CHAPTER - EIGHT

RISK ASSESSMENT, ON-SITE DISASTER MANAGEMENT PLAN, HEALTH & SAFETY POLICY

8.1 Background

Any undesirable happening of such magnitude & nature resulting in loss of life & property, damage to the environment is termed as Disaster. A heavy toll or loss in terms of life imbalance in environment, failure in achieving targets etc. can be caused by accident owing to either any major or a number of minor failures. Risk assessment thus forms an integral part of Disaster Management.

It is essential to ensure safety and reliability to avoid any accidental occurrence in an industrial set-up. This is done by a systematic study of the industrial installations and to identify possible failures and prevent their happening/occurrence and avoid the same which otherwise can result into a disaster. The following risk assessment, On-site Disaster Management Plan and Health & Safety policy are proposed for M/s. Shamli Distillery & Chemical Works distillery which shall be further strengthened at the time of setting up of the project.

8.2 Technical Prerequisites and Recommendations

The plant shall have storage facility for Alcohol , chemicals and Fuel for D.G. Sets. The fuel shall be stored in tanks.

Within the distillery, the vessels, columns, etc. shall be provided with safety valves. Wherever necessary, stand-by safety valves will be provided in the process plants.

In the case of over-pressure, the safety valve discharges shall be vented to a safe point located within the battery limits of the plant. In addition to this, necessary fire-fighting facilities shall be provided as per standard norms.

The plant shall get the boilers and other critical equipment regularly checked for safety to avoid any hazard and or accident.

Alcohol Storage Facility (Tanks)

Spirit storage tanks will be in the open with brick wall height 1.5 m and above brick wall a chain link fencing 1.5 m. Internal & external plaster with paint. Gate lock arrangement will be at place for storage section. The tank sizes will be for 30 days bulk storage and 3 days storage as day storage tanks.

The inter spacing between two tanks will be as per the Safety guidelines. There will be lightening arresting system, flame-arresting system at the top of the tanks. In addition to this, there will be condensing system to condense alcoholic vapors. Since the storage tanks are proposed in the open area, there will be sufficient natural ventilation available.

Alcohol Truck Filling: Truck filling area shall be protected by a complete deluge system / water sprinkling system. Flame proof silencer for tankers shall be used at the time of loading of finished good products.

8.3 Properties of Hazardous Chemicals & its Management

The distillery is relatively less hazardous plant. The main chemical handled is alcohol and to a small extent liquid fuel. The possible damages caused by alcohol are given below:

8.3.1 Alcohol

Alcohol is a clear liquid and burns in air with blue flame forming CO2 and water. Vapour-Air mixture is explosive. Vapours are heavier than air and travel considerable distance.

Potable alcohol is stored in warehouses to be matured, bottled and transported.

The material safety data sheets of Ethanol have been given as Annexure - 8.1, to make oneself familiar with the physical and chemical properties of the materials, their effects and measures to be taken in case of exposure or fire.

Ethanol has a relatively low flash point (55 deg.F) and boiling point (78.5 deg.C). It has also a lower NFPA flammability rating of 3. The evaporation rate of the vapour in air is 1.4. The burning rate of alcohol being lower heat radiated would be far lower. Hence the damage distance will be very small.

The ethanol store area on fire scenario can be discounted as it is stored at room temperature and pressure and has low flammability. All necessary precautions are applied.

8.3.2 Liquid Fuel System and Onsite Storage Facility

HSD will be used for diesel generator to meet the emergency supply.

The material safety data sheet of Diesel have been given as Annexure - 8.2, for familiarity with the physical and chemical properties of the materials, their effects and measures to be taken in case of exposure.

Diesel oil has a relatively high flash point (51.7 deg.C) and boiling point range (232-338 deg.C). It has also a lower NFPA flammability rating of 2. The flammability range of the vapour in air is 1.3-6.0% v/v. It has negligible vapour pressure at the ambient temperature. The burning rate of HSD being lower at 0.05 kg/m3 sec heat radiated would be far lower. Hence the damage distance will be very small.

The diesel tank on fire scenario can be discounted as roof is a fixed type, quantity stored shall be too small and with a flash point of 40 deg.C to 55 deg.C.

8.4 Risk Management

Proper fire prevention measures and up-to-date maintenance of fire fighting facilities assume vital importance for an industry like distillery. Since, Alcohol/Ethanol production units have been classified, as high hazard occupancy therefore proper fire fighting equipment must be installed in adequate numbers throughout the entire facility. The industry will take care of all safety guidelines and measures, to minimize the fire hazard at all sub-units of the distillery. The fire fighting system will be as per National Building Code- for Factories, the details of which are as follows.

8.5 Fire Fighting Requirements

8.5.1 The fire fighting equipments shall include (1) Fire Buckets, (2) Fire Extinguisher Cylinder; CO2 type; Dry Chemical Powder Type; Class-B & C, (3) Water hydrants - and a 200 ft or more Emergency Water Hose – would be provided at required places, 4) water sprinklers 5) ventilation system 6) Smoke Detection system 7) Fire Alarms.

