RISK ASSESSMENT & HAZARD ANALYSIS

1. Introduction

Accidental risk involves the occurrence or potential occurrence of some accident consisting of an event or sequence of events resulting into fire, explosion or toxic hazards to human health and environment. Risk assessment (RA) provides a numerical measure of the risk that a particular facility poses to the public. It begins with the identification of probable potential hazardous events at an industry and categorization as per the predetermined criteria. The consequences of major credible events are calculated for different combinations of weather conditions to simulate worst possible scenario. These consequence predictions are combined to provide numerical measures of the risk for the entire facility.

MCA stands for maximum credible accident or in other words, an accident with maximum damage distance, which is believed to be probable. MCA (maximum credible accident) analysis does not include quantification of the probability of occurrence of an accident. In practice the selection of accident scenarios for MCA analysis is carried out on the basis of engineering judgement and expertise in the field of risk analysis especially in accident analysis.

Detailed study helps in plotting the damage contours on the detailed plot plan in order to assess the magnitude of a particular event. A disastrous situation is the outcome of fire, explosion or toxic hazards in addition to other natural causes that eventually lead to loss of life, property and ecological imbalances.

2. Methodology of MCA Analysis

The MCA analysis involves ordering and ranking of various sections in terms of potential vulnerability.

The data requirements for MCA analysis are:

- Operating manual
- Flow diagram and P& I diagrams
- Detailed design parameters
- Physical and chemical properties of all the chemicals

- Detailed plant layout
- Detailed area layout

Following steps are involved in the MCA analysis:

- Identification of potential hazardous sections and representative failure cases
- Visualization of release scenarios considering type and the quantity of the hazardous material
- Damage distance computations for the released cases at different wind velocities and atmospheric stability classes for heat radiations and pressure waves.
- Drawing of damage contours on plot plan to show the effect due to the accidental release of chemicals

3 Hazards Identification

Identification of hazards is an important step in risk assessment as it leads to the generation of accidental scenarios. The merits of including the hazard for further investigation are subsequently determined by its significance, normally using a cut-off or threshold quantity.

Once a hazard has been identified, it is necessary to evaluate it in terms of the risk it presents to the employees and the neighbouring community. In principle, both probability and consequences should be considered, but there are occasions where it either the probability or the consequence can shown to be sufficiently low or sufficiently high, decisions can be made on just one factor.

During the hazard identification component, the following considerations are taken into account.

- Chemical identities
- Location of process unit facilities for hazardous materials.
- The types and design of process units
- The quantity of material that could be involved in an airborne release and

- The nature of the hazard (e.g. airborne toxic vapours or mists, fire, explosion, large quantities stored or processed handling conditions) most likely to accompany hazardous materials spills or releases

3.1 Hazard Survey

This is a formal systematized approach using a rotary form the final rating number provides a relative ranking of the hazard. Inventory analysis and Fire and Explosive Toxicity Index (FEI) are the two techniques employed for hazards identification process.

3.1.1 Inventory Analysis

Inventory analysis requires the holdup quantities in process vessels associated, intermediate and main storages. All process materials which are capable of producing major accident hazards owing to their physical and chemical properties are identified. Large or substantial inventories in storage or process streams are indicative of the potential hazards to the plant and its surrounding. Flammability and toxicity factors of these inventories can lead to unpredictable incident.

- The list of all the major inventory of chemicals is marked on the plot plan to show the relative significance and interactive effect. Each inventory is evaluated based on its hazards nature, temperature and pressure in relation to the flash point, auto ignition characteristics, LD 50 value and its location in the complex.
- In case of pipeline, the flow rates and the total material handled are also considered since these dynamic inventories may or may not be isolated effectively during accident.

3.1.2 Material Inventory and Storage

- The plant maintains adequate inventory of raw material and others utility items (fuels, solvent etc.) to ensure uninterrupted production. Actual average monthly inventory indicate the fairly medium storage requirements for solvents i.e. methanol stored in four nos. of underground tanks of capacity 70 KL each.

- In addition high speed diesel are procured locally and stored in 200 L (HSD) capacity tanks.

3.1.3 Inventory and Mode of Storage of Raw Materials

The mode of storage of raw material and their storage and tank farm are presented in **Table 71** and tank farms are shown in Figures below:

TABLE 1

INVENTORY OF RAW MATERIAL

S. No.	Name of Raw Material	Quantity (MT)	Mode of storage	Grade
1.	Methanol	70 x 4	M.S. Tank	Commercial Grade
Total		**280**		

For consequence analysis few likely accidental scenarios are considered and subjected to consequence analysis. The purpose of this listing is to analyze the failures individually and in combination. The flammable chemicals stores in explosive tank farm area are much more hazardous and flammable than liquid a fuel that is HSD.

3.2 Fire and Explosion Index (FEI)

Fire and Explosion Index (FEI) is useful in identification of areas in which the potential risk reaches a certain level. It estimates the global risk associated with a process unit and classifies the units according to their general level of risk. FEI covers aspects related to the intrinsic hazard of materials, the quantities handled and operating conditions. This factor gives index value for the area which could be affected by an accident, the damage to property within the area and the working days lost due to accidents. The method for evaluation of FEI involves following stages.

- Selection of pertinent process unit which can have serious impact on plant safety
- Determination of Material Factor (MF): This factor for a given substance in the process unit gives intrinsic potential to release energy in case of fire or an explosion. Material Factor can be directly obtained from Dow's Fire and Explosion Index Hazard classification Guide of American Institute of Chemical

Engineers, New York. The factor can also be evaluated from NFPA indices of danger,health, flammability and reactivity.

- Determination of Unit Hazard Factor: The Unit Hazard Factor is obtained by multiplication of General Process Hazard (GPH) factor and Special Process Hazard (SPH) factor. GPH factor is computed according to presence of exothermic actions and loading and unloading operations.

The penalties due to each of these reactions / operations are summed up to compute GPH factor. Similarly, SPH factor can be evaluated for the operations close to flammable range or pressures different from atmospheric. Penalties of these operations for both factors can be obtained from Dow's EFI index form.

Fire and explosion index is then calculated as the product of Material Factor (MF) and Unit Hazard Factor. Degree of hazards based on FEI is given in the following **Table 2**.

