

RISK ASSESSMENT

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To ensure the safety and health of workers in the premises and pursuit sustainable development of the enterprise, hazard identification and risk assessment are very important parameters to be studied. The hazard principle, possible occurrence places, and the preventive and emergency treatments have been studied, so the workers could understand the hazards during operations to ensure their safety and health. Moreover, to improve the occupational safety and health issues, the safety and hygiene standards of the proposed distillery should be regularly maintained.

Hazard analysis involves the identification and quantification of the various hazards (unsafe condition) that exist in the plant. Risk analysis deals with the identification of hazards and its quantification in terms of risk to which plant equipment and personnel are exposed to and prone due to accidents resulting from the hazards present in the plant. Risk analysis involves the identification and assessment of risks to the population exposed to hazards present. 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 the proposed Molasses based Distillery and Co-Generation power plant.

There are both onsite and offsite hazards/accidents and activities which require assessment of risk due to their occurrence & frequency. Major on-site and offsite risks are given below:

On-site

- Exposure to fugitive dust, noise, and other emissions
- Housekeeping practices requiring contact with solid and liquid wastes
- Alcohol leakage/ spillage through pipeline during pumping & subsequent fire

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.

In view of the hazards involved in handling and storage of hazardous chemicals and processes "On Site Emergency Plan" has been prepared. It gives a clear organization structure, including outside agencies and elaborates the duties to be performed by each individual when situation demands. The plan enumerates the actions required to be taken by various personal working at different work station in the plant. Particular emphasis is given to eight most vital areas of disaster planning like Organization responsibilities, procedure, training, mutual aid, communication, transportation and public relations.

Identification of Hazards

The following types of hazards are identified at the site.

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)	Sliding, fire
7.	Storage tank (alcohol)	Fire
8.	Stack	Uncontrolled air pollution due to failure of ESP
9.	Lagoon storage	Odor
10.	HSD storage area	Fire due to spillage

Assessment of Risk along with mitigation measures

Qualitative risk assessment is done based on both probability and impact which provides greater insight into the absolute risk severity. The study of risk and its impact evaluation finds out the influence on a project due to a particular risk including positive and negative and its impact on objective such as schedule, cost, quality, or performance.

Description of hazards identified, risk assessment and mitigation measures

Distillery operations (working area)

Activity	Associated hazards	Health impact	Proposed control & mitigation measures
Working near distillation column	Heat, Fire, Slipping, falling from stairs	Physical injury and burning	<ul style="list-style-type: none"> • Use of Personal protective equipment • Fire-fighting facilities • Provision for immediate availability of First aid • Proper maintenance of all distillation equipment and periodic checking

Boiler operations

Activity	Associated hazards	Health impact	Proposed control & mitigation measures
Fuel yard	Heat & Fire	Physical injuries and burning	<ul style="list-style-type: none"> • Storage should be away from ignition source • Fire-fighting facility shall be provided • PPEs should be provided • First aid box
Working near boiler	Heat	Burning	<ul style="list-style-type: none"> • Use of Personal protective equipment • First aid availability
	Noise	Hearing impairment	<ul style="list-style-type: none"> • Required Personal protective equipment
Boiler maintenance	Mechanical hazard	Physical injury, Electrocution	<ul style="list-style-type: none"> • Use of PPEs • Regular monitoring for leakages • Proper training to workers regarding handling of boiler operations • Provision of first aid boxes
High pressure steam	Explosion	Severe burning and damage to equipment	<ul style="list-style-type: none"> • Use of PPEs • Regular maintenance of boiler • Storage areas for raw materials should be away from boiler • Flammable materials need to be stored away from boiler area • Fire-fighting facility • Provision of first aid boxes
Incomplete combustion of fuel in boiler	Asphyxiation from carbon monoxide	Lethal damage	<ul style="list-style-type: none"> • Online CO monitors should be provided • Regular checking of work place • Individual alertness
APCD failure	Release of PM in ambient air	Air pollution	<ul style="list-style-type: none"> • Regular monitoring & inspection shall be done. • The plant shall immediately shut down on APCD failure

