

RISK ASSESSMENT

Industrial accident results in great personal & financial loss. Managing these accidental risks in today's environment is the concern of every industry, 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 planning & management of industrial prototype hazard analysis in Indian context.

Hazard Identification & Risk Assessment (HIRA)

Hazard identification 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 assessment involves the identification and assessment of risks to the population which 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 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

Identification of Types of Hazards in Distillery & co-generation Power Plant (HAZID)

Disaster at distillery and co-generation plant may occur due to following hazards:

- Fire electric panels, oil room and alcohol storage
- Explosion in boiler house etc.
- Electrocution
- 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.

Possible Hazardous Locations on Site

S. No.	Hazardous Area	Likely Accident
1.	Boiler Area	Explosion
2.	Turbine room	Explosion
3.	Electrical rooms	Fire and electrocution
4.	Transformer area	Fire and electrocution
5.	Cable tunnel	Fire and electrocution
6.	Storage yard (Bagasse/coal/rice husk)	Sliding, fire
7.	Storage tank (alcohol)	Fire
8.	Stack	Uncontrolled air pollution due to failure of bag filter
9.	Lagoon storage	Odor
10.	HSD storage area	Fire due to spillage

Fire

Fire can be observed in the boiler area, bagasse/coal/rice husk 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 below shows tentative list of damages envisaged due to different heat loads.

Electrocution

Fatal Accident due to carelessness during working hours may lead to electrocution.

Proposed Mitigation Measures

(A) Electricity hazard

- All electrical equipment is to be provided with proper earthing. Earthed electrode will be 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 will be 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.

(B) Fuel Storage

- Fuel handling unit/Agency will be at minimum 500 meters away from the residential area, school/colleges, Historical Monuments, Religious Places, Ecological sensitive area as well as forests area.
- Fuel handling unit will be located at a minimum 500 meters away from the Railway line, Express ways, National Highways, State Highways and District Roads and from water bodies like River, Nala, Canal, Pond etc.
- The unit will have adequate water supply through pipe/ surface water before selection of the site. Fuel storage unit is to be ensured for stacking of fuel in heaps.
- Adequate dust suppression measures will be provided to prevent fugitive emission and also risk of fire. Similar measures will also be adopted for loading/unloading operations.
- Fuel ash will be transported in covered and closed vehicles/conveyors so that there is no chance of spillage during transportation.
- Fire fighting measures will be provided to avoid any fire case
- Measures will be taken to control the air pollution during loading/handling of the fuel.

(C) Precautionary Measures for Falling Material

- Safety helmets to be used to protect workers against falling material
- Barriers like 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 will 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.

(D) Safety measures for Storage & Handling of Alcohol

Handling and storage of alcohol will be done as per prescribed norms. The alcohol will be directly fed to the storage area 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 Measures

- (i) Keeping away from oxidizers, heat and flames.
- (ii) Care will be taken for avoidance of spillage, skin and eye contact
- (iii) Well ventilation and use of approved respirator if air contamination is above acceptable level will be promoted.
- (iv) Avoidance of plastics, rubber and coatings in the storage area.

- (v) Cool, dry, & ventilated storage and closed containers.
- (vi) 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, 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.

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 or walkie-talkie 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 dealt 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 fire fighting 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.

Environment Health and Safety Cell

The project will have full fledged EHS cell (Environment Health & Safety Cell). Main function of EHS cell will be 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 will be taken up. Also regular monitoring of different parameters will be carried out to ensure safety of environment and society. Trainings and mock drills will be carried out in regular intervals for workers to ensure the safety in case of any accident or natural hazard.

Emergency Planning & Procedure

Emergency Control Center

Emergency Control Centre (ECC) is a 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 will be 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.