TABLE 2 DEGREE OF HAZARDS BASED ON FEI

FEI Range	Degree of Hazard
0-60	Light
61-96	Moderate
97-127	Intermediate
128-158	Heavy
159 and above	Severe

Preventive and protective control measures are recommended based on degree of hazard. Therefore, FEI indicates the efforts to be taken to reduce risks for a particular unit. FEI computed for various chemicals in Plant are given in **Table 3.**

TABLE 3 FIRE AND EXPLOSION INDEX

S. No.	Unit Name	FEI	Category
1.	Methanol	82.46	Moderate

3.3 Toxicity Index (TI)

The TI value is computed from Maximum Allowable Concentration (MAC), General Process Hazard and Special Process Hazard by use of DOW's hazard classification guide. The scale for TI is given below:

TABLE 4 Scale for Toxicity Index

Ti Range	Degree of Hazard
0-6	Light
6-10	Moderate
Above 10	High

3.4 RISK MITIGATION MEASURES

The scope of the risk assessment study covers risk mitigation measures based on Maximum Credible Accident (MCA) Analysis. The Fire and Explosion Indices were computed for the identification and screening of vulnerable sections. Consequence analysis was carried out for the accidental release scenarios of hazardous chemicals at various weather conditions leading to the computation of damage distances. The following general and specific risk mitigation measures are suggested based on the study.

3.4.1 General Recommendations

Fire prevention and code enforcement is one of the major areas of responsibility for the fire service. Hence the facility should be equipped with following measures,

- Water supply
- Fire hydrant and monitor nozzle installation
- Foam system
- Water fog and sprinkler system
- Mobile Fire Fighting equipment
- First aid appliances
- Surrounding population (includes all strata of society) should be made aware of the safety precautions to be taken in the event of any mishap within the plant. This can effectively be done by conducting the safety training programs (Its DMP compliance as MAH unit as there is storage of hazardous material inventory crossing threshold limit.
- Safety escape routes should be provided at strategic locations and should be easily accessible
- Grating and vent panels should be provided to minimize Domino Effects

- Critical switches and alarm should be always kept in line.
- Fire extinguishers should be tested periodically and should be always kept in operational mode Its OISD and statutory compliance.
- Hydrocarbon detectors to be installed at strategic locations near the units and pipelines handling hydrocarbons at higher temperatures and pressures to assess any leak.
- Periodical mock drills should be conducted so as to check the alertness and efficiency of the DMP and EPP and records should be maintained.
- Proper training should be given to staff to handle any emergency situation
- Signboard including phone numbers, no smoking signs and type of emergencies should be installed at various locations.
- The chain-driven conveyor system should be installed for the transportation of heavy goods with an even bearing surface.
- Automated storage/retrieval systems (AS/RS) store and retrieve products from an inventory location. These systems should be used for unloading, sorting, put-away, storage, order picking, staging, and loading.

3.4.1.1 Storage Tanks

- Storage areas must be adequately separated from buildings process areas and flammable materials (as per OISD)
- Separate dike area must be provided for the different products. Do not store the different products in the same dike
- The separation /space in the storage areas such that sufficient to escape from fire, at the same time it should allow emergency procedures to be mobilized.
- Proper dyke area should be provided for the storage of chemicals. In the event of a fire, the fire in the dyke area should be addressed first so as to minimize the heat input to the tank
- The fire proofing material/coating should be resistant to weather effects such as chalking and erosion. Top coat, wherever provided, must be resistant to solar ultra violet radiation

- The fire proofing materials should have adequate adhesion, strength and durability
- In case of accidental release, shut-off leaks without risk. Prevent spillage from entering drains or water sources
- After spills wash area with soap and water preventing runoff from entering drains.
- For small spills, take up with sand or other non-combustible material and placed into closed containers for later disposal
- For large liquid spills, build dyke far ahead of the spill to contain the spilled material for later reclamation or disposal
- Seal all the waste in vapour tight plastic bags for eventual disposal or incineration.
- Provide proper ventilation
- Use respiratory protection if ventilation is improper
- Use face shield, PVC gloves, safety boots while handling. Contaminated clothing to be immediately removed

3.4.1.2 Control Rooms

- Control rooms shall be blast proof and shock proof
- The building shall be located upwind of the process storage and handling facilities. The building shall not be at a lower level than the tank farm. The recommended distances are 30 m for more than two process units
- Adequate number of doors shall be provided in the control room for safe exit Halon / Its proven Equivalent shall be used for control rooms and computer rooms
- Smoke detectors system shall be provided for control rooms at suitable locations
- To resist fire spread through ducts, dampers shall be installed in ducts
- One hydrant (minimum) for every 45 m per wall of the building shall be positioned all around the building

4.2 Mitigation Measures for Natural Disasters

4.2.1 Earthquake

Personal structural mitigation in earthquake prone areas includes seismic retrofits of property and the securing of items inside a building to enhance household seismic safety. It may include the mounting of furniture, refrigerators, water heaters and breakables to the walls.

4.2.2 Severe Storms

- Land use management should provide protection from wind and storm surge.
- Engineering of structures should withstand wind forces and water damage (including storm surge).
- Building should be constructed with higher wind-resistant capacity.
- Securing of elements such as metal sheeting, roofing, and fences should be done to avoid severe damages.
- Safety shelters are to be arranged to tackle cyclones and storms.
- Severe weather warning systems should be installed.
- Community awareness regarding severe storms risk and evacuation plan should be properly addressed.

4.3 Preventive Measures of the Electricity Hazard

- All electrical equipment shall be provided with proper earthing. Earthed electrode shall periodically tested and maintained
- Emergency lighting shall be available at all critical locations including the operator's room to carry out safe shut down of the plant, ready identification of firefighting facilities such as fire water pumps and fire alarm stations.
- All electrical equipment shall 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 annunciation system for fire safety should be provided.

