CHAPTER-7
RISK ASSESSMENT & DISASTER MANAGEMENT PLAN

This Chapter provides the details about the Risk Assessment, Disaster Management Plan (DMP) and on-site emergency plan as proposed for the new project. Brief summary of additional studies (Occupational Health & Safety, Need Based Assessment Survey etc.) carried out.

7.1 Hazard Identification

In practical terms, hazard identification is a thorough look at the workplace and processes to identify those things, situations, processes that may cause harm, particularly to the working force and nearby population. After identification of the potential hazards, one has to evaluate it potential to cause harm and then decide what type of control measures shall be taken to control it from the happening.

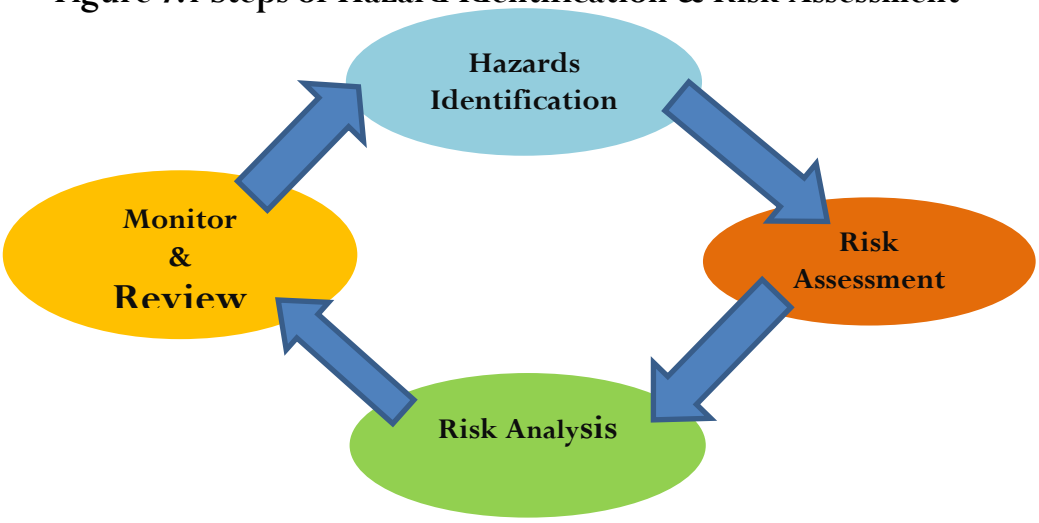
Hazard identification is very important tool as it is integral part of a good occupational health and safety management plan. The aim of the hazard identification process is to reduce level of risk by taking precautions or initiating control during project execution.

The various hazard analysis techniques that may be applied are Hazard and Operability (HAZOP) studies, Fault – Tree Analysis (FTA), event –tree analysis and failure and effects mode analysis.

7.1.1 Hazard Identification & Risk Assessment (HIRA)

The purpose of a Hazard Identification and Risk Assessment (HIRA) is to understand what risks or threats to public safety, property or the environment exist.

Figure 7.1 Steps of Hazard Identification & Risk Assessment



Hazard Identification and Risk Assessment (HIRA) Process,

- Identification of hazards
- Analyze or evaluate the risk associated with the hazards
- Determine appropriate ways to eliminate or control the hazards
- Evaluate the likelihood of an injury or illness occurring, and its severity
- Review of all available health and safety information about the hazard including MSDS, manufacturer's literature, information from organizations and results of testing
- Identify actions necessary to eliminate or control the risk
- Monitoring to confirm the risk is controlled
- Keep any documentation or records that may be necessary. Documentation may include detailing the process used to assess the risk, outlining any evaluations, or detailing how conclusions were made.

7.1.2 Identification Hazard

Details of major anticipated risks from the Hazards is given in **7.1**

Table 7.1: Hazards of the proposed plant

S.No.	Name	Description	Severity	Hazard
1	**Transportations of raw material**	Molasses	Major	Exposure
		Yeast, Urea	Minor	Exposure & inhalation
		Sulphate Acid, Di Ammonium Phosphate	Major	Exposure & Inhalation
		Anti-foam Reagent, Caustic soda		
2	**Storage of Molasses & Products**	Molasses, RS/Technical Alcohol, fuel oil	Major	Explosion, Fire
3	**Manufacturing process**	Fermentation	Major	Fire
		Distillation Unit	Major	Heat & fire
		Power generation unit	Major	Heat fire & electrocution
4	**Utilities**	Boiler, Turbine	Major	Heat, fire & electrocution
	Other accidents	Leakages from the vessels, Catastrophic rupture of pressure vessels and Storage Tanks	Major	Exposure and Fire

7.2 Risk Assessment

Risk analysis deals with the identification and quantification of risks, the plant equivalent and personnel are exposed to, due to accidents resulting from the hazards present in the factory. Risk classification table is given in **Table 7.2.**

Table 7.2 Risk classification

	Rare	Unlikely	Possible	Likely	Almost Certain
Catastrophic (5)	Moderate Risk	Moderate Risk	High Risk	Critical Risk	Critical Risk
Major (4)	Low Risk	Moderate Risk	High Risk	High Risk	Critical Risk
Moderate (3)	Low Risk	Moderate Risk	Moderate Risk	High Risk	High Risk
Minor (2)	Low Risk	Low Risk	Moderate Risk	Moderate Risk	Moderate Risk
Insignificant (1)	Low Risk	Low Risk	Low Risk	Low Risk	Moderate Risk

Table 7.3 Risk Score

Risk Score	Risk Level Category	Description
1 to 4	Low Risk	Manage by routine procedure and operations should not require much attention but should be received at least every 18 Months
5 to 10	Moderate risk	Manage by specific monitoring or response should not monitored and received every 12 months
11 to 18	High Risk	Require escalation to VP, should be constantly monitored and received every 3 months
19 to 25	Critical Risk	Requires escalation to Board committee responsible for risk management oversight should be constantly monitored and received monthly