Power room & D.G. Set operation

Activity	Associated hazards	Health impact	Proposed control & mitigation measures
Working in power room	Electrocution	Physical injury and lethal damage	<ul style="list-style-type: none"> Use of PPEs First aid facility Acoustic enclosures
	High noise	Gradual hearing loss	
Working near DG	High noise	Hearing impairment	<ul style="list-style-type: none"> Use of PPEs Acoustic enclosures
Maintenance operations for DG	Physical hazard and electrocution	Physical injury and burns	<ul style="list-style-type: none"> Use of PPEs Restricted entry of staff Use of flame proof fittings
HSD storage area	Leakage / Fire	Severe burns and physical injury	<ul style="list-style-type: none"> Storage will be away from ignition source Regular monitoring to check the leakages and spillages Firefighting facility will be provided PPEs will be provided First aid box

Handling and storage of raw material and products

Activity	Associated hazards	Health impact	Proposed control & mitigation measures
Transportation of raw materials and products	Physical hazards, spillage of material	Injury due to road accidents	<ul style="list-style-type: none"> Trained drivers to be employed Proper first aid kits to be provided in all vehicles MSDS training to be provided for hazardous chemicals Transport Emergency (TREM) cards to be provided to the drivers
Handling & storage of molasses/cane juice	Spillage from tankers	Physical injury	<ul style="list-style-type: none"> Proper handling of molasses/cane juice Training to workers involved in handling and storage Concerned PPEs to be provided to workers Inspection and regular monitoring of storage area Provision of level indicators for storage tanks
Handling and storage of fuel	Spillage and leakage, probability of fire in coal storage yard	Physical injury	<ul style="list-style-type: none"> Proper training to workers Water sprinkling for maintaining temperatures of coal storage yard Use of PPEs Regular monitoring of storage area Proper system for loading operations
Handling and storage of chemicals	Spillage and leakage of hazardous chemicals	Physical injury	<ul style="list-style-type: none"> Proper labeling of harmful chemicals Immediate First aid provisions Discarded containers to be stored properly Training of MSDS to be provided to workers Proper ventilation to avoid fuming in the storage area
Handling and storage of alcohol	Inhalation, ingestion & fire	<ul style="list-style-type: none"> 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, 	<ul style="list-style-type: none"> Avoid all possible sources of ignition like spark or flame. Use spark/flame proof hand tools Electrical wiring will be flame proof type Proper cleaning provisions if any spillage occurs Proper fire safety systems

		vomiting, and diarrhea • Liquid or vapor of alcohol may cause eye and skin irritation • Burn injury	• Training for proper handling of alcohol. • Provision of level indicators for storage tanks of alcohol • Avoidance of plastics, rubber and coatings in the storage area.
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Hazard identification and Risk Assessment Matrix

Defining scales based on assumptions:

Scale, S1		Scale, S2				Risk classification	
		Likelihood		Level of Consequence			
0-5	Low	0-5	Rare	0-5	Low	0-50	Low
6-8	Medium	6-8	More often	6-8	Medium	51-80	Medium
9-10	Severe	9-10	Frequent	9-10	High	81-100	High

Proposed 110 KLPD Molasses based Distillery along with 4.0 MW cogeneration power plant
At Village Sewrahi, Block & Post Office Seorahi, Tehsil Tamkuhi Raj, District Kushinagar, Uttar Pradesh