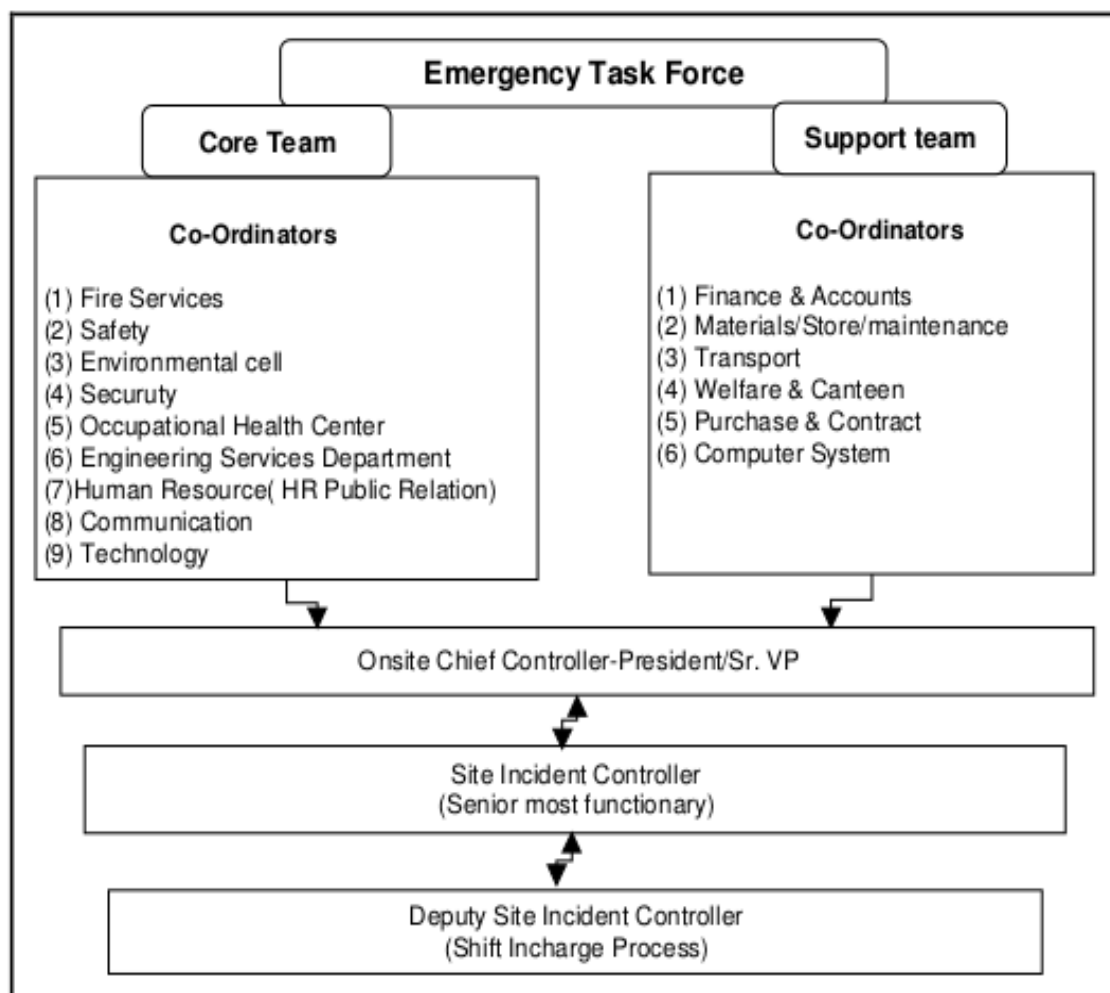
The ECC provides shelter to its occupants against the most common accidents; in addition, the ECC's communication systems are protected from possible shutdown. The ECC will have its own emergency lighting arrangement and electric communication system operation. Figure & table given below show team involved in Emergency planning & names, details and contact numbers 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 will be 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.



Emergency Team

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.

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 work 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.