7.2.1 Potential risk and mitigation measures for during construction phase

Risk impact and mitigation measures during construction phase are describes in **Table 7.4**

Table 7.4: Risk Impact and rating matrix during construction phase

Activity	Associated Hazard	Health impact	Risk Rating	Proposed Mitigation measures and control
Site Levelling	Vehicle movement, Insect/Snack bite	Physical injury and organ damage	M	Providing PPEs to workers Appointing the qualified persons for the particular job. Speed limit control Providing Training
Loading and Unloading of material	Accidents	Physical Injury	M	Providing PPEs to workers Training to workers
Excavation	Falling objects or objects near an excavation Slips, trips, and falls	Property Loss Physical injury	M	• Work Permit System shall be followed. • Excavated material shall be stacked safely. • Area shall be barricaded • Training to workers • PPEs shall be provided
Construction	Structure may fall down Workers may fall down from the height.	Physical Injury Physically handicapped Property Loss	H	• Work Permit System shall be followed. • Height work permit shall be issued to the person. • Safety belt shall be provided to workers Training to workers
Cutting and Welding	fire or explosion Electric shock from and electrical welding	Physical Injury Burn Injury Property loss	H	Standards Work Procedure • Training shall be provided • Proper PPEs shall be provided. • Regular monitoring of electrical equipment's to avoid loose connection. Area shall be barricaded
Installation of Machineries	Structure may collapse	Property loss Physical Injury	M	• Only authorized person shall operate the machine • Appropriate platform shall be designed as per the load bearing calculation.

7.2.2 Potential risk and mitigation measures during operation phase

7.2.2.1 Boiler Operation

The potential risk and its mitigation measures for Boiler operation is given in Table 7.5.

Table 7.5: Risk Impact and rating matrix for Boiler operation

S. No.	Activity	Associated Hazards	Health Impact	Risk Rating	Proposed mitigation and control measures
1.	Working near Boiler	High Noise	Noise induced hearing loss	M	Required PPEs need to used
2.	Boiler Maintenance	Explosion	Risk Severe injury, damage to equipment	M	PPEs Regular monitoring Individual vigilance and proper training to worker for proper handling Provision of first aid box
3.	High pressure steam	Explosion	Risk severe injury damage to equipment	H	Required PPEs Good housekeeping Regular monitoring of the storage facility Flammable chemical stored away from the source of ignition Firefighting facility Provision of first aid box
4.	Incomplete combustion	Asphyxiation from carbon monoxide	Possible fatality	H	Online CO monitor Regular checking workplace Individual alertness precaution
5.	Maintenance work	Slips, trips and falls	Physical injury	M	PPEs Individual alertness precaution
6.	Electrical maintenance work	Electricity	Electric shock possible burns	H	Regular checking and maintenance of electrical units PPEs Provision of First aid box
7.	Maintenance of burner	Burn injury	Severe Physical injury or burn	M	PPES shall be provided. Work shall be carried out under proper supervision. Follow of SOPs. Individual alertness and precaution is important Provision of First aid box

7.2.2.2 Risk during D.G. set operation

Table 7.6: Risk Impact and rating matrix for D.G. set operation

S. No.	Activity	Associated Hazards	Health Impact	Risk Rating	Proposed mitigation and control measures
1.	Working near DG	High noise	Noise induced hearing loss	M	Use of PPEs Acoustic enclosure
2.	Maintenance	Fire	Burns, Serious injury	H	Restricted Entry Use of flame proof fittings Use of PPEs
3.	HSD Storage	Fire/Leakage	Risk of severe physical injury and burn	H	Storage shall be away from ignition source Regular monitoring to check the leakages and spillages Firefighting facility shall be provided PPEs shall be provided First aid box
4.	DG set maintenance	Mechanical Hazard	Physical injury	M	PPEs Leakage and heat in the joint shall be checked before maintenance First aid box at approachable place

7.2.2.3 Hazard & Associated Risk of Storage and Handling of Raw Material

Impact matrix for risk associated with storage and handling of material is given in Table 7.7. alcohol storage Tanks details are given in Table 7.9.

Table 7.7 Hazard & Associated Risk of Storage and Handling of Raw Material

S. No.	Activity	Associated Hazards	Health Impact	Risk Rating	Proposed mitigation and control measures
1.	Storage, handling, loading & Unloading of material	Exposure, leakage, Fire, Explosion	Physical Injury, burn, Eye irritation and respiratory problem	H	• Provision of Eye wash • Inspection and regular monitoring of storage area • Training to Workers for proper handling • PPEs shall be provided as Nose mask, Hand gloves. • Proper system for loading operation to prevents spillage • Provision of level indicators for storage Tanks • Spill kit for Acid and • other chemicals • Proper ventilation • First Aid boxes
2.	Transportation	Fire, Accident, leakage	Burns, serious injury	H	Firefighting facility • Training to Driver • MSDS (Material Safety Data Sheet) • TREM Card (Transport Emergency Card) • First Aid Box

7.2.2.4 Hazard & associated Risk of Molasses storage tank

Molasses can ferment if excessive moisture contamination is allowed. Fermentation can yield carbon dioxide with possible traces of ethanol or volatile fatty acids (e.g. acetic, propionic, lactic, or butyric) and if exposed to a spark or flame may result in an explosion. Fermentation may also occur in dilute surface layers formed by condensation from the headspace above the liquid.