Risk Assessment

Activity	Associated risk identification								Risk assessment						Risk Management Measure required
	Related Hazard	Condition			Adequacy of measures		Risk		Scale S1	Severity S2= L x C		Detectability (D)	Total S1+S2+D	Risk classification	
		D/I	R/NR	N/AN/E	Measures	Gaps, if any	Likelihood	Consequences		Likelihood (L)	Level of Consequence (C)				
Distillery plant	Falling or slippage from stairs	D	NR	E	Helmets	N	Physical injury	Injury on head	8	6	8	10	66	Medium	Mandatory use of helmets in the plant premises.
Boiler	Fire & explosion	D	NR	E	Fire extinguishers	N	Burning of skin	Major burning and loss of life	9	2	9	10	37	Low	Fire extinguishers for emergency fire
Power Room	Electric shock/short circuit	D	NR	E	Proper wiring & insulation	N	injury	Loss of life	7	5	9	10	62	Medium	Facility of onsite fire extinguishers
Handling of alcohol &storage	Fire & explosion	D	NR	E	Fire extinguishers	N	Burning of property and persons	Loss of life	9	7	8	10	75	Medium	On site availability of Fire extinguishers
Storage of coal and biomass	Fire	D	NR	E	Water sprinkling & fire extinguishers	N	Burning of life and property	Loss of life	9	7	8	10	75	Medium	Fire extinguishers and water sprinkling
Handling & storage of Chemicals	Spillage	D	R	E	Proper labelling and storage	N	Burning, rashes on skin	Major burns on skin	7	7	8	10	73	Medium	Material safety data sheet (MSDS) and proper labelling of materials

Legend: D: Direct, I: Indirect, R: Routine, NR: Non-Routine, N: Normal, AN: Abnormal, E: Emergency

DISASTER MANAGEMENT PLAN

Definition

The below given definitions of DMP are sourced from those proposed by the "International Strategy for Disaster Reduction (ISDR)", a "UN (United Nations) and the WHO World Health Report 2002 (WHO 2002)":

"Hazards are defined as potentially damaging physical events, which may cause loss of life, injury, or property damage. Each hazard can be characterized by its location, intensity, frequency, and probability".

Vulnerability is the extent to which a community or person is susceptible to a hazard giving way to physical, social, economic and environment factors which govern this study. If a person or community is strong enough to the extent that it will have the capacity to maintain its strengths and resources then it will reduce its vulnerability to the extent it has the ability to cope the situation.

Risk is defined as the probability of harmful consequences or economic losses resulting from the interactions between natural or human-induced hazards and vulnerable or capable conditions. In a simplified manner, risk is a function of hazard and vulnerability

Risk = function of (Hazards * vulnerability) [Source: <https://www.ncbi.nlm.nih.gov/books/NBK11792/>]

Scope

An important element of mitigation is an emergency planning, 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.

Emergency planning is just one aspect of safety and cannot be considered in isolation from the project and hence before starting to prepare the plan, works management will ensure that the necessary standards, appropriate to safety legislation, are in place.

Objectives

The overall objectives of the emergency plan will be:

- I. Define roles and responsibilities of site management
- II. Provide training and guidelines and requirements.
- III. Protect the human life and property.
- IV. Ensure the welfare of the public during emergency.
- V. Provide reference for those co-ordination emergency activities
- VI. Take account of shortcomings and update as appropriate from time to time.

Rehearsal of Plan

Emergency plans need to be tested when first devised and thereafter to be rehearsed at suitable intervals. Individual personnel with duties under the plan should be qualified by exercise which will help to refine the procedures by identifying deficiencies, difficulties and monitoring response time. To create awareness about safety and emergency response procedure among the personnel, mock drill should preferably be carried out monthly.

Rehearsals or exercise are important for all personnel likely to be involved in an accident on or off the site because:

- I. They familiarize on-site personnel with their roles, their equipment and the details of the plans.
- II. They allow the professional emergency services to test their parts at the plan and the co-ordination of all the different organizations.
- III. They provide the current accuracy of the details of the plan (telephone numbers etc.) and the availability of special equipment (fire and rescue breathing sets etc.)
- IV. They give experience and build confidence in the team members. In the initial shock and confusion of real incident, the ability to fall back on established initial actions are invaluable.