- Temperature sensitive alarm and protective relays to make alert and disconnect equipment before overheating.
- Prevent higher humidity and temperature near electric insulations.
- Danger from excess current due to overload or short circuit should be prevented by providing fuses, circuit breakers, thermal protection
- Carbon dioxide, halon or dry chemical fire extinguishers are to be used for electrical fires

4.4 Preventive Maintenance Inspection Schedule for Pumps

All the following items shall be checked / recorded after the specified period:

After 1000 running hours or 3 months whichever earlier

- Bearing lubricant (for water contamination and sediments)
- Oil ring for performance
- Deflector for looseness
- Constant level oiler for leakage
- Mechanical seal for leakage
- Seal flushing/quenching system (of Mechanical Seal) for clogging and chocking.
- Cooling water flow in both the bearing housings
- Condition of bearing by sound and temperature (in running condition)
- Performance of all measuring instruments (Pressure/Temperature gauges and Flow meters)

After 4000 running hours or 1 year whichever earlier

- Repeat all checks given above
- Flushing of bearing with lube oil and refilling of oil to required level, whether carried out or not
- Flushing of cooling water lines and strainers to ensure proper flow of cooling water.
- Foundation, foundation bolts and supports
- Replacement of old packing with new ones and condition of gland follower, lantern ring and sleeves (in case of gland packing)
- Condition of coupling, coupling bolts, nuts, spring washers and their conformity to uniform size. Change grease in half coupling in case of gear type

After 8000 hours or 2 years whichever earlier

- Repeat all checks given above
- Condition of outboard bearing, lock nut and lock washer (in case lock washer found damaged and lock nut loose, shaft axial play shall be checked)
- Following items of Journal bearings:
- Clearance of I/B and O/B bearings
- High spot (High Spots shall be scrapped)
- Condition of thrust bearing, lock nut and lock washer (in case lock washer found damaged and lock nut loose, shaft axial play shall be checked)
- Pump float (adjust, if necessary)
- Condition of mechanical seals
- Alignment (Misalignment shall not be more than 0.05 mm)
- Painting of equipment, whether carried out or not
- After completing the checks listed above the pump shall be started and the following shall be checked
- during the trial run (the trial run duration shall be half to one hour for electric driven and 3 to 4 hours for diesel driven):
- Discharge pressure
- Suction pressure
- Condition of Mechanical Seal/Gland Packing
- Electric Motor load current at discharge valve shutoff and open condition
- Condition of bearing by sound and temperature
- Any leakage
- Vibration and shock pulse reading.

4.5 On-site Disaster Management Plan

Onsite Emergency/disaster is an unpleasant event of such magnitude which may cause extensive damage to life and property due to plant emergencies resulting from deficiencies in Operation, Maintenance, Design and Human error, Natural Calamities like Flood, Cyclone and Earthquake; and deliberate and other acts of man like

Sabotage, Riot and War etc. An Onsite Disaster may occur all of a sudden or proceeded by a Major Fire. Purpose for the on-site disaster management plan is

- 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.
- To inform authorities including helping agencies (doctors, hospitals, fire, police transport etc.) in advance, and also at the time of actual happening.
- 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.
- Following fire protection facilities are available to combat the emergencies and depending upon the type of emergencies any one or combination of the facilities are applied.
- Fire Water System
- Carbon Dioxide System
- Foam System
- First Aid Fire Fighting Equipment
- Mobile Fire Fighting Equipment
- Gas / Fire Detection and Alarm System.

Fire Protection Systems

Fire Hydrant System and Other Facilities

A fire Hydrant System has been provided for the premises. The system comprises of an underground water storage tank with make-up facility through Bore wells & water storage tanks. The system is kept pressurized all the time with the help of a Jockey Pump. Whenever a fire hydrant outlet is opened and the line pressure drops, the fire hydrant pump starts automatically.

Main Plant Hydrant System Consist with:
Underground water storage tank

Fire Pump (Electrical Driven)
Fire Pump (Diesel Driven)
Jockey Pump
Pumps Head
Single Hydrant point
Double Hydrant point
Water monitor
Hydrant Riser
Prills Plant Hydrant System Consist with
Underground water storage tank
Fire Pump (Electrical Driven)
Fire Pump (Deisel Driven)
Jockey Pump
Pumps Head
Single Hydrant point
Double Hydrant point
Water monitor
Hydrant Rise

For use with the Fire Hydrant System, the following firefighting equipment's / facilities are available:

1. Fire Hoses	5. Foam Compound (AFFF & ARFFF)
2. Branch Pipes & Nozzles	6. Breeching & adaptors
a) Gunmetal Branch-pipe b) Triple Purpose c) Diffuser d) Foam Making Branch pipes	7. Fire Blankets 8. Fire Suits 9. Portable Water Monitor 10. Emergency Ladder
3. Fire Hooks	11. Portable foam Trolley
4. Fire Man's Axe	12. Smoke Extractors

Fire Buckets/Fire Extinguishers

Fire Buckets and portable Fire Extinguishers are provided in all the areas depending upon the specific needs of the area. Some spare equipment's are maintained in the inventory at an identified Fire & Safety Equipment' Store. The following table shows the number of various types of Fire Extinguishers available in the premises.

Table –5 Type of Fire Extinguishers

S. No	Type of Fire Extinguishers	Numbers available
1	No. of Water Foam Monitors	As per OISD
2	No. of Mobile Foam Unit	As per OISD
3	Foam Carrying capacity	As per OISD
4	No. of Foam making branches	As per OISD
5	Storage of AFFF	As per OISD

4.6 Emergency Safety Cupboards & PPE'S

To have adequate tools, tackles & PPE's during emergency handling, stock of these items has been maintained in emergency cupboards. ESM can take the required items from these cupboards.

Emergency safety cupboards are available inside factory premises at various locations. Checklist of safety cupboard is maintained and frequency of checking in monthly basis. Followings are the particulars available in the safety cupboard. Following items are maintained in cupboards. **Note:** Number of item & items in cupboards may vary in different areas.

4.7 Occupational Health and Safety

For large industries, where multifarious activities are involved during construction, erection, testing, commissioning, operation and maintenance; the men, materials and machines are the basic inputs. Along with the boons, industrialization generally brings several problems like occupational health and safety.

The industrial planner, therefore, has to properly plan and take steps to minimize the impacts of industrialization and to ensure appropriate occupational health and safety

including fire plans. All these activities again may be classified under construction and erection, and operation and maintenance.

4.7.1 Occupational Health

Occupational health needs attention both during construction and erection and operation and maintenance phases. However, the problem varies both in magnitude and variety in the above phases.

Construction and Erection

The occupational health problems envisaged at this stage can mainly be due to constructional accident, dust and noise. To overcome these hazards, in addition to arrangements to reduce it within TLV's, necessary protective equipment will be supplied to workers.