Table 7.8: Impact matrix of storage of molasses

S. No.	Activity	Associated Hazards	Health Impact	Risk Rating	Proposed mitigation and control measures
1.	Storage and Handling	Explosion	• May cause slight Irritation • May cause irritation	H	• Proper ventilation shall be provided • Inspection and regular monitoring of storage area • Training to Workers for proper handling • PPEs shall be provided as Nose mask, Hand gloves. • Provision of level indicators for storage Tanks • If causes eye irritation wash area with soap, flood eye with water and water

Table 7.9: Storage Tanks details

1.	Spent Wash Storage Tank	6000.00 m^3 (Storage for 7 Days as per CPCB) (Lined Lagoon)	
2.	Bagasse	Fuel yard	2500.00 m^2
3.	Ash	Ash Yard	5.351 Acre

Source: Detailed Project Report

S.No	Location	Description	No. of Tank	Gross Capacity of each tank	Size
					Dia*Height
1	Absolute Alcohol Storage Tank **(Receiver Section)**	AA Daily receive from C-Molasses	3	165 KL	5.7 x 6.5
2	Absolute Alcohol Storage Tank **(Storage Section)**	AA bulk storage tank from C-molasses	2	1800 KL	12.7 x 14.25
3	Absolute Alcohol Storage Tank **(Issue Section)**	AA issue tank from C- Molasses	1	165 KL	5.7 x 6.5
4	Absolute Alcohol	AA daily receive from	3	165 KL	5.7 x 6.5

	Storage Tank **(Receiver Section)**	B-heavy molasses			
5	Absolute Alcohol Storage Tank **(Storage Section)**	AA bulk storage tank from B-heavy molasses	2	1800 KL	12.7 x 14.25
6	Absolute Alcohol Storage Tank **(Issue Section)**	AA issue tank from B-heavy Molasses	1	165 KL	5.7 x 6.5
7	Alcohol Storage Section	ENA daily receiver	3	100 KL	4.5 x 6.5
8	Alcohol Storage Section	TA daily receiver	3	5 KL	1.85 x 1.875
9	Alcohol Storage Section	FO Tank	2	10 KL	2.6 x 2.0
10	Alcohol Storage Section	ENA bulk storage tank	1	1800 KL	12.7 x 14.25
11	Alcohol Storage Section	TA bulk storage tank	1	150 KL	5.7 x6.5
12	Alcohol Storage Section	ENA issue tank	1	100 KL	4.5 x 6.5
13	Absolute Alcohol Storage Tank	Denatured AA issue tank molasses	1	165 KL	5.7 x 6.5
14	Absolute Alcohol Storage Tank	Denatured AA issue tank molasses	2	165 KL	5.7 x 6.5
15	Alcohol Storage Section	Denatured chemical A Tank	1	50 KL	3.6 x 5.0
16	Alcohol Storage Section	Denatured chemical B Tank	1	50 KL	3.6 x 5.0
17	Molasses storage tank for "C" Molasses"		1	100000 qtls.	31 x 9.61
18	Molasses storage tank for "B" Molasses"		2	100000 qtls.	31 x 9.61
19	Spent Wash Lagoon Capacity		1	6000 KL	7 days storage

7.2.2.5 Risk associated with alcohol storage and its mitigation measures

Impact matrix of risk associated with storage and transportation of alcohol along with control and mitigation measures are given in Table 7.10.

Table 7.10: Impact matrix of risk associated Alcohol storage

S.No	Activity	Associated Hazards	Health Impact	Risk Rating	Proposed Control mitigation measures
1.	Storage of Alcohol	Exposure, inhalation, ingestion & Fire	• Exposure to over 1000 ppm may cause headache, drowsiness and lassitude, loss of appetite, and Inability to concentrate. • Throat Irritation • Ingestion causes depression of central nervous system, nausea, vomiting, and diarrhea Liquid or vapor may cause eye and skin irritation • Burn injury	**H**	**Storage** • Storage shall be away from process area with well- ventilation. Avoid all possible sources of ignition like spark or flame. • Use spark/flame proof hand tools • Electrical wiring shall be flame proof type • Based on the leakage quantity, wiped out with or dilute by spraying the water to suppress the vapors Control measures in case of over exposure • If victim is conscious and able to swallow, then give water or milk to drink to dilute the contents in the stomach • Look out for medical help Skin or Eye exposure • Immediately flush affected area with plenty of water. Eyes should be flushed for at least 15 minutes with water PPEs shall be provided to avoid exposure

7.2.2.5.1 Risk associated with work area of distillation

Table 7.11: Impact matrix of risk associated distillation area

S.No	Activity	Associated Hazards	Health Impact	Risk Rating	Proposed Control and mitigation measures
➢	Working near distillation column	Heat & Fire	Physical injury & burning	H	• PPEs • Firefighting facility • First aid box • Periodic checking of all parts

7.3 Safety Measures Recommendation

7.3.1 Storage and material handling area

- Proper ventilation shall be provided
- Area shall be marked as "No smoking Zone"
- Use of proper PPEs
- Pressure relief valves shall be provided
- Provision of Safety valves and rupture disk
- Provision of fire hydrant system along with other portable fire extinguishers
- Adequate distance between the storage Tanks
- Provision of dyke wall to the Tanks
- Proper earthling to the Tanks

7.3.2 Reactor Safety

- Provision shall be made for temperature & pressure indicators
- Heating & cooling Jacket shall be provided to maintain the temperature
- Pressure switch with hooter shall be provided
- Pressure safety valve shall be provided
- Double earthing shall be provided

7.3.3 DG Sets

- Acoustic enclosures to be provided
- Entry near the unit shall be restricted
- Qualified and highly trained engineers shall be appointed

7.3.4 Boiler

- Work permit system shall be evolved and shall be followed during maintenance work
- Proper ventilation shall be maintained
- Entry shall be allowed only after proper checking of gases, if any
- Worker should be trained properly
- Working should be under supervision of qualified and trained personnel

7.3.5 Storage and Handling of Alcohol

- Keeping away from oxidizers, heat and flames.
- Avoidance of plastics, rubber and coatings in the storage area.
- Cool, dry, and ventilated storage and closed containers.
- Leakage should be washed out and diluted.
- Regular monitoring and maintenance to avoid leakages.
- If major leakage in tanks can be mitigated by transferring the material to other tank.
- Transfer the material to other tank.
- Grounding of the container and transferring of equipment to eliminate static electric sparks. In case of any emergency following measures would be taken:
- First Aid Measures
- Use of extinguishing media surrounding the fire as water, dry chemicals (BC or ABC powder), sand, dolomite, etc.
- Foam system for firefighting shall be provided to control fire from the alcohol storage tank. The foam thus produced shall suppress fire by separating the fuel from the air (oxygen), and hence avoiding the fire and explosion to occur in the tank. Foam would blanket the fuel surface smothering the fire. The fuel shall 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 shall scatter and spread fire. Use of spray or fog nozzles shall be promoted, cool containers shall be exposed to flames with water from the side until well after the fire is out.