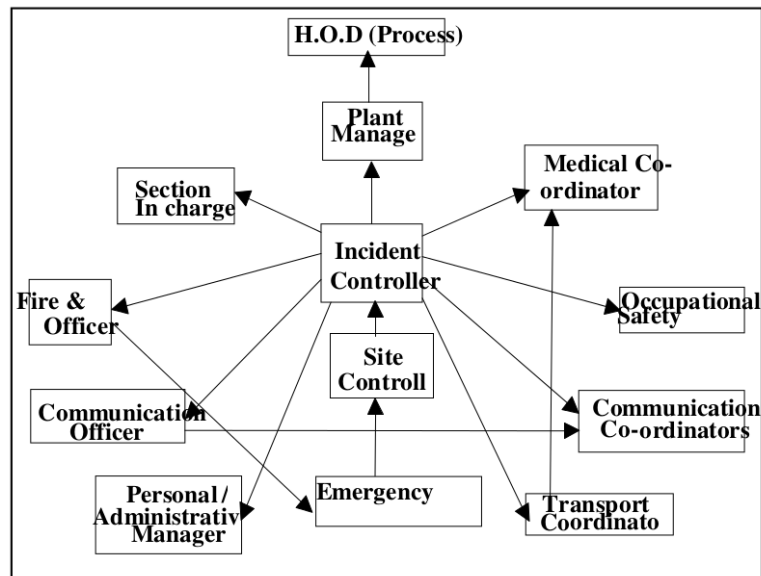
Proposed on-site Emergency Plan

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

Disaster Control Management System

Disaster Management group plays an important role in combating emergency in a systematic manner. Schematic representation for Emergency Control Management system is shown in figure below.



Onsite DMP - Disaster Control / Management System

Control Room Facility

Following are the facilities to be provided at the control room 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.

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.

Communication

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

Fire Protection System

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 of 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.

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.

C) 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.

A) 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.

B) 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 fire fighting foam.

C) 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.

D) 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.

E) 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.

F) Evacuation Procedure

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

G) Personal Protective Equipment (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 personnel trained in this On-site Disaster Management Plan with adequate facilities and equipment 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 equipment plays a vital role in overcoming major disastrous situation saving life during onsite emergency. List of recommended Personal Protective equipment (PPE) is given below.

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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H) Mock Drill

As per the Industrial Major Accident Hazard Rules,

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

I) 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 is 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.

Off-Site Emergency Planning

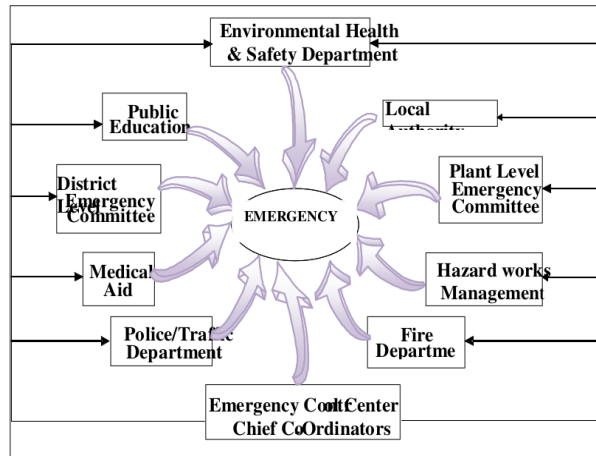
The off-site emergency plan is an integral part of any hazard control system. It is based on those accidents identified by the works management, which could affect people and the environment outside the works. Thus, the off-site plan follows logically from the analysis that took place to provide the 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 below shows communication nos. during offsite emergency.

Local Statutory Government bodies

S. No.	Name of Govt. Agency	Contact Nos.
1	District Collector/Magistrate-Lakhimpur Kheri	05872-252822, 9415906226
2	Sub Divisional Office/Magistrate (Mohammadi)	9454416568
3	Factory Inspector of the area (L.E.O.Gola)	9450444536
4	P.C.B.(Regional Officer) Lucknow	7839891841
5	S.P. Lakhimpur	94544002841
6	C.O. (Mohammadi)	9454401487
7	Fire Brigade (Gola)	8382836919
8	Police Station(Pasgawan)	9454403792
9	DDF/ADF Lucknow	9455902156
10	DGFASLI (Director General Factory Advice Service and Labour Institutes)	Not Available
11	Dy. Chief Controller of Explosive (Agra)	0562-2523244
12	Govt. Hospital (Nearest)(PHC-Pasgawan)	9415082939
13	Civil Surgeon (CMO Lakhimpur)	800519294

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.