The on-site emergency procedures for each process plant, storage facility etc. should be tested regularly and that all employees receive initial and refresher training, exercise should be arranged to test each part of the emergency plan on each plant, stage by stage. Emergency isolation and shut down should be rehearsed.

After each rehearsal or practice, the plan should be reviewed to take account of any shortcomings highlighted by the exercise.

Consequence analysis

Major hazards associated with distillery are fire and explosion. Fire hazard due to alcohol storage, fuel storage, boiler operations etc. and explosion due to boiler operations, molasses storage etc. Ethanol is a highly flammable liquid.

Hazards due to ethanol - Flammable. Risk of ignition. Vapors may form explosive mixtures with air. Vapours of ethanol might travel/spread to a potential source of ignition capability and then flash back immediately. Containers may explode when heated. Vapors may form explosive mixtures with air. [Source: MSDS of ethanol]

Fire due to ethanol leakage can cause irreparable damage within plant premises. Burning of men and property in areas of leakage.

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	<ul style="list-style-type: none"> • 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			

Carbon dioxide gas released during fermentation can also cause various hazards if not collected properly and leakage occurs. Carbon dioxide is an odourless, colourless and toxic gas. The consequence analysis at various concentrations is given below:

Carbon Dioxide is a powerful cerebral dilator. Carbon dioxide, if present at concentrations between 2 and 10% might cause nausea, dizziness, headache, mental confusion, increased blood pressure and respiratory rate. Above 8% nausea and vomiting might appear and above 10% it might cause suffocation and lethality can occur within minutes. [Source: MSDS of Carbon dioxide]

Safety Measures for Storage & Handling of Alcohol

The alcohol will be directly fed to the storage tanks mechanically and no manual handling will be involved which will reduce the risk of spillage. Following precautionary measures would be taken for safety:

- **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.
 - Storage of acid and alkalies should be done properly as they can cause severe burns on skin.

In case of any emergency following measures will be taken:

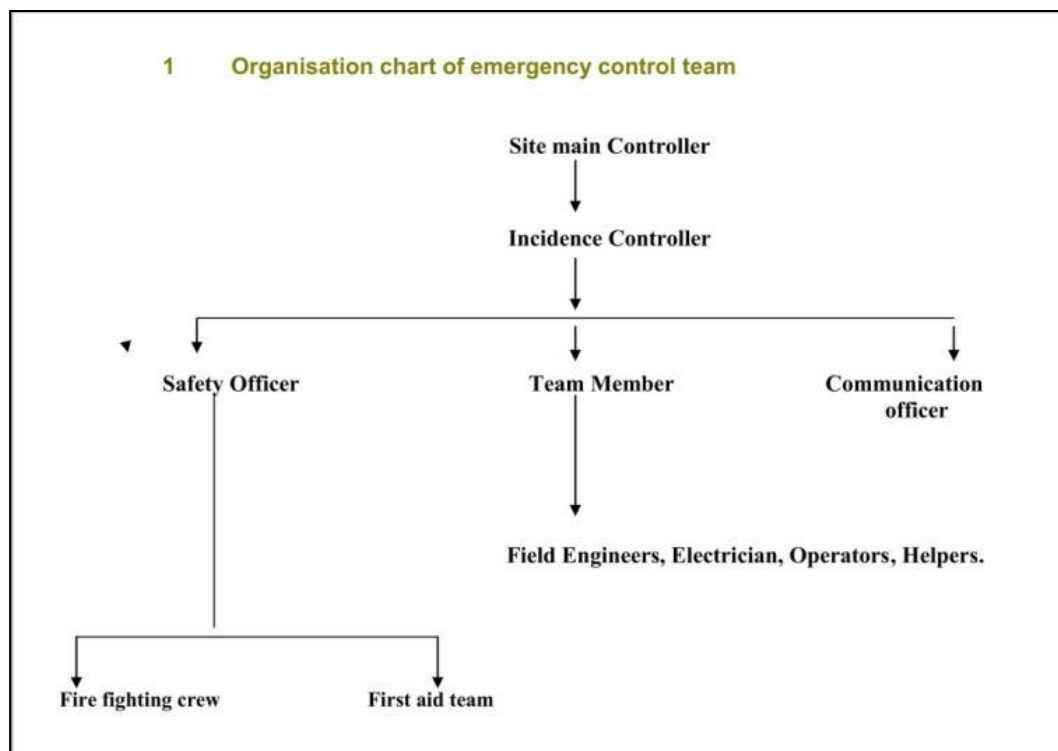
- **FIRST AID MEASURES:** For skin contact, eye contact, & inhalation.
- **FIRE FIGHTING MEASURES:**
 - In plant precautions will be taken by declaring plant operating area as No Smoking Zone.
 - All the Electrical installations will be flame proof type in the alcohol storage area.
 - Use of extinguishing media surrounding the fire as water, dry chemicals (BC or ABC powder), CO₂, Sand, 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 avoid the fire & explosion to occur in the tank. Foam would blanket the fuel surface extinguishing the fire. Simultaneously, the temperature of the fuel will be lowered by the water content of the foam.
 - The foam blanket will suppress 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. Water in straight hose stream shall be avoided as it will scatter and spread fire. Spray or fog nozzles shall be used, cool containers will be used towards flames consisting of water from the side still the fire is out.
 - Hazardous Decomposition Products of fire and explosion: Carbon Monoxide (CO) & Carbon Dioxide (CO₂).