7.3.6 Molasses storage

- Store in good quality ventilated and leak-proof tanks (mild steel, stainless steel, polyethylene, PVC) at ambient temperatures, out of moisture.
- Continuous mixing of molasses should be done.

- If there is increase in temperature beyond 300 ^{0}C external cooling of tanks should be provided. A temperature recorder should be provided to the tanks.
- Avoid microbiological contamination or dilution with water.
- Regular monitoring and maintenance to avoid leakages.

7.3.7 Building & workspace

- Adequate space shall be provided for equipment repair or removal
- Equipment maintenance shops shall be set up with appropriate safety provisions for hazards associated with maintenance activities.
- Lightning protection shall be provided.

7.3.8 Electric items

- Medium and high voltage cables shall be completely enclosed
- Electrical equipment shall be grounded adequately
- Wiring shall be properly insulated, grounded, and non-exposed
- Emergency shutoff switch, clearly labelled, at all machinery units shall be provided
- DG set shall be provided as stand by source of power
- Maintenance tools with insulated handles shall be provided

7.3.9 Fire

- The fire protection system is to provide for early detection, alarm, containment and suppression of fires. The complete fire protection system shall comprise of the following. Fire hydrant network shall be provided for firefighting in the entire project area along with following firefighting equipment shall be provided
- Different type of Fire Extinguishers, Detectors and fire Alarm shall be provided
- Fire hydrant system
- Fire Tender with chemicals foam and required arrangement for firefighting to control the fire from the alcohol storage
- Foam system shall be contain aqueous film forming compound of 3 to 6% alcohol resistance foam concentrated with ISI mark 4889
- Water storage Tank exclusively for firefighting operation
- Rubber mat shall be used near panel area.
- Periodical training to the identified supervisors and Employees in the field of Firefighting and safety
- Emergency exits at specific locations and shall be marked on the layout
- Cautionary note, safety posters, stickers shall be displayed at appropriate locations

- First Aid boxes shall be made available at appropriate locations
- Emergency Control Center Provision shall be made to establish an Emergency Control Centre (ECC) from which emergency operations are directed and coordinated. This center is activated as soon as on–site emergency is declared. ECC is equipped with adequate communication systems in the form of telephones (Emergency telephone numbers.) and other equipment's to allow unhampered organizations and other nearby facility personnel.

7.3.10 Occupational health hazard and safety measures

During operation handling of chemicals and other material used, a practice of preventive maintenance shall be adopted to take care of employee's health. The various safety equipment such as breathing apparatus, gum boots, goggles and helmets shall be provided to the workers/operators.

Besides, all the first aid, firefighting devices shall also be inspected, tested and maintained periodically so that it is available in ready to use condition. Provision of pre- medical and periodical health check-up for all the employees shall be implemented and record maintained. If any abnormality is noticed due to occupational exposure, necessary treatment shall be assured from qualified physician. Following measures shall be implemented to avoid the occupational hazards to the employees:

- Regular housekeeping of the entire plant area
- Regular or preventive maintenance of floor, platforms, staircases and passages to avoid the slip incident
- Provision of obstruction free walkways and workplace
- Periodical training to the employees for the proper operation of the Plant and various processes
- Restricted entry into the plant premises
- Checking and calibration of all Instruments and Fire Devices to keep them in proper operating conditions
- Installation of Electrical devises as per the prescribed standards
- Provision of D.G. Sets to avoid the complication during power failure
- Provision of required fire Extinguishers at different locations for easy access
- Provision of lighting Arrester
- Various types of PPEs like breathing apparatus, ear muffs, earplug, masks, leather hand, gloves; asbestos hand gloves; acid/alkali proof rubber hand gloves; electrical resistance hand gloves and gum boots, goggles and helmets shall be made available
- Provision of First aid Boxes and periodical checking for required medicine and other material to take care of superficial bodily injuries during work

7.4 Disaster Management Plan (DMP)

A disaster is an unforeseen combination of circumstances that causes serious body injuries, loss of life or extensive damage to the plant, Machineries or to the environment. Following uncontrollable situation may lead to disaster or plant emergency:

7.4.1 Manmade

- Plant failure
- Rupture or damage of the line, vessel or Tank
- Excessive leakage of flammable material

7.4.2 Natural

- Cyclone
- Earthquake
- Flood
- Fire
- Terrorist attack

Disaster management plan is a written document where all the details regarding the causes disaster are noted along with required control measures. It also gives details about the responsible personnel shall be available on site during emergency and their role to control the disaster to a minimum level or from spreading the outside to protect the plant and machinery including employees and nearby areas. The DMP to tackle the emergency can be divided into the two parts for the ease of operation and to effectively control the emergencies within shortest possible time.