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 forecast updates.

Humanitarian Arrangements

Transport, evacuation centers, 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, Samiti, municipalities can help in combating emergency situation after assessing the impact scenario in rescue phase.

Role of police

Police are 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 will be made to check the clarity and reliability of information as it becomes available, and before it is communicated to public.
- Public health authorities will be 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 Centers and Municipal Dispensaries to ensure required quantities of drugs and equipment
- Securing assistance of medical and paramedical personnel from nearby hospitals/institutions
- Temporary mortuary and identification of dead bodies.

Occupational health & safety hazards and their management

Occupational health and safety will be categorised broadly into two categories:

1. Protection of Health
2. Promotion of Health

Protection of Health

In an industry, the most important factor for proper running of it is the health of employees which has to be taken care of by following some measures like:

- Proper regular check-up of employees
- Regular training of employees
- 24 hrs First aid and medical availability
- Records maintenance

Promotion of Health

- Training regarding importance of health
- Programs related to health education
- Records maintenance
- Organizing health campaigns

Occupational health centre

The industrial premises will have one occupational health centre for regular check-up of employees and to deal in case of emergency. The centre will be equipped with all the emergency facilities and a qualified doctor as well as staff for auxiliary works.

Plan and Fund allocation for Occupational and Safety Hazards

Plan and fund allocation to ensure the occupational health and safety of all contracts and sub-contract workers is given in table below.

Proposed fund allocation for occupational and safety hazards

S. No.	Description	Amount (Rs. In lacs per annum)
1.	Doctor's Retainer Fee (including staff)	12.0
2.	Medicine Expenses	5.0
3.	Health Checkup Exp.	2.0
4.	Ambulance Expenditure	10.0
	Total Amount in (Rs.)	29.0

Permissible exposure levels

The distillery has following hazardous chemicals that are used in process and can prove harmful if not handled properly. The medical health check-up will be carried out regularly to find out any previous symptoms related to any disorder or disease. The industry will be having all the MSDS of hazardous chemicals and employees will be given proper training pertaining to medical emergencies and situations. The exposure levels of hazardous chemicals will never be surpassed and in case of leakage

or sudden emergency ,proper measures will be taken to avoid emergency situations.

S. No.	Hazardous chemical	Predicted exposure level (TLV)	Chronic effects
1.	Sodium hydroxide	2 mg/m ³	Prolonged skin contact may burn the skin and produce dermatitis.
2.	Carbon di-oxide	5000 ppm	Asphyxiant in high concentrations if leakage occurs
3.	Sulphuric acid	Acute toxicity of the vapor (LC ₅₀): 320 mg/m ³	The substance may be toxic to kidneys, lungs, heart, cardiovascular system, upper respiratory tract, eyes, teeth. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated or prolonged contact with spray mist may produce chronic eye irritation and severe skin irritation. Repeated or prolonged exposure to spray mist may produce respiratory tract irritation leading to frequent attacks of bronchial infection. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.
4.	Ethyl alcohol	1000 ppm	Dry skin. Gastrointestinal complaints. Enlargement/affection of the liver. Change in the haemogramme/blood composition. Cardiac and blood circulation effects. High arterial pressure. Impairment of the nervous system. Behavioural disturbances. Mental confusion. Disturbed tactile sensibility. Tremor. Affection of the bone marrow. Affection of the endocrine system. Weakening of the immune system.