- Security Guards' team will always be there to maintain security all time in whole of the plant premises. The Company will hire fully trained operating and security staff for fire-fighting and fire drill will be conducted at regular intervals by the fire experts.
- **ACCIDENTAL RELEASE MEASURES:** For Spill Clean-up 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.

Whenever disaster occurs, the incident should be communicated to the concerned authority in minimum possible time, in case of failure of a means of communication due to electrical failure an officer should rush to the nearest public telephone booth/ police station to transmit message through line or police wireless.

During office hours on a working day

During office hours on working days, senior most executive in the factory will take the charge of site main controller in case of any emergency. In case of incident controller is not present in the factory production chemist shall take over the function of incident controller as indicated in the organization chart.



Emergency Planning

General

Emergency planning in an industry is an essential need for any disaster to be minimised to the best possible extent in case of emergency situations arising from natural or man-made disasters.

The objectives of a detailed emergency planning include:

- Identification of various types of expected disaster and their probability.
- Identification and enlisting of Govt. bodies, authorities to be contacted/approached immediately in case of disaster.

- Training of various groups of industrial units in case of specific and general disaster related to the work zones and plant.
- Establishment of an early detection system for the disaster.
- Development of a reliable instant information/communication system.
- Organization and mobilization of all the concerned departments/ organizations / groups and agencies instantly when needed.
- A major disaster that can be expected due to fire in this distillery.