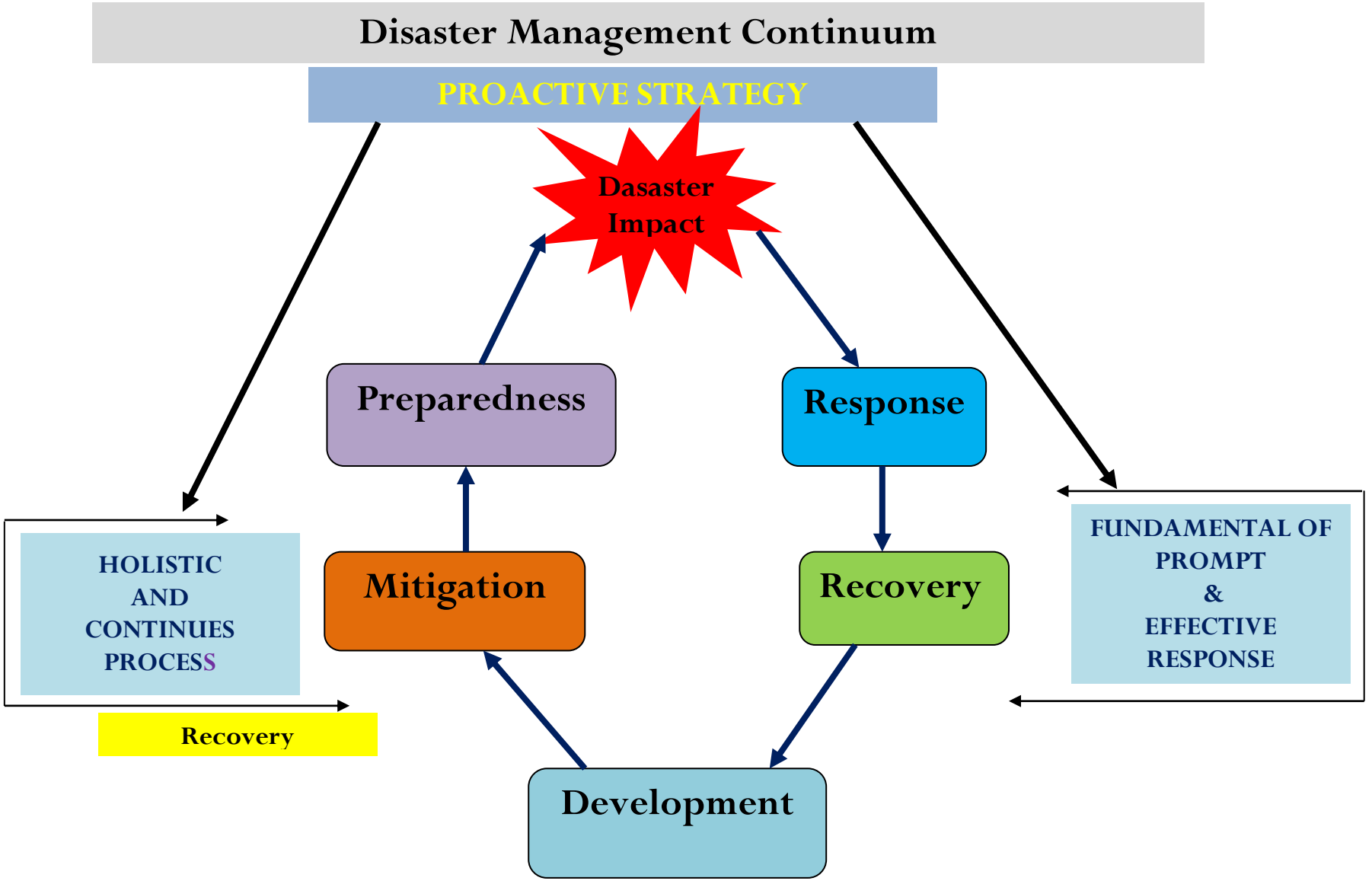


Figure 7.2. Disaster Management Continuum

7.4.3 Onsite Emergency Plan

If an accident / incident takes place and its effects are confined to the only, then it is termed as an onsite emergency. It involves employees and other infrastructure within the organization. In this plan, the company officers and employees are given pre-decided responsibilities to handle the emergency. All other required resources to tackle this type of emergency are available. The individual employee or designated persons shall be held responsible to take or initiate appropriate action as and when required. All the employees / responsible persons required to take or initiate the action at the time of emergency are trained appropriately so that they can perform their task without any difficulty. To make the handling of emergencies absolutely perfect, mock drills need to be conducted periodically for a particular scenario. During mock drills, particular scenario is simulated to understand the gravity and requirements of action. During the mock drills, all the important points or happenings are noted and discussed to find out the lacunae or for the further improvement in the written plan.

7.4.4 Offsite Emergency Plan

If the accident or incident occurred in the premises, man shall need help from outside sources because of magnitude of emergency then it termed as Offsite Emergency. This offsite emergency cannot be controlled only by using the internal resources and need timely help from the outside companies or from the government authorities to tackle such type of emergencies to avoid the loss of property, human health or environment in and around the premises. An offsite emergency management plan involves government bodies as well as nearby industries for necessary help and to control the emergency.

7.4.5 Objectives of disaster management

- To control the incident or accidents from the happening
- To eliminate the emergencies if possible
- Prepare for the emergency handling
- To see whether required activities are performed in right order by the individuals or not
- To find out the required changes for coordinated activities
- To reduce the time of activities to control the emergencies
- To minimize the effects of the incident on person, property and environment
- Continuous improvement

7.4.6 Onsite Emergency Preparedness Plan

- Main elements of on-site Emergency Preparedness Plans are:

- Leadership and emergency management cell
- Defined role and responsibilities of the key personnel
- Emergency actions to be executed by the Members of the Committee
- Protective and rescue equipment
- Medical care Unit
- Training and periodic review
- Periodical Mock drills, its monitoring and analysis to find out the short coming for the improvement
- List of available firefighting equipment, its maintenance and records
- Training to the committee members and feedback on requirements if any
- Line of command
- Requirement of Siren and alarm system
- Written document
- List of available resources with the Company
- List of resources available from outside during the emergency
- Important phone numbers of authorities

7.4.6.1 Disaster Management Cell

Disaster Management Cell (DMC) consisting of authorized head that shall be responsible for the handling of emergency situations. All the details of team members shall be available at the site; their contact details shall be displayed in the plant and shall be informed to other employees. DMC shall make the employees to understand and aware about the hazards and associated risks that may give rise to an emergency situation at the plant. DMC shall train and inform the employees regarding their role and responsibilities during emergency and dos and don'ts. Following team of personnel shall be required to fulfill their responsibilities to tackle the emergency.