Operation and Maintenance

The problem of occupational health, in the operation and maintenance phase is primarily due to noise, dust etc., and the necessary personal protective equipment will be given to all the workers. The working personnel will be given the following appropriate personnel protective equipment

- Industrial Safety Helmet
- Face shield with replacement acrylic vision
- Zero power plain goggles with cut type filters on both ends
- Zero power goggles with cut type filters on both sides and blue color glasses
- Welders equipment for eye and face protection
- Cylindrical type earplug
- Ear muffs
- Canister Gas mask
- Self-contained breathing apparatus
- Leather apron
- Aluminized fiber glass fix proximity suit with hood and gloves
- Safety belt/line man's safety belt
- Leather hand gloves
- Asbestos hand gloves

- Acid/Alkali proof rubberized hand gloves
- Canvas cum leather hand gloves with leather palm
- Lead hand glove
- Electrically tested electrical resistance hand gloves
- Industrial safety shoes with steel toe/ Electrical resistance safety shoes with fiber toe In order to ensure safety of the employees including contract workmen, the following measures will be taken
- Ensuring use of Personal Protective Equipment by the employees and the contract workmen
- Following Work Permit System
- Induction, Regular Awareness and Refresher Training Program on Safety and Special Safety Training Program to specifically address various jobs
- Pep Talk/Group Discussion of safety
- Safety Audit
- Safety Committee Meeting
- Mock Drills/Training on Emergency Preparedness and Response Plan

Fully fledged medical facilities will be available round the clock for attending emergency arising out of accidents, if any. All working personnel will be medically examined at least once in every year and at the end of his term of employment. This is in addition to the pre-employment medical examination.

4.7.2 Safety Plan

Safety of both men and materials during construction and operation phases is of concern. The preparedness of an industry for the occurrence of possible disasters is known as emergency plan. The emergency in the plant is possible due to collapse of structures and fire/explosion etc.

The plant will formulate safety policy, keeping in view the safety requirement during construction, operation, maintenance phases, which will address the following points

- Allocation of sufficient resources to maintain safe and healthy conditions of work

- Taking steps to ensure that all known safety factors are taken into account in the design, construction, operation and maintenance of plants, machinery and equipment;
- Ensuring adequate safety instructions are given to all employees;
- Providing all necessary protective equipment, safety appliances and clothing and to ensure their proper use
- Informing employees about materials, equipment or processes used in their work which are known to be potentially hazardous to health or safety
- Keeping all operations and methods of work under regular review for making necessary changes from the point of view of safety in the light of experience and up to date knowledge
- Providing appropriate facilities for first aid and prompt treatment of injuries and illness at work
- Providing appropriate instruction, training, retraining and supervision to employees in health and safety, first aid and ensuring adequate publicity is given to these matters
- Ensuring proper implementation of fire prevention methods and an appropriate firefighting service together with training facilities for personnel involved in this service
- Organizing collection, analysis and presentation of data on accident, sickness and incident involving people injury or injury to health with a view to taking corrective, remedial and preventive action
- Promoting through the established machinery and joint consultation effective participation by all employees in health and safety matters.
- Publishing /notifying regulations, instructions and notices in the vernacular language of employees.
- Preparing separate safety rules for each type of occupation/processes involved in a plant ensuring regular safety inspection by a competent person at suitable intervals of all buildings, equipment, work places and operations.

4.7.3 Safety Organization

Construction and Erection Phase

A qualified and experienced safety officer is to be appointed. The responsibilities of the safety officer will include identification of the hazardous conditions and unsafe acts of workers and advice on corrective actions, conduct safety audit, organize training programs and provide professional expert advice on various issues related to occupational safety and health. He is also responsible to ensure compliance of Safety Rules/ Statutory Provisions.

Operation and Maintenance Phase

When the construction is completed the posting of safety officers will be in accordance with the requirement of Factories Act and their duties and responsibilities will be as defined thereof.

4.7.4 Safety Circle

In order to fully develop the capabilities of the employees in identification of hazards in the processes and improving safety and health, safety circles will be constituted in each area of work. The circle will consist of five to six employees from that area. The circle normally will meet for about an hour every week.

4.7.5 Safety Training

Safety training will be provided by the Safety Officers with the assistance of faculty members called from Professional Safety Institutions and Universities. In addition to regular employees, contractor labors will also be provided safety training. To create safety awareness safety films will be shown to workers and leaflets will be distributed. Some precautions and remedial measures proposed to be adopted to prevent fires are:

- Compartmentalization of cable galleries, use of proper sealing techniques of cable passages and crevices in all directions will help in localizing and identifying the area of occurrence of fire as well as ensure effective automatic and manual firefighting operations;

- Spread of fire in horizontal direction will be checked by providing fire stops for cable shafts;
- Reliable and dependable type of fire detection system with proper zoning and interlocks for alarms are effective protection methods for conveyor galleries;
- Housekeeping of high standard helps in eliminating the causes of fire and regular fire watching system strengthens fire prevention and firefighting; and
- Proper fire watching by all concerned will be ensured.

4.7.6 Health and Safety Monitoring Plan

The health of all employees will be monitored once in a year for early detection of any ailment/abnormality due to exposure to heat /dust.

The company will have a well-defined Emergency Preparedness & Response Plan (ERPR) in place and made for risk assessment of all probable risks with mitigation measures.

The organization will be capable of handling any adverse situation arising out of unforeseen circumstances. At company there will be well trained rescue persons and required equipment in sufficient number to deal with any emergency including fire.

4.8 Precautionary Measures for Falling Objects

- Provide safety helmets to protect workers below against falling objects
- Barriers like a toe boards or mesh guards should be provided to prevent items from slipping or being knocked off the edge of a structure
- Secure objects to the structure like lashing of scaffold boards
- Ensure that there are no loose objects and all tools are properly secured
- Create an exclusion zone beneath areas where work is taking place.
- Danger areas should be clearly marked with suitable safety signs indicating that access is restricted to essential personnel wearing hard hats while the work is in progress.

5 APPROACHES TO DISASTER MANAGEMENT PLAN

5.1 Emergency Preparedness & Response Plan (EPRP)

Safety in the premises is ensured by means of engineering design and construction, use of recent technology and sophisticated equipment, reliable safety systems, careful personnel selection and training. Pine Laminate Pvt. Ltd give priority for Safety, Health and Environment through all phases of activities. Lot of emphasis is given on preventing personal injuries and damage to environment.

Thus Safety Department is one of the important departments in the organization. Presently Sr.Manager - Safety heads the department. He is having direct access to VP-Manufacturing, ExecutiveVice President -Manufacturing (Location head) & Corporate EHS head. Executives & Technical staff members –Safety, assists Sr. Manager -Safety in departmental activities. Manager and Executives are qualified and having experience in Safety field.