Occupational and Safety hazards

S. No.	Hazards	Impact	Mitigation measures
1.	Carbon dioxide leakage from fermentation	Dizziness, a faster heart rate, headaches or hearing impairment. labored breathing, headaches, tinnitus (a ringing in the ears) and impaired vision	<ul style="list-style-type: none"> Carbon dioxide will be collected in scrubbers and sold to vendors. Proper monitoring and maintenance of fermentation equipment. Proper PPEs to be provided to workers exposed to the zone. Regular checking of pipes and bolts for avoiding any fugitive emissions.
2.	Spillage of chemicals used in process	Caustic soda can cause burns. Acids and alkalis can cause severe burns.	<ul style="list-style-type: none"> Proper PPEs to be provided to workers. Handling in accordance with good industrial hygiene and safety practice Avoid contact with water. Direct contact

			with water may cause an exothermic reaction.
3.	Dust exposure	Sudden dust cloud can affect the respiratory tract and interfere with breathing. Cause pneumoconiosis Some particles dissolve in the bloodstream. The blood then carries the substance around the body where it may affect the brain, kidneys and other organs.	<ul style="list-style-type: none"> • Proper dust mask for persons handling biomass and coal. • Regular water sprinkling to avoid dust dispersion. • Storage of coal and biomass in covered sheds and continuous water sprinkling. • Proper greenbelt will be developed in all the areas having the probability of dust explosions.
4.	Fire	Alcohol storage tank bursting or leakage Power room short circuit	<ul style="list-style-type: none"> • Proper flow meter to check the flow of alcohol in storage tanks. • Proper training to employees to act in case of alcohol leakage. • Proper fire extinguishers adequate for the fire that can happen in distillery i.e. foam type. • Proper fire hydrant network will be spread in all the areas prone to fire hazard. • Fire sensors and alarms.

Occupational health surveillance

In distillery plant, the occupational health surveillance of the employee will be done on a regular basis and record of the same will be maintained as per the Factories Act.

Pre placement and periodical health check-up tests to be undertaken

The check-ups will be dependent on age, sex, duration of exposure and department wise. Following tests will be done regularly:

- X Rays (Chest)
- Audiometry (Ears)
- Spirometry (Lungs)
- Vision testing (Eyes)
- ECG (Heart)

Frequency of Medical Examination

- Once in a year

Personal Protective Devices and Measures

- Industrial Safety helmets, Crash helmets
- Goggles
- Safety Shoes & Rubber Gumboots
- Aprons

- Ear muffs and Ear Plugs
- Full body Safety harness
- Leather hand gloves, Heat Resistive hand gloves, Chemical hand gloves and Cut resistance hand gloves
- Safety belt / line man's safety belt

Implementation of OHS standards as per OHSAS/USEPA

The overall objective of the company is to provide a system that is capable of delivering healthy and safe workplace. Following measures will be adopted for implementation of OHS standards.

- Well-equipped Occupational Health Centre with adequate paramedical staff
- Routine and special investigation related to occupational health
- Health surveillance and maintenance of health record
- Rules and procedure for effective implementation of Safety Health and Environment policy and made to know all employees
- Round the clock ambulance facility
- Sufficient number of first aid boxes
- Formulation of OHS implementation team/ cell
- Risk assessment of each and every activity
- Implementation of OHS management program
- Displaying the safety and health policy and instructions at various locations
- Display of safe operating procedure (SOP) at various locations
- Job safety analysis
- Carry out daily plant safety inspection by internal safety department
- Investigation of fatal, serious accidents
- Investigation of reports of occupational diseases
- Monthly safety meeting of all employees & workers to discuss last month accident if any, reason and corrective measures taken.
- Organize safety training, seminars for safe working and safe vehicle and traffic movement within the plant premises and regular training for safe driving outside the plant premises
- Prepare annual reports of accidents and occupational diseases. Preparation and updating of Onsite Emergency Plan and liaison with external agencies and authorities
- Ensure use of PPEs according to the job like helmet, safety shoes, goggle, dust mask, ear plug and hand gloves etc.
- Establishment of Occupational Health Centre for pre and periodic medical examination of workers and staff to detect any onset of occupational disease and corrective measures
- Display Material Safety Data Sheet (MSDS) for use of every hazardous substance
- Implement the recommendations of HAZOP (Hazard and operability study) for examination of problems in existing process / operation that may represent risks to personnel or equipment

- Periodic safety audits both internal and external, review and implementation of recommendations.