7.4.6.2 Key Personnel

The actions necessary in an emergency shall clearly depend upon the prevailing circumstances. Nevertheless, it is imperative that the required actions are initiated and directed by nominated people, each having specified responsibilities as part of coordinate plan. Such nominated personnel are known as Key Personnel.

1. The Key Personnel are:
2. Chief Controller

3. Deputy Chief Controller
4. Chief Co-Ordinator
5. Site Controller
6. Liaison Officer
7. Medical and Welfare Team
8. Rescue and Evacuation Team
9. Engineering Team
10. Fire Fighting Team
11. Safety Committee

Chief Controller

- On getting information about an Emergency he proceeds to the Emergency Control Center and takes overall charge of all the activities for the dealing with the Emergency.
- He remains in the emergency Control Center till the Emergency is called off so that all the concerned are aware of the location of availability during Emergency.
- He communicates and co-ordinates amongst Site – Controller, Chief Coordinator & Deputy Chief Controller along with various team leaders.
- He is the final authority for all matters related with management of emergency such as firefighting, emergency control, rescue operations, calling outside agencies for assistance, welfare, evacuation, transportation, rehabilitation, liaison, public relation.
- Managing Director shall be the Chief Controller.

Deputy Chief Controller

- During emergency he rushes to the actual site and updates chief controller at emergency controller centres for any support activity needs of the teams.
- He assists the Chief Controller.
- He assumes the duties of Chief Controller in his absence.
- He regulates entry and exit of personnel for controlling the fire Emergency.
- Restricts the entry of any person other than authorized by the chief controller.
- Takes command of fire team and directs the firefighting operations during absence of Site Controller

HOD- Logistics shall be the Deputy Chief Controller
Chief Co-Ordinator

- During emergency he rush to the Emergency control center and facilitate the communication and coordination of all the teams for their activities.
- Evacuates the Safety and Health Hazards.
- Co-ordinates the transport services, arrange for temporary shelter in consultation with the site controller and Liaison officer.
- Calls the local fire brigade in consultation with chief controller.
- Calls / Communicate to Local Police station in case of necessity, in consultation with the chief controller.
- He is responsible for providing transport facilities for removal of casualties at the medical aid point and also for their eventual removal to the nearby hospital if required.
- He also provides transport for evacuation of personnel in case they need to be evacuated.
- He keeps the detailed records of incidence & progress of operations to fight the emergency.
- Arrange for additional security personnel as per the requirement.
- Makes available extra security personnel for maintaining the law and order.
- In case of power failure / Telephone service disruption he arranges for messengers for the purpose of communications.
- Create and facilitate infrastructure for rescue, evacuation and medical aid.

HOD-Manufacturing shall be a Site Controller

Liaison Officer

- Maintains liaison with the press, Government agencies and neighboring companies regarding the emergency under the instructions from Chief Controller / Chief Coordinator as appropriate.
- Discloses all the necessary information in the plant so as to avoid rumors and confusion.
- He takes responsibility of law and order and keeps liaison with police and fire brigade.
- He collects and disseminates information's as per requirements of all concerned.
- He also co-ordinates the activity of medical – officer. He assumes complete responsibility of providing medical assistance and arranges for the treatment during the emergency.
- He provides and arranges for ambulance services and medical facilities from outside agencies and hospitals, if so required.

Mngr. – HR shall be the Liaison Officer.

Medical and Welfare Team

- This team is responsible for providing First Aid and the canteen facilities such as tea and biscuits to the injured as and when required.
- The leader on receiving the information reports to the Chief Controller / Deputy Chief Controller with team head count and shall mobilize his team and rushes to the site of the emergency.
- Some of the team members accompany the injured to the Temporary medical aid point or local / ESIS Hospital as the case may be.
- First aiders under the instructions from Welfare team in-charge attend the injured person brought to the medical aid point. If the number of injured persons is high, team does not move out of medical – aid point till the emergency is under control. They shall keep continuous communication with Deputy Chief Controller/ Chief coordinator and direct the injured to the hospitals.
- In case where hospital treatment is required, the leader arranges for the transport through chief coordinator and informs the hospital in advance so that they are prepared for the emergency.
- The welfare team maintains the list of names of all the personnel for whom the treatment has been given and others who have been directed to the local/ ESIS hospital / other hospitals.
- Other officers form the state Government of Local authorities should be courteously conducted to the reception room and the liaison officer informed, so that they can be taken care off.

Mngr. – HR shall be the Team Leader.

Rescue and Evacuation Team

- This team works under the instruction of Chief Coordinator.
- This team directly fights the emergency and rescues the people under the instruction from site controller at site.
- On hearing the emergency the group leader establishes communication with Chief Controller / Chief coordinator and starts handling emergency directly.
- He takes the help of security team to cordon off the area.
- He ensures that emergency does not escalate, but it is contained within the spot of occurrence.
- The leader mobilizes his team and establishes contact with the liaison officer regarding manpower accounting and starts the search operations, if required.

- The leader ensures that he and his team members wear the necessary personnel protective equipment while searching for missing personnel's.
- He is also responsible for head counts at the assembly points and reports to Chief controller.
- On hearing the siren the team leader ensures that the main gate is closed and the movement restricted.
- The team leader arranges to provide security coverage at the main gate, site of occurrence also at the reception office.
- The team effectively cordons off the emergency area and prevents unauthorized people entering the scene.
- Fire Engines or Ambulance requisitioned by the site Controller / Liaison officer is to be permitted inside the plant.

HOD - Stores & the ETP shift in-charge on duty shall be the Team Leader
Engineering Team

- Works under the instruction from site controller.
- Team ensures that the remaining part of plant is safe.
- Isolates the fire to spread out.
- Carries out Firefighting, Spillage control & other required actions that may became necessary during the emergency.
- Ensures use of Fire Hydrant, Fire Extinguishers & other Fire Fighting Equipment's till the emergency is over.
- Ensure the Proper use of Fire Hydrant, FE, mobile foam unit, water monitors, spillage kits, Fire blankets etc.
- Use of Necessary tools required to tackle the emergency situations.
- He ensures that emergency does not escalate, but it is contained within the spot of occurrence.

