the implementation of an off-site plan are described below. The responsibility for the off-site plan will be likely to rest either with the works management or with the local authority. Schematic representation of various organization involved during emergency is shown below in Figure & Table shows details with Communication No's during Offsite Emergency.

Table - 6

Local Statutory Government bodies

S. No.	Name of Govt. Agency	Phone Nos.
1	District collector	0231-2654811
2	Sub Divisional Officer	02328-235026
3	Factory Inspector of the area	0231-2656922
4	PCB Head Quarters	0231-2662433
5	DCP Traffic (HQ/Control room)	0231-2657591
7	Addnl. Commissioner of Police	0231-2656163
8	Fire Brigade	0231-2537221
9	Police Station (Panhala)	02328-235054
10	Director Ind. Safety & Health	022- 26572504,26572509
11	Addl. Director Civil Defense	-
12	Fire Advisor (Maharashtra)	022-26677555
13	DGFASLI	-
14	Dy. Chief Controller of Explosive	-
15	Govt Hospital(nearest)	CPR Kolhapur 0231-2644369
16	Civil Surgeon	0231-2644233

Either way, the plan must identify an emergency coordinating officer who would take overall command of the off-site activities. Consideration of evacuation may include the following factors:

- In the case of a major fire but without explosion risk (e.g. an oil storage tank), only houses close to the fire are likely to need evacuation
- If fire is escalating very fast it is necessary to evacuate people nearby as soon as possible
- In acute emergency people are advised to stay indoors and shield themselves from the fire.

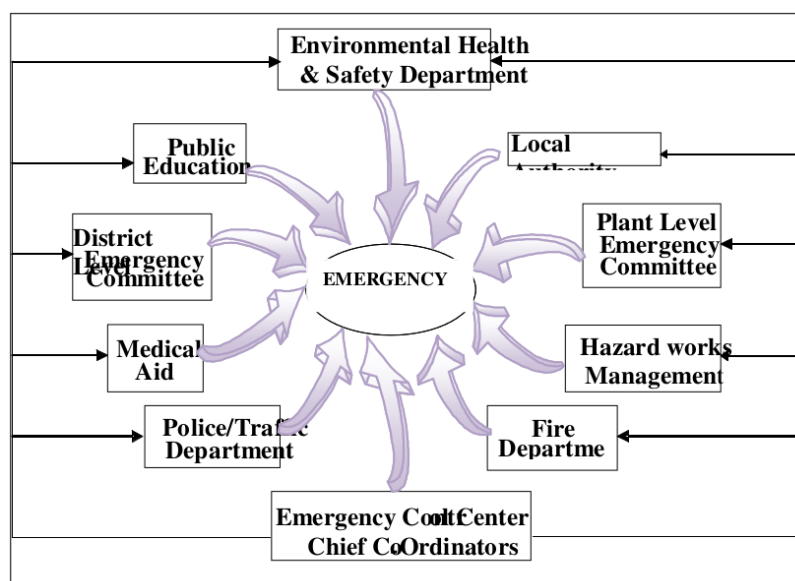


Figure 4: Various Organizations Involved During Emergency

Organization

Organizational details of command structure, warning systems, implementation procedures, emergency control centres include name and appointments of incident controller, site main controller, their deputies and other key personnel involved during emergency.

Communications

Identification of personnel involved, communication centre, call signs, network, list of telephone numbers.

Special Emergency Equipment

Details of availability and location of heavy lifting gear, specified fire-fighting equipment, fireboats etc.

Voluntary Organizations

Details of Voluntary organizations, telephone numbers nearby of hospitals, Emergency helpline, resources etc are to be available with chief authorities.

Non-governmental Organizations (NGO)

NGO's could provide a valuable source of expertise and information to support emergency response efforts. Members of NGOs could assist response personnel by performing specified tasks, as planned during the emergency planning process.

- Evacuation of personnel from the affected area
- Arrangements at rallying posts and parking yards
- Rehabilitation of evacuated persons

Chemical information

Details of the hazardous substances (MSDS information) and a summary of the risks associated with them are to be made available at respective site.

Meteorological information

There are arrangements for obtaining details of weather conditions prevailing at or before the time of accident and weather forecasts updates.

Humanitarian Arrangements

Transport, evacuation centres, emergency feeding, treatment of injured, first aid, ambulances, temporary mortuaries.

Public Information

- Dealing with the media-press office
- Informing relatives, etc.

Assessment

Collecting information on the causes of the emergency

Reviewing the efficiency and effectiveness of all aspects of the emergency plan.

Role of local authority

Local Authorities like Panchayat, Sabha, Samity, municipalities can help in combating emergency situation after assessing the impact scenario in rescue phase.

Role of police

The police is to assist in controlling of the accident site, organizing evacuation and removing of any seriously injured people to hospitals.

- Co-ordination with the transport authorities, civil defence and home guards
- Co-ordination with army, navy, air force and state fire services
- Arrange for post mortem of dead bodies
- Establish communication centre with easy contact with ECC

Role of Fire Brigade

The fire brigade is to be organized to put out fires and provide assistance as required during emergency.

Media

- The media is to have ready and continuous access to designated officials with relevant information, as well as to other sources in order to provide essential and accurate information to public throughout the emergency and to avoid commotion and confusion.
- Efforts are made to check the clarity and reliability of information as it becomes available, and before it is communicated to public
- Public health authorities are consulted when issuing statements to the media concerning health aspects of chemical accidents
- Members of the media are to facilitate response efforts by providing means for informing the public with credible information about accidents involving hazardous substances

Role of health care authorities

- Hospitals and doctors must be ready to treat all type of injuries to casualties during emergency.
- Co-ordinate the activities of Primary Health Centres and Municipal Dispensaries to ensure required quantities of drugs and equipments
- Securing assistance of medical and paramedical personnel from nearby hospitals/institutions
- Temporary mortuary and identification of dead bodies.

3.0

Conclusion

It is concluded that there will be no major risk involved due to proposed expansion project. Proper precautionary measures are being/ will be taken to minimize risks. Personal Protective Equipments (PPEs) will help to minimize the health hazards and accidental casualties. So it is safe to say that there is being/ will be no major risk involved due to the proposed expansion project.