Duties and Responsibility of Key Personnel of Environmental Management Cell

Site Main Controller:-	<p>Site main controller is the main working personnel who will head the chain response in case of fire or explosion or any disaster related to industry. He will</p> <ul style="list-style-type: none"> • Call the fire tender. • Ensure that unwanted persons are safely removed from the affected area • Inform the fire tender to reach the area where disaster has occurred. • Make sure that all the workers have gathered in the assembly point in case of emergency. • Extend medical help for wounded. • Remove casualties.
Incident Controller	<p>In absence of site main controller, he will be authorized as his substitute.</p> <ul style="list-style-type: none"> • Immediately inform site main controller about the disaster/incident and explain the situation. • Call the fire tender. • Ensure that unwanted persons are safe removed from the affected area. • Inform and call the fire tender to reach the area where disaster has occurred. • Make sure that all the workers have gathered in the assembly point in case of emergency. • Provide Safety Appliance as required. • Inform and guide fire safety workers from outside to approach the area where disaster has taken place. • Help in searching for casualties. • Guide the team to collect evidence and cause of disaster.
Distillery Manager:	<p>In case site controller and incident controller are not in the factory, he will take over the function of incident controller otherwise he will:</p> <ul style="list-style-type: none"> • Mobilize the fire-fighting operation and coordinate with external fire tenders/fire- fighting equipment. • Liaison between the incident controller and the maintenance, fire, safety and production and medical services. • The maintenance squad should isolate the hazardous area, and plug the leak.
Security Officer:	<ul style="list-style-type: none"> • To coordinate fire-fighting operation and replenish the fire-fighting equipment. • To rescue the injured persons. • To provide first aid/medical assistance. • To liaison with ambulance services. • Remove tank lorry/other vehicles to safe location.
Maintenance Manager:	<ul style="list-style-type: none"> • Maintenance squad should plug the leak, isolate the hazardous area and ensure the safety of the remaining part of the factory. • Remove the tank lorry and other vehicles form the factory premises. • Liaison between the incident controller and fire and safety departments. • The team will mobilize any repair work on an emergency basis.
Accounts Officer:	<ul style="list-style-type: none"> • To coordinate the evacuation of the visitors and office staff who have no role in controlling emergency.

	<ul style="list-style-type: none"> To rescue the injured persons. To provide first-aid/medical assistance to injured workers. To liaison with ambulance services.
Personnel Manager:	<ul style="list-style-type: none"> To communicate with the following authorities for the necessary help. <ul style="list-style-type: none"> ➤ Police Station ➤ Fire Brigade ➤ Local Hospitals ➤ Ambulance Services. ➤ Head Office To request the police to control the traffic and maintain law and order. To liaison with neighbouring organizations for assistance.
Shift In charge after office hours:	<ul style="list-style-type: none"> Establish the emergency control centre Mobilize all coordinators assembled at the Emergency Control centre and put the disaster control plan into action. Mobilize the fire- fighting operations. Mobilize help from ambulance services and hospitals for medical assistance. Mobilize help from the outside agencies for fire-fighting. Inform the police and request to control traffic and maintain law and order. Inform site controller, incident controller and appraise the situation. Direct the shutting down of plants and their evacuation. Give adequate attention to the casualties and send them to hospital.

Preparation of Plan

Alarm System

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

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

Communication

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

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 will comprise of the following.

(a) Fire brigade

Automatic / manual fire detection & alarm system

(b) Fire Hydrant

Fire hydrant will be provided at all danger prone areas and around the premises as per TAC (Tariff Advisory Committee) Norms.

(c) Portable fire extinguishers

Each area of the plant will be analyzed for the kind of extinguisher needed and one or more of the fire fighting system will be installed depending upon the particular nature of risk involved in that area.

(d) Portable chemical fire extinguishers

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

(e) 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 will comprise fire alarm panels, automatic fire detectors, manual call points and fire siren (hooter).

The main fire alarm panel will provide both visual and audible alarm of fire in any protected areas of the plant. Break glass type fire alarms to be operated manually will be provided at strategic locations where high hazards exists.

Automatic fire detectors will be provided in plant areas such as control rooms, switchgear rooms, cable galleries etc.

Emergency Control Center

For the purpose of handling emergency, emergency control centre has been identified and shown on the site plan. All communications to and from will originate at this control centre. The emergency control centre will have the following:-

- 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 will be stored.
 - Plot plans of storage tanks, routes of pipelines, all water permanent lines etc.
 - The locations where personal protective equipment will be stored.
 - The position of pumping stations and other water sources.
 - Roads and plant entrances.
 - Assembly areas & layout of Hydrant lines.