Team Leader; Engg Shift In-charge shall be the Team Leader
Fire Fighting Team

- Works under the instruction from site controller.
- Team ensures that the remaining part of plant is safe.
- Isolates the emergency area in co-ordination with site controller.
- Carries out civil/all engineering work that may became necessary during the emergency.

- Ensures that supply of water till the emergency is over.
- He ensures that emergency does not escalate, but it is contained within the spot of occurrence.
- Carries out mechanical / electrical / electronic shut down procedures, if required.
- Mobilizes necessary tools and tackles to handle any repair work on emergency basis.

Safety Committee

The Safety Committee shall be responsible for the following:

- Promote safety training, education, and communication from time to time.
- Provide safe work environment
- Create and enforce company policies relating to all safety issues
- Strive for the elimination of all incidents in the workplace
- Plan & conduct mock drills for identified risks as per procedures.
- Carry out root cause analysis of observations made during mock drills & prepare CAPA with the individual M/s Gularia Chini Mills Unit-Distillery team leaders & ensure timely completion.
- Guide & control the working of M/s Gularia Chini Mills Unit-Distillery teams.
- Take up specific time bound objectives pertaining to current issues for the site.
- Investigate safety issues at the site and offer guidelines to the management & all M/s Gularia Chini Mills Unit-Distillery teams working under it
- Conduct monthly departmental safety rounds, report findings & actions required to HOD under copy to MR / Asst. MR highlighting the issues concerned.
- Arrange meeting of M/s Gularia Chini Mills Unit-Distillery teams once in every quarter, to discuss any issues pertaining to safety at site. The minutes of the meeting shall be recorded and produced to the MR / Asst. MR on demand.
- Ensuring proper follow up of safety instructions for material handling equipment's
- Ensuring usage of PPEs
- Outsourced activities (if any) related to safety to be controlled by team
- Control of contractor work (entry permit, work permit, height job permit, etc.)

All Employees

On hearing alarm/ siren

In emergency, key persons shall report to MCC (Main Control Centre). Supervisor/ operators at affected area shall stop operation, keep in readiness for evacuation if necessary and wait for further instructions. Security shall guide contract workmen and visitors to assemble at the assembly point.

Emergency Control Centre

The Emergency Control Centre shall be the focal point in case of an emergency from where the operations to handle the emergency are directed and coordinated. It shall control site activities. Emergency management measures in this case have been proposed to be carried from single control Centre designated as Main Control Centre (MCC).

MCC is the place from which messages to outside agencies shall be sent and mutual aids and other helps for the management of emergency shall be arranged. It shall be located in the safe area. It shall be equipped with every facility for external and internal communication, with relevant data; personal protective equipment's to assist hose manning the center to enable them to co-ordinate emergency control activities. Centre Control shall be attended by SC. Following facilities would be available in the MCC:

P &T phones, mobile phones, intercoms, and wireless

- Fax and telex
- Emergency manuals
- Blown up area maps
- Internal telephone directories
- District telephone directories
- Emergency lights
- Wind direction and speed indicator
- Requisite sets of personal protective equipment such as gloves, gumboots and aprons MCC shall be furnished with call out list of key persons, fire, safety, first aid, medical, security, police and district administrative authorities. MCC shall also contain safety data pertaining to all hazardous materials likely to cause emergency and well-defined procedures of firefighting, rescue operations, first aid etc.

Assembly Point

In an emergency, it shall certainly be necessary to evacuate personnel from affected areas and as precautionary measure, to further evacuate non-essential workers, in the first instance, from areas likely to be affected, should the emergency escalate. The evacuation shall be effected on getting necessary message from i.e. on evacuation; employees would be directed to a predetermined safe place called Assembly Point, where all non-key personnel would assemble on getting direction over Public-Address System. Outdoor assembly points, predetermined and pre-marked, shall also be provided to accommodate evacuees from affected plant area(s). Roll call of personnel collected at these assembly points, indoor and outdoor shall be carried out by roll call crew of safety team to account for any missing person(s) and to initiate search and rescue operations if necessary.

Declaration of Emergency

An emergency may arise in the terminal due to major outbreak of fire/explosion. In case of major outbreak of fire the state of emergency has to be declared by the concerned by sounding Emergency Siren. Upon manual or sensor detection of a major loss of containment of volatile hazardous substance, the DMP is activated by raising an audible and visual alarm through a network of geographically dispersed gas/ vapor and heat detectors and also "break glass" type fire alarm call points with telephone handsets to inform the Central Control Room.

A separate siren audible to a distance of 5 km range shall be available for this purpose. The alarm is coded such that the nature of emergency can be distinguished as a leakage or major fire. The Control Centre and Assembly point shall be located at an area of the minimum risk or vulnerability in the premises concerned, taking into account the wind direction, areas which might be affected by fire/explosion, leakage etc. After cessation of emergency, Deputy Chief Controller shall communicate to Chief Controller. After verification of status, Chief Controller shall communicate with Site Controller and then announce the "All Clear" by instructing the Time Office to sound the "**All Clear Signal**".

Alarms would be followed by an announcement over Public Address System (PAS). In case of failure of alarm system, communication would be by telephone operator who shall make announcement in the complex through PAS. Walkie-talkie system is very useful for communication during emergency with predetermined codes of communication. If everything fails, a messenger could be used for sending the information.

Up to 5 km, range variable pitch electric sirens (one in service and the other standby) shall generate the main alarm for the entire site as well as for the district fire brigade. The alarm is coded such that the nature of emergency can be distinguished as a leakage or major fire. Fire and Gas alarm matrices are provided at the Central Control room, security gate, on-site fire

station and main administrative office corridor to indicate location of the site of emergency and its nature.