Here, various vulnerable locations in the Distillery Unit, probable causes & chances of occurrence of fire, its Class etc. would be given due consideration.

Fire Extinguisher: Extinguishers that can be used on such fire are Foam, DCP and CO2 type.

Hydrants: In a distillery, hydrants play the dual role of providing water for extinguishing tank fires as well as protection against fire exposure of other equipment in the vicinity. There shall be provision for adequate number of hydrants to protect the entire manufacturing and spirit handling facilities. These units shall be at storage of final products (RS, ENA and Ethanol), at the fermentation and distillation section and other raw material storage areas. In addition to hydrants 7.5 HP pump with flameproof motor and head of 40 meters will be provided. Galvanized pipe of 2.5 inch diameter having adequate pressure, shall be provided

Automatic Sprinklers: The distillation plant as well as the spirit storage area shall be protected by open head deluge system. Because of the height of the distillation plant, sprinklers shall also be provided at each floor. All sprinkler system shall be equipped with water flow alarms connected to a central board.

Ventilation: Proper ventilation shall be provided both in the distillation plant and in the spirit storage tank area to prevent accumulation of alcohol vapours in the air. Since, the adequate natural ventilation is available at the site, the mechanical ventilation is presumed to be insignificant.

However, if mechanical exhaust ventilation needs to be provided, it should be to the order of 1cfm/sq.ft. or floor area, (0.3m3/min.-m2) by fans of adequate capacity having their suction intake located near floor level to ensure a sweep of a air across the entire area.

Vapour density of alcohol is 1.59; alcohol vapours, being heavier than air, tend to settle at ground level, hence either low-level ventilation arrangement (in case of natural ventilation) or downdraft mechanical ventilation is recommended. An approved, portable, flammable vapour indicator should be used to check for the presence of alcohol vapours in and around the distillation plant and spirit storage tank area at regular intervals. Any process plant must be well designed and provided with adequate protection systems. But safety is ensured when appropriate training of personnel and proper maintenance of plant facilities are simultaneously undertaken.

8.5.2 Use of Fire Fighting Equipment-

Every worker will be trained with respect to nature and utility of Fire Fighting Equipment, its type and class of fire for which it is to be used.

Classification of Fire

Class (A): Fire involving combustible materials like wood, paper, cloth and grains.
Class (B): Fire due to liquid materials like oil, diesel, petroleum products and all inflammables.

Class (C): Fires involving domestic and industrial gases like butane and propane etc.
Class (D): Metal fires, etc.
Class (E): Electrical fires due to short circuiting, etc.

Every worker shall be given clear-cut information regarding the location of Fire Extinguishers, Fire Buckets, water Points etc.

- Use of Personal Protective Equipment (PPE):

  Every worker shall be trained and made it mandatory to use the PPE such as safety helmets, hand gloves, nose mask, goggles etc.

- Inspection

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

- **First Aid**

  A first aid centre with adequate facilities shall be provided. It shall be maintained round the clock by trained personnel.

- **Safety**

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

- **Evacuation Procedure**

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

- **Emergency Control Center**

Provision is made to establish an Emergency Control Center (ECC) from which emergency operations are directed and coordinated. This center is activated as soon as on–site emergency is declared.

The ECC consists of one room, 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 will gather in the ECC. Therefore, the ECC will be equipped with adequate communication systems in the form of telephones and other equipments to allow unhampered communication.

Mock-drill with all the employees will be conducted periodically to prepare them to react to the actual event if happens.

8.5.3 Other provisions

1. A direct communication line between the unit and nearest medical centre.

2. A wind bag type wind direction indicator to be installed to show wind speed flow, direction and approximate strength.

3. Some of the operating personnel shall be given first aid training particularly against fire hazard & acid exposure. In addition a fully equipped first aid centre shall be set up, including sufficient storage of medicines.

4. A green belt consisting of tall plants and shorter shrubs of fast growing variety shall be installed thus reducing the concentration and dispersion of emission in the surrounding area.

5. The shifting of acid to the process shall not be manual. It is proposed to feed acid through a PVC pipe line. A regular checkup of t he leakage, if any, in the pipe line joint shall be carried out.

8.6 On-site Disaster Control Plan at the Distillery

First who notices the emergency

1. Any one who first notices or gets information of any type of emergency inform immediately the concerned shift engineer about the details of the emergency.

2. Shift engineer of respective area should immediately inform the department officer and production manager giving full details of emergency and inform security department if required.

3. Respective duty officer should reach the spot immediately and check the gravity of the emergency. In consultation with the production manager he will take immediate steps for closing/shutting down the plant or that area. He will give full assistance to production manager.

4. Production manager has to play the important role in controlling the disaster/emergency. He has to act as a site controller. He should be available all the time. He will instruct all his assistants for asking help from security/fire fighting/medical safety/ maintenance or any other agency. He will also instruct for audio alarm (Siren) sounding if needed. He may visit the emergency/disaster site for assessing the gravity of the situation, but most of the time he will be in the control room. According to the gravity of the emergency he will decide whether to call for outside help or not and in turn he will inform the security department for asking outside help i.e. police station/medical services/fire services/traffic police etc.