Occupational Health center (OHC) equipped with required facility is also a part of safety department. Qualified doctor (Factory Medical Officer) is appointed on retainer ship basis & visits daily on working days. He looks after the OHC. Male nurse is available round the clock and gives first aid to the injured. In Occupational Health Center all required facilities and medicines are available. Stock is updated periodically. Ambulance van along with driver is available round the clock.

Safety is one of the most important aspects in all activities. Consideration for safety is given throughout all stages of production activities. Safety department is involved in decision making related to safety. Safety department conducts trainings to increase safety awareness amongst all the employees. MSDS for the chemicals handled at this site are made available in respective department to make employees aware about the hazards & necessary precautions required to be taken. Good housekeeping is ensured all the time in the department. Adequate ventilation, illumination & hygienic conditions are maintained at workplace. Safety department is responsible for setting up safety systems, procedures & their effective implementation. Safety executives take safety rounds & gives recommendation to improve work environment related to safety. It is ensured through work permit system that all the jobs are carried out safely. Suggestions from employees regarding safe work environment are accepted positively & efforts are taken to implement them.

5.2 Objectives of the Plan

The plan is developed to make the best possible use of the resources available at Plant and/or the agencies available outside to provide help/assistance in case of an emergency in the factory premises. The activities will include;

1. To control and contain loss.
2. To safeguard employees, visitors and public in the vicinity.
3. To minimize damage to property and / or the environment.
4. To inform employees, the general public and the authorities about the hazards/risk assessed, safeguard provided, risk if any and the role to be played by them in the event of emergency.
5. To inform authorities and emergency services for additional help, if required.
6. Rescue victims and give them the necessary medical attention in the shortest possible time.
7. To identify and list out the casualty, if any.
8. Provide necessary information to families/relatives of affected persons
9. To secure the safe rehabilitation of affected area and to restore normalcy.
10. To provide necessary information to outside agencies including media and statutory bodies.
11. To preserve evidences, records, equipments, etc, and to organize investigation for the root cause of the emergency and develop necessary preventive measure avoid its recurrence.
12. To ensure safety of the employees before re-entry and resume the work.
13. To work out a plan with all provisions to handle emergencies and to provide for emergency preparedness and the periodical rehearsal of the plan.

Responsibilities should be clearly assigned and should be practicable. For clear understanding and quick action, the action (Role) by each individual (his emergency duty) shall be defined & communicated clearly.

Small or Localized emergency situation, this is an emergency situation that will have small fire, explosion, toxic gas release or chemical spill in small or controlled area. This will be limited to specific small area or department section. These

situations get normally controlled by individual or by group of people with or without initiating emergency alarm.

Local Emergency is a state of emergency consisting of situation which may affect one or more plant / department, but the effects are contained within the premises and it is possible to bring the emergency situation under control using own resources. This includes activation of emergency plan of site.

Major Emergency is defined as that event may affect one or more operating areas of plant and possibly extend beyond the factory premises. It may cause injuries, loss of life or extensive property damage. It may require use of additional resources than what we have available with us in-house. The areas where possible major accidents may happen are solvent storage tanks of warehouse and plant.

Possible Emergencies

The types of emergencies which can happen at plant are as listed below. These emergency situations can be of one of the above or combination from above three type i.e. Small or Localized emergency situation, Local Emergency and Major Emergency

a) A large fire and / or explosion in chemical tank farm areas, manufacturing areas, warehouse and other service department/ offices.

b) Sudden emission of flammable or toxic gases/vapours to the atmosphere.

c) Spillage or release of chemical from vessels / containers.

d) Earth Quake –The area is classified as Zone IV (High Risk Zone) as per the BIS classification.

e) Flood – Due to Heavy rain.

Various actions which need to be followed and taken to control these emergency situations are covered in this plan.

Fire

Flammable solvents are used in process & hence fire hazard is always there if the safety norms are not followed. There could be a spillage/ leakage of flammable solvent from containment & if it gets accidents ignition source from anywhere then it will catch fire.

Possible ignition sources could be spark from electrical equipment, if their flame proofness is not maintained properly. Accumulation of static charge creating spark if earthing & bonding is not proper. Hot work jobs in plant area without proper precautions etc.

Spillage of Chemical

Another probable danger is leakage of flammable and / or corrosive chemicals from storage tanks in tank farms. This could be possible from flange joints, tank shell, through vent due to overfilling, line rupture etc.

Flood / Earthquake

Due to Heavy rain water accumulation problem will be there but there is no possibility of flood as nearby Indori Nala is around 5.7 km (towards NE). The river bed in on lower side, in the past there is no any evident where flood occurred in industrial area. Industrial area of Bhiwadi lies in seismic zone IV. This region is liable to High probability and is classified as the High Damage Risk Zone.

5.3 Emergency communication

Procedure for raising emergency alarm and communication:

A reliable and prompt communication system is extremely important in controlling a major emergency. Corrective actions can be initiated in time only, if information can be passed on to key personnel quickly. If necessary have a runner in case of electrical or phone failure.

An emergency gets communicated to emergency control center through**.** A dedicated phone is maintained at emergency control center for receipt of emergency calls. Intercom telephone has been provided at all areas of operations.

An audible fire alarm and siren system is installed throughout the working area of the factory and can be activated from any MCP provided at various places throughout the factory Manual Call points are fast communication of emergency situation. Manual call points are provided in factory premises at various locations. This is the enclosure consist with the breakable glass having switches inside. Any emergency communication can be done by breaking the glass of MCP through attached hammer. Breaking of cover glasses on the manual call points will actuate the audio visual

indication on the fire alarm panel located at the Main Security Gate and Fire Sirens will also blow automatically in the veiling mode.

The wailing siren is having typical rising and lowering sound (10 to 15 sec). This wailing sound signifies to the employee the onset of emergency.

After controlling the emergency situation Incident controller informs to security officer on duty regarding declaration of all clear announcement.

The evacuation is declared by multiple announcements on public address system. At the time of evacuation, the employees are expected to leave their work place after bringing the operations to the safe working conditions, to assembly point area.

Siren tone (sound) What it means Duration of siren sound

Wailing mode (Up & Down) Emergency Siren 45 sec.

Continuous tone (Long siren) All Clear 60 sec.