Off-site emergency control plan:

The Off-Site emergency plan is based on those events which could affect the people and the environment outside the factory premises/installation. The nature of the accident is so serious that it becomes important not only in factory management but also for the general public outside the factory premises to deal with the situation. The basic objective is that damage to human life and property is minimized. Advance planning is the key. The on-site and off-site plans should detail so that the emergency services are summoned at the appropriate time and are provided with accurate information and the correct assessment of the situation. The responsibility for this should be with the site main controller. The various emergency services should be co-ordinated by fire and Safety coordinator who will liaise with site Main Controller.

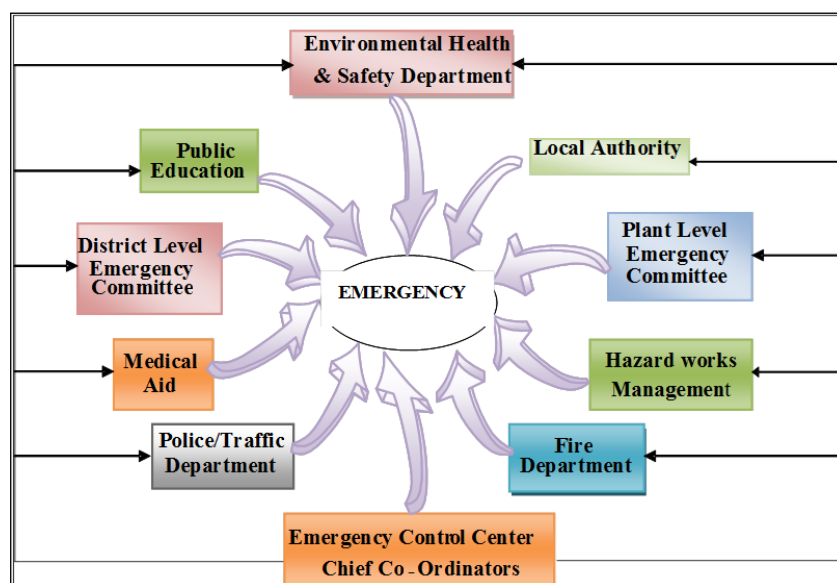
Action Plan: -

The site Main Controller will assess the situation and if the emergency is likely to spread outside the installation or affect the neighbour industry and people outside the factory premises, will declare off-site emergency. He will coordinate with the incident controller and get in touch with all essential local authorities and mutual aid members for controlling the disaster. The local authorities will work under the direct supervision of the site Main Controller.

The help of the following agencies is summoned: -

- Local police
- Fire Brigade
- Hospitals
- Ambulance
- Blood Banks
- Home guards
- Voluntary Agencies

After the incident has been controlled, the site Main Controller should assess the situation and call off the emergency.



Various organizations involved during emergency

Sequence of operations required in case of emergency:

- 1) To take notice of the actual situation after hearing emergency siren.
- 2) To instruct the watchman for communication to all the agencies.
- 3) To see that person controlling the hazard wear appropriate personal protective appliances (Breathing Apparatus)
- 4) To move to the spot to assess what action is required.
- 5) To ascertain that the message has been communicated to the desired persons properly.
- 6) To ensure that unwanted people goes far away from the incident spot.
- 7) The fire shall be controlled with the help of fire extinguishers, water jets, Carbon dioxide Cylinders. The helper shall assist him in this job.
- 8) To remove the Gas- affected / fire effected workers, give first aid and to be sent for medical care.

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 every six months.

Disclosure of Information to Worker and Public Awareness System 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.

Local Statutory Government bodies

S. No.	Name of Govt. Agency	Phone Nos.
1.	District collector/ Magistrate	05564-240202
2.	Additional District Magistrate	05564-240205
3.	DCP Traffic (HQ/Control room)/ SP	05564-240093
4.	Addnl. Commissioner of Police/ CO - Sadar	9454401082
5.	Fire Brigade/Station (Tamkuhi Raj)	101/ 9454418805
6.	Police Station (Sewrahi)	103/ 9454403817
7.	DGFASLI (Directorate General Factory Advice Service and Labour Institutes),/ Regional Labour Institute	0512- 2218691, 2218692, 2218745
8.	Dy. Chief Controller of Explosive/ ADM(E)	0562-2521322
9.	Govt Hospital (nearest)	05862 – 242217