   He will command over all the emergency operations from first line/second line ECR. He will keep a close contact with factory Director and G.M. immediately after getting the information of the disaster/ emergency. Security officer/incharge should give necessary instructions to their team and rush to the emergency site.

5. Safety officer will reach at once at the site and check the gravity of the emergency. He will help in fire/medical and other reactive operations and will keep close liaison with the production manager. He will also assist/ advise production manager in all emergency operations. Due to his expertise in the field, he can suggest best ways and means for controlling the emergency. He will also help in arrangement of proper Personnel Perfect Equipment required at emergency site. Safety officer will ensure that all related legal authorities such as factories and boilers inspection department, pollution control department, explosive department, electrical inspector etc. are informed at once.

6. The medical officer/assistant will be ready for extending first aid treatment to victims. He can suggest to production manager for shifting victims to nearby hospital or to ask for medical help from these places. He will brief the type and quantum of help needed. If instructed by production manager, medical officer/assistant will rush to the scene with all required first aid arrangements at emergency/site.

7. The employees will be attentive at their duty spot and will act as per the directives of the department officer/production manager. They may be asked to help in emergency operation/shifting of victims/ any other maintenance.

8. Designated Public relation officer will work as communication officer. He will work as per the directives of site controller. He will help in contacting outside agencies for necessary help. He will also contact press-men/news men/photographers and ensure that they publish the realistic situation as false information can misguide the community/public.

9. The security man at main gate will work as traffic controller and work as per the instructions of Site Controller/communication officer. He will guide the outside agencies like fire brigade/ambulance, local administration and other authorities properly so as to reach the emergency site at the earliest possible.

   He will not allow unnecessary movement to the emergency site. All contact telephone numbers should be displayed and made available to all concerned persons.

10. Control room of respective departments will be the emergency control centre. From there the site controller will direct all the operations.

    Each such control room should contain the following:

    a) Site Plan
    b) External and internal telephone connections,
    c) List of key persons with telephone numbers and home address,
    d) A copy of chemical fact sheet
    e) F.F.E
    f) Torches

    In case Ist line emergency control centre is involved in emergency/disaster then P.M office will be the 2nd line emergency control centre. P.M who has to work as site controller will govern all the functions from here. It contains the following:

    a) Site Plan
    b) External and internal telephone connections,
    c) List of key persons With telephone numbers and home address
    d) A copy of chemical fact sheet

11. Time office which is away from work place will be assembly point where employees, visitors and contractors would assemble in case of major emergency. Here the list of person at works at the time of emergency will be available and accordingly roll call of persons may be taken by the Time Officer.

8.7 Health & Safety Policy

8.7.1 Preparation of (occupational) Health and Safety policy for the Safety of the workers at work in the factory and the origanization itself is solely an obligatory duty of the Occupier in general under the statutory provisions of statutory legislation (Medical Provision) prescribed in the Factories Act 1948 and also under section 41B(2) ibid. In case of hazardous process industries as listed in the first schedule of the Factories Act, it is the legal responsibility of the Occupier to make this Health and Safety policy known to his workers local authority and the Chief Inspector of the Factories as well.

This Health and Safety plan followed by the factory in accordance with the guidelines embodied in the licit provisions of Rule 63B of Factories Rules 1958 amended w.e.f. 27/11/1991 and include the following features:

8.7.2 Main Features

1. It is policy of the company that every reasonable effort shall be made to provide and maintain safe and healthy working condition of equipment and system of work for all employees.

2. The prevention of accidents or accident hazard leading to personal injury or damage of equipment/property is recognised as essential and integral part of efficient operation.

3. It shall also be the endeavour of the factory to ensure that surrounding environment is not adversely effected.

4. Every employee shall follow safety rules/regulations, operating procedures/safe work-method design to protect people and equipment from risk of injury or damage to property.

5. The factory shall endeavour to adequately train all employees suitably to equip them to perform their duties in a safe and effective way.

6. Every employee shall discharge his personal responsibility and shall co-operate and actively participate in maintaining and improving safety standards.

7. A health policy will be framed and the policy will be distributed amongst workers. The health policy will be displayed at prominent places so that every worker is aware of it.

8. All necessary safety equipment's/tool will be provided to workers.

9. Adequate supply of clean drinking water, neat and clean toilets and washing facilities will be provided in the factory.

10. Proper ventilation and exhaust fans will be provided in the workshop.

11. Proper protections, steps, guards, will be provided at all required places.

12. Fire fighting equipment like sand buckets and fire extinguishers will be placed at handy places.

Medical Facilities

1. First-aids kits will be kept ready and available to the workers.

2. A registered medical practitioner shall be arranged to look after the health of the workers.

3. An ambulance will be provided in the factory premises for transferring the patient to hospital in case of an emergency.