Evacuation at site through continuous announcement via public address system

5.4 Roles and Responsibilities in Emergency

- Person First Noticing Fire / First Observer:
- Following actions must be taken in case of emergency
- He/ She are first person who observes the incidence. He shall press the nearby MCP (Manual call point) of the fire alarm system and / or Inform to main security gate & give following information:
- His name
- Type of emergency
- Location of emergency If first observer is a squad member then after informing / communicating security, he should perform his duties as squad member and if not then stand by the Incident controller for next instruction. If he/she feels to control the situation, will initiate required actions.
- If he is familiar with plant, machinery or equipment affected, isolate as necessary for containment purpose.
- In case of fire observer should attempt to extinguish the fire with the nearest portable firefighting equipment without exposing himself to undue risk

- Attempt to be made to restrict access of personnel and vehicle until the arrival of the fire team.

Action by Person discovering gas leak / spillage:

- first seek to protect himself by moving to a safe location (it is safer to travel across wind)
- He should alert persons in the immediate area of the danger and raise the alarm & inform his department head.
- He should use the nearest emergency telephone or dial fire station.
- He should not run, but walk quickly.
- He should cover his nose with wet cloth and breathe through it.
- He should remain up wind of the leak and restrict of persons in that area.
- Security Supervisor / Guards

Breaking glass of manual call point will automatically actuate the audiovisual indication on fire alarm panel located at main security gate along with blowing of fire siren in wailing mode for about 30-45 seconds.

If emergency is communicated through intercom number then security supervisor / officer shall initiate siren in manual mode. Call on intercom doesn't initiate siren in auto mode.

Security supervisor on duty will acknowledge & confirm the emergency location & nature of emergency and switch on the public address system and make announcement three times through public address system consist with mike & Speaker, regarding the 'Type & Location of emergency. Announcement happens in Hindi language.

Note – all employees should go nearest speaker available in area and listen announcement being made for further actions as per individual role laid down in procedure.

Do work allotment to security guards as follows:

i) Send Ambulance with one security guard and megaphone.

ii) Ensure security guard available in the area of emergency scenario has opened the lock of fire hose box.

iii) Ensure entry / exit in OR outside from factory is stopped from the gates of the factory.

iv) Stop vehicle movement on roads.

v) Ensure traffic clearance for emergency vehicle.

- Affected Area In charge / SSPO
- Immediate rush to the emergency location and initiate necessary actions as per judgments on the gravity of emergency.
- Ask to evacuate unwanted persons (employee and contract workers) from the site of emergency.
- To take decision on the actions such as shut down, transfer of material, removal of drums/materials ON/ Off of AHU, electrical isolation of equipments, stop the plant operations based on situation.
- Try to control situation with the help of emergency squad members reached at site & available resources, Get the megaphone & Guide ESM for handling emergency Arrangement for shifting patient.
- Ensure no-body is trapped inside affected area.
- Perform head count of plant persons including contract casuals & other engineering personals, refer shift log book, work permit system to verify it.
- After arrival of SSPO handover charge to him and then he will act as Incident controller.
- Take necessary help of maintenance person & electrician for isolation / provision of pipelines, Electrical energy if required.
- Concern plant SSPO will voluntarily provide information which in relevant to incident controller
- Incident Controller:

a) Incident controller defined for; i. Main plant

b) Rush to the site of emergency and acknowledge the situation.

c) Consult with the respective Shift in-charge

d) Arrange with the help of safety squad, for removing the casualties, if any, from the spot & their first aid/ treatment.

e) Guide ESM for effective use & application of safety appliances & ensure action taken is satisfactory.

f) Direct Plant operations/shut-down operations as needed to control situations.

g) Direct for the rescue operation if required and ensure the effective & timely rescue operation under his control.

h) He will communicate through megaphone for the complete plant evacuation, if required.

i) Ensure no person trapped inside the affected area and verify the head count done by the respective shift in charge as per evacuation & headcount procedure.

j) Arrange for any additional firefighting/safety equipments that may be required at the site.

k) After controlling the emergency, he will ensure and take a walk through around the site along with respective shift in charge and ensure no reappearance of the emergency situation.

l) Informed to security in charge to declare ALL CLEAR siren and announcement.

m) Give permission for the reentry to the affected area.

n) Take action to restore operations as required under the circumstances

o) Inform and seek guidance from higher authorities

p) Preserve records/evidences that may be required for investigation.

q) Carry out preliminary investigation into the accident with the help of concerned personnel.

Emergency Squad Member (ESM)

At the incident spot incident controller will assign the responsibilities to ESM for controlling situation or of first aid to injured person & accompany injured person till OHC.

a) ESM should rush to the site of emergency immediately after hearing emergency siren & location of emergency on PAS speaker.

b) Carry BA set, Fire extinguisher, according to the scenario heard on speaker

c) Follow instruction of SPO till arrival of incident controller.

d) Wear the required personal protective equipment's.

e) Know the emergency situation & engage to control the emergency with the help of available resources.

Duties of assigned First Aiders

f) On hearing the fire siren, members of first aider's squad should reach the location of incident.

g) 1f any one body found injured, immediately they will give first aid treatment at site and bring injured person to Occupational Health Center.

h) If required, one or two first aiders will remain at Occupational Health Center, otherwise they will return to the emergency site.

i) Fire & safety equipment's brought from various locations but not used, are kept back on their place.

Welfare Arrangement (HR / Admin Manager)

a) Arrangement shall be made to communicate the necessary information to relatives/ family of the victims.

b) Welfare arrangement – Water, snacks, Cold drinks, Tea for the employees reported at emergency site and participated to control the emergency.

c) Make necessary arrangement at emergency site.

Advisory Team

(Safety Manager, Plant Managers, Engineering Managers, Managers)

a) This includes Safety Manager, Plant Managers, engineering managers, Managers and there second line in silent hrs.

b) Keep in touch with the Emergency controller for information that will help firefighting/rescue operations.

c) Keep in touch with the other coordinators for requirement of any services like external help, communication, transportation etc.

d) Carry out investigation of the accident and assist in filing of statutory reports as required.

e) Each plant Manager / Area manager has to ensure the uniform distribution of ESM & First aider in each shift & this shall be checked & verified randomly by safety team.

Duties of Engineering Manager or executive

f) He will provide necessary help to Incident Controller such as cutting off, startup electrical supply / steam supply / water supply and other services.

g) Ensure utility operators are at fire pump house, to ensure that the pump remains running till the fire is extinguished and get information regarding the same.

Utility Operator - Hydrant Pump House

Operator rush to the hydrant pump house – Main Plant & Utility operator for PRILLS area and ensure:

- Pressure in hydrant system,
- Smooth startup of fire hydrant main pump (1st Electrical, if not, then Diesel Engine)
- Water level in underground water tank & water make up.
- Stop fire pump after getting instruction from Incident controller or after hearing ALL CLEAR siren.