Fire Fighting 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 shall comprise of the following.

Fire brigade

Automatic/ manual fire detection & alarm system

Fire Hydrant

Fire hydrant shall be provided at all around in the plant as per TAC Norms.

Portable fire extinguishers

Various areas of the plant shall have one or more of the above system depending upon the particular nature of risk involved in that area.

Portable Chemical Fire Extinguishers

These are intended as a first line of defense, and hence shall be stationed at strategic locations in different buildings and also for outdoor facilities. Portable fire extinguishers shall be foam type; carbon dioxide type and multipurpose dry chemical (MPDC) type.

Fire Detection and Alarm System

Fire detection and alarm system an effective means of detection, visual indication of fire location and audible alarm of any fire at its incipient stage. This system shall comprise fire alarm panels, automatic fire detectors, manual call points and fire siren (hooter). The main fire alarm panel shall provide both visual and audible alarm of fire in any protected areas of the plant.

Manual break glass type fire alarms shall be provided at strategic locations where high hazards exits. Automatic fire detectors shall be provided for fuel handling areas and in plant areas such as control rooms, switchgear rooms, cable galleries etc.

First Aid

A first aid center 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.

7.4.6.3 Requirement of Equipment and Materials

- Based on actual assessment of emergency, there can be requirement of Extra First Aid personnel to deal with casualties and need to be provided from outside

- All types of PPEs
- Emergency engineering works, provision of extra or replacement of light, isolation of equipment, temporary by pass electrical lines etc.
- Assembly point, emergency control center, sign boards
- Moving Tankers or other vehicles from area of risk
- Fire protection and firefighting facilities
- Emergency lighting and standby power
- Emergency equipment and rescue equipment
- Material safety data sheets for hazardous chemicals
- Plan showing hazardous material storage area
- List of emergency equipment
- List of safety equipment
- List of important telephone numbers and addresses
- Nearest hospitals and ambulance service center
- Nearest fire station
- Govt. Officials
- Transport provider
- Names and address & contact telephone number of key personnel
- The onsite emergency plan shall be documented and circulated to all concerned for knowledge, study, to understand and easy follow up. The emergency plan shall be rehearsed and practiced at regular intervals i.e. Mock drills shall be conducted at suitable interval to test efficiency of plan, personnel, equipment and coordinated efforts to increase confidence level of personnel during emergencies.

7.4.6.4 Training

- Training on fire fighting
- Training on spill control
- Training on toxic release control
- Training on good housekeeping
- Training on use of PPEs

7.4.6.5 Communication

- Following means of communication shall be been made available,

- Telephones
- Walkie-talkies
- Mobiles
- Public announcement system
- Emergency Siren

7.5.7 Offsite Emergency Plan

In case the hazard spreads out-side the premises Chief Controller of DMC shall communicate to the District Magistrate, commissioner of the Police and inform the situation as Off-Site Emergency.

Type of emergency facilities/actions required from outside bodies are,

- Firefighting facilities required: Factory shall have its own firefighting facilities but during emergency, fire brigade may be called from nearby areas or other establishments
- Police help shall be required during emergency for control of people, traffic and security arrangements
- Medical help required: seriously injured personnel may be referred to the

Hospital/Primary Health Centre depending upon injuries

7.5.8 Information to authorities

- Emergency situations shall be informed to the local Panchayat official regarding the likely hazards from the industry and the steps to be taken when there is an Off-Site Emergency. It is preferable that the Local Panchayat Officials are also trained on simple protective methods through demonstrations and practice
- District Magistrate, Commissioner of the Police and District Control Room if exists.

7.5.9 General Natural Disaster Management Measures

- As Project site is located at (Khasra no. 265, 264, 272, 267, 274, 266, 269, 270, 271, 273, 273, 276, 277, 278, 278, 279,01,02,03), village Rudrapur Gularia, Block -Bijua, Tehsil-Gola, District-Lakhimpur Kheri, U.P. 262901, Seismic zone for the proposed project site comes under zone IV.
- Factory Management shall train their staff to manage emergencies arises from fire, flood, lightning and leakages.

- As soon as the emergency warning receives from District Disaster Management Authority, the raw material as well as finished products shall be kept to a minimum to avoid spillage or misuse
- All the material and products shall be stored properly to avoid the damage or mixing with other
- All the employees shall have the list of important phone numbers and contact details to help in getting the required help in time. These numbers shall be displayed at distinct location within Factory premises.
- Company's designated person from Team A shall be main contact person for all the employees for any type required help from outside
- District level disaster management units
- Health & Family Welfare
- Medical
- Nearest Fire station
- Nearest Doctors & Ambulance
- Forest & Environment department
- Police Station
- Village heads & Panchayat
- Company's Emergency Management Cell Members
- Transport
- Electricity
- PWD
- Substation details from where Company takes power
- Civil Supplies
- Animal Husbandry
- Agriculture

7.6 Conclusion

Project proponent shall implement all preventive measures to tackle all type of emergencies arising out of operation or malfunction of individual unit's. The required resources for Onsite and Offsite emergency management plan shall be properly planned and provided to implement the plan effectively. The factory shall give highest priority towards Health and safety of the employees and people residing nearby areas. Management shall conduct the training to the

nearby villagers to appraise them about their role during emergency. All nearby people shall be given training on do's and don'ts during emergency situation.

Distillery Industry (Ethanol Plant) is associated with potential hazards to the employee and environment. As the hazards involved during operation and production activities shall be known to the Management, all required mitigation measures shall be implemented in time to avoid the emergency situation from the arising. Unfortunately, if there is any emergency onsite of offsite, it shall be tackled effectively due to availability of required resources at the site. Similarly, all the concern staff and members of the Teams shall be trained appropriately to tackle the emergencies in the plant. By knowing the type of emergency situation that may arise during operation of the plant, appropriate control measures shall be implemented to reduce the gravity of the emergencies.

Similarly, to avoid the emergency situation, all required mitigation measures shall be implemented as recommended.