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

S. No.	Description	Amount (Rs. In lakhs per annum)
1.	Doctor's Retainer Fee (including staff)	5.0
2.	Medicine Expenses	1.0
3.	Health Checkup Exp.	2.0
4.	Ambulance Expenditure	4.0
	Total Amount in (Rs.)	12 Lakhs

Details of Occupational and safety hazards and their mitigation

The distillery has following hazardous chemicals that are used in process and can prove harmful if not handled properly. The medical health checkup 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)	Mitigation measures
1.	Caustic soda (sodium hydroxide)	2 mg/m ³	<ul style="list-style-type: none"> • Proper PPEs to be provided to workers. • Handling in accordance with good industrial hygiene and safety practice.
2.	Carbon di-oxide	5000 ppm	<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.
3.	Ethyl alcohol	1000 ppm	<ul style="list-style-type: none"> • Mechanical seal will be provided in all pumping systems. • 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. • 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.
4.	Dust exposure	-	<ul style="list-style-type: none"> • Proper dust mask for persons handling biomass and coal. • Regular water sprinkling to avoid dust dispersion. • Storage of biomass in covered sheds and continuous water sprinkling. • Proper greenbelt will be developed in all the areas having the probability of dust explosions.
5.	Noise exposure	75 dB(A) during day time And 70dB(A) during night time	<ul style="list-style-type: none"> • Proper PPEs to be provided like ear muffs and ear plugs • Alternation of duties. • Regular audiometry check-up. • Proper maintenance, oiling & greasing of machines to detect any loosened nuts, bolts.
6.	Heat exposure	-	<ul style="list-style-type: none"> • Alternation of duties. • Proper PPEs to the workers.
7.	Electrocution	-	<ul style="list-style-type: none"> • Proper earthing. • Doubly insulated instruments/machineries. • Proper PPEs like rubber gum boots to be provided.
8.	Physical	-	<ul style="list-style-type: none"> • Proper PPEs for workers operating at heights like safety helmets, fall protection etc. • Proper first aid facilities at all danger prone areas.

Source: National Institute of Occupational Safety and Health document

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

Occupational Health and safety is the most important aspect in an industry which envisages the proper analysis of hazards with respect to workers and human population present inside and around plant premises and the measures which has to be taken in order to run operations smoothly and on ethical back grounds. An industry needs its workers, in turn the industry should make such arrangements so that not even a single life is wasted with the perspective of implementation of every security details and very stringent rules. Following measures will be adopted for implementation of OHS standards.

- Well-equipped Occupational Health Centre with adequate paramedical staff
- Routine investigation related to operations pertaining to occupational hazards
- Health surveillance and maintenance of health record
- Proper implementation of Health and Safety policy
- Round the clock ambulance facility
- Sufficient number of first aid boxes
- Formulation of OHS implementation team/ cell
- Implementation of OHS management program
- Proper visual aids which display the health & safety policy along with specific instructions depending on area covered.
- Training and placards visualizing safe operational procedure (SOP) in case of disaster at all danger prone areas

- Investigation of fatal, serious accidents
- Investigation of reports of occupational diseases
- Corrective and preventive action plan for any kind of small or big disaster if occurred and brainstorming for avoiding such situations in the near future
- Regular conduction of safety training, seminars, workshops to handle disastrous situation.
- Proper training for accidental measures outside plant premises and knowledge of driving mishaps with implementation of strict driving rules.
- Ensure proper use of PPEs according to the work zone like helmet, safety shoes, goggles, 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

CONCLUSION

It is concluded that there will be no major risk involved due to proposed project. Proper precautionary measures will be taken to minimize risks. Personal Protective Equipment (PPEs) will help to minimize the health hazards and accidental casualties.