Electrician

- Electrician should be present at respective PCC room /D. G. house to take care of power failure. If more than one electrical personnel are available; then one should remain at PCC/D. G. room & other should go to Incident Spot and act as per the instructions of Incident Controller.
- Ensure Emergency backup system for emergency equipment's, lighting is ready & working properly.

Other Persons / Visitors

- People from the affected area, who are not members of the above squads / teams, should stand by to incident controller for next instruction.

- If complete evacuation is declared then all people should go and stand at the nearest, chosen as per wind direction.
- People from other areas, who are not members of the above squads / teams should not leave their workplace and do their work normal, till further instruction on public address system or respective area in charge or incident controller.

Instructions to Employees

- Do not get panic.
- Do not approach emergency site as a spectator.
- Do not engage phones (internal& external) unless it is in connection with the emergency.
- Do not move about unnecessarily.
- Remain at your working places unless called and be attentive to instructions.
- When told to evacuate, do it in orderly manner and proceed to the area.
- Ensure that all contract labors working in the premise and visitors also follow the above stated instructions.
- Do not leave the working place without informing your immediate supervisor / subordinate /monitor. Production officer in each plant will act as a monitor in his plant.
- No visitors will be allowed to come during emergency

5.5 Drills & Exercise

To ensure the level of emergency preparedness amongst the employees, a mock drill plan has been established & conducted on a periodical basis (Quarterly).

This will conducted to cover the full range of possible scenarios, different shift, and odd hrs & on holidays.

Safety procedure no.13 describes the more details about the mock drill procedure, defined observers, location and briefing / debriefing / finding/recording methodology

along with action tracking. As per the gaps identified, appropriate changes in the hardware and business plan shall be done.

5.6 Evacuation, Rescue, Head Count, All Clear & Re-Entry

Evacuation

Objective

Provide the guidance for the evacuation, if on site emergency is beyond control and converted into major or offsite emergency. When need turn in to the complete evacuation of the plant / area during emergency situation,

Scope

Evacuation is done for the safety of human lives working in the department / in the factory. Evacuation means withdrawal of the personnel from place of work in an emergency. Evacuation can be departmental or total.

ALL EMERGENCIES LIKE FIRES OR DANGEROUS OCCURANCE NEED NOT NECESSARILY BE FOLLOWED BY AN EVACUATION.

If a fire or dangerous occurrence (explosion, spread of gases / vapours etc.) is of minor nature (i.e. very quickly and easily controllable), evacuation is not necessary.

If a fire or dangerous occurrence is of a serious nature, goes out of control and is likely to endanger the lives of the people in a section or in a department, evacuation of the people of only that particular section / department and the adjoining department is necessary.

If a fire or a dangerous occurrence is likely to spread over a large area, goes out of control and is likely to endanger the lives of people of the entire factory, a total evacuation is necessary.

The following procedure has been drawn mainly with a view to moving personnel from their place of work to a safe place as quickly as possible and in an orderly manner, when a situation arises where evacuation becomes necessary

Following are the key steps shall be taken by the site incident controller:

1. Assess the situation for the potential severity & probability of the situation may lead to a major catastrophic situation.

2. Initiate & raise the evacuation need, based on emergency scenario.

3. Evacuation of specific area shall be initiated through announcement in PAS.

4. Incident controller should give necessary instructions to security supervisor for making announcement of evacuation. He shall tell the /Location in details to security.

5. Security supervisor after getting communication from incident controller shall make announcement regarding evacuation for multiple times (5-6 times) at the frequency of two minutes.

6. Incident controller if required shall also make parallel announcement at incident area through megaphone.

7. Sectional / departmental evacuation:

8. Whenever a fire or a dangerous occurrence takes place, the department head or the plant manager or the shift in – charge or the floor management staff will immediately

- Make an on the spot assessment whether the situation warrants evacuation by the people of that particular area.
- ensure that all operations have been brought to a satisfactory 'STANDSTILL STATE ' (SAFE)
- Order evacuation through megaphone / orally and communicate this message to the people of that area.
- Ensure that the visitors / contractors men are also evacuated.
- THE EMPLOYEE OF THE DEPARTMENT WILL,
- When an order has been given to evacuate, move quickly to the Area through the safe exit in an orderly manner by the route which is notified separately in the department.
- Not leave the area until advised to do so

9. The headcount Shall be done through ESM or person available at incident spot, he should Ensure that no one enters in the section / department which are to be evacuated.

- After the evacuation, take a roll call of the members of the concern department in the assembly point area.

- Report the missing names to the at Incident controller, detail about his work place to incident controller.
- Incident controller should search missing person if any.
- If required, arrange the facility for First Aid / Transport / Canteen etc.

10. Incident controller will do following,

- After receiving message, he will instruct ESM (rescue) team to find out the person or casualty in that affected area.
- Give feedback about casualty / missing persons to Security so that he can do further communication to Admin head, safety head, HR head and Location head.
- If required, take the help of First Aider for the treatment & send the injured person / casualty to Occupational Health center for further treatment.

11. Contractor or visitors are present in the dept. then staff of the respective dept. will take the responsibility of them and take them along with him the assembly point Area.

12. Dept. Management staff must ensure that total evacuation of their dept. and reach to the area.

13. Incident controller will check that all employees are evacuated by performing head count at assembly point.

14. He shall verify that all employees are evacuated through concerned employees /ESM of affected area.

15. He should instruct to employees to be alert and if required, he can declare total site evacuation.

16. Employees / Visitors should follow the evacuation routes. When evacuation is declared, Plant employee will take the colleagues, contractors and visitors along with them and move towards assembly point.

17. Ensure adequate & clear communication at the site for the evacuation.

18. Direct & ensure the peoples are gathered at a defined place at chosen assembly point.

19. Ensure chosen assembly point is in correct direction as per wind direction.

20. Clear communication to the shift incharge/ area incharge /supervisors to ensure peoples under him was evacuated safely.

21. Ensure peoples from services department engaged through work permit procedures were communicated effectively & evacuated.

22. Ask Shift in charge to refer log book, work permit & ensure nobody trapped inside the plant area.

23. He shall also check visitor entry at gate to check details of visitors.

5.7 Assembly Point

In the event of emergency in one operating area, it may be essential to evacuate the personnel from the affected area. Total eight assembly points have been identified in the premises. Employees, who are required to evacuate from their respective area

HEAD COUNT PROCEDURE:

- Incident controller has to assign the responsibility to a Plant employee (ESM/Shift in charge) for head count of the members gathered at assembly point.
- Ensure all chosen assembly points were covered for head count.
- Cross verification by referring the log book, muster roll, Gate pass, Card punching system, work permit system shall be done.
- This shall also be done agency wise contract employees and direct Plant employee's department wise if required.
- Any missing person shall be identified & initiate the search & rescue operation

SEARCH & RESCUE PROCEDURE:

- This will be initiated as soon as need identified.
- Rescue need will be confirmed before initiating the action of rescue operation, who are trapped, where trapped and nature of risk during rescue.
- Before starting the rescue operation, incident controller will give necessary instruction to ESM.
- Instruction / Plan shall include the entry & exit route, PPE's required, Back-up support in terms of man power, tools, equipment & facility required.

- Incident controller shall ensure adequate illumination and back-up of power for lighting.
- Incident controller will direct the rescue team actively & involved directly in rescue operation.
- Ensure vehicles, Ambulance with required items available at site.

ALL CLEAR & RE- ENTRY PROCEDURE

After controlling the emergency, incident controller will ensure that emergency situation is under control and no further propagation of emergency situation is possible at the place. He will take a visit of emergency area and ensure the situation is up to the acceptable limit to initiate all clear & re- entry procedure.

Incident controller shall pass a communication by Walkie-Talkie And /OR Intercom no. to the main security in charge at control center to initiate "ALL CLEAR" siren (Long siren for 60 sec.) with announcement as "EMERGENCY UNDER CONTROL"

Followings are the steps to be followed towards Re-entry procedure:

- Ensure all clear siren after clearance by incident controller, before proceeding to re-entry to the area.
- Employee selected for re-entry should be familiar with the area & Hazard involved and trained in emergency handling procedure.
- Predefined route to be followed during reentry.
- Ensure compliance of required PPE's during reentry.
- Possible hazards in the area shall be assessed and evaluated.
- Ensure adequate illumination in the area OR portable device with the person.
- Ensure source of energy is controlled for the area.
- Initial walk through shall be conducted by incident controller along with respective area in charge to ensure the area is safe for the normalization of activities.
- Security in charge has to recommence the man movement / vehicle movement through gate.

5.8 Facilities and Infrastructure

- Emergency Response Centre

  The place identified as **Emergency Response Centre** at present, is the Main Security Gate Office where the Fire Alarm Control Panel is installed. The facilities available at the Emergency Response Centre include:

  1. Internal Telephone
  2. External telephone, STD.
  3. Fire alarm panel
  4. Manual Fire Siren
  5. Fire Alarm System with Public Address System
  6. Important Addresses & Telephone No.
  7. Ambulance Van
  8. Megaphone
  9. A copy of On-Site Emergency Plan.

  All communications after General Shift Working hours and on Sundays/Holidays are routed through the Security Gate Office.

5.9 Emergency Communication Facilities:

Internal communication:

- Intercom telephone points have been provided at all critical areas of operations. An emergency telephone is available at the Emergency Response Centre.
- Fast communication of emergency situation using manual call points MCP.
- Walkie –Talkie, Mobile as well as virtual no. have been provided to ensure immediate contact.
- Smoke Detector: Smoke detectors provided at identified

MANUAL CALL POINTS (MCPS):

This is the enclosure consist with the breakable glass having switches inside. Any emergency communication can be done by breaking the glass of MCP through attached hammer. Breaking of cover glasses on the manual call points will actuate the

audio visual indication on the fire alarm panel located at the Main Security Gate and Fire Sirens will also blow automatically in the veiling mode.

Fire Alarm Panels

There are two panels installed in main security office to get the location of emergency after raising the siren. Visual indication on panel activated. Zone wise identification of plant area displayed on panel to know the exact location of the emergency.

Siren- sirens are located at various identified places to ensure adequate sound level during emergency. Following is the detail for the type of sound:

Public Address System

Public address system consists with Mike & Speaker. After hearing the emergency siren, Security Supervisor on duty at the main gate will see the visual indication on fire alarm panel to acknowledge the exact location of emergency, and then make an announcement on the Public Address System **(PAS)**.

He will announce the nature of emergency & Location of emergency on PAS. Speakers are installed at all over the premises. All employees on hearing the siren reach the nearest speaker, hear the announcement and act according their role as per Fire Fighting Procedure.

After the emergency is brought under control and confirmation received from the incident controller for the all clear siren, the Security Supervisor will blow the All Clear Siren and makes suitable announcement on the Public Address System. The audio visual indication on the panel will remain there until and unless the broken glass is repaired and replaced. This system is aimed at expediting the communication process in the event of an emergency situation so as to save valuable time and effective emergency preparedness.

Megaphone

It can be used by incident controller to give instructions to safety squad members and other employees. It is kept at Security gate – Main Plant & PRILLS area. During emergency, Security guards collect it from security office and hand over it to incident controller.

Self-Contained Breathing Apparatus (SCBA)

These sets are very useful to tackle the emergency situation like working in oxygen deficient atmosphere. Similarly it is very much necessary to use these sets by the ESM where toxic gases are evolved during fire.

Emergency Ladder

During emergency, if need arises to reach at height then there are three emergency ladders provided at conspicuous places. One ladder is at prills main gate and other two area at emergency cupboard kept at safety building in main plant.

Monitoring Equipment

The following monitoring equipments are available in the premises. These can be used on need basis.

a) Explosive cum Oxygen meter

b) H_2S meter

c) Dragger Detection kit and Detection Tubes.

d) Multi-gas Detector.

e) Static Charge Meter

f) Smoke detectors

5.10 Resources Available

The following resources available at Pine Laminate, with respect to Emergency Preparedness:

EHS Management Team

There is a full-fledged Safety, health & Environment department to provide all types of inputs in the areas of Industrial Safety, Health & Environment related issues. Safety & Health department has strength of around seven persons and is headed by a Manager –Safety. All references, data sheets and information which may be required in the event of an emergency are readily available with the Safety Department. Besides other related functions of the department, this team provides valuable and comprehensive inputs in terms of training to employees.

Emergency Squad Members

This is a group of personnel who have been identified to handle any emergency situations. These personnel are taken from various operating areas including offices and are imparted training in handling of possible emergencies at site. This includes fire, fire, toxic gas release, spill etc, the firefighting, rescue operations, first aid and other related functions. The members are so chosen that at any given time, at least 30-40 members of Emergency Squad are available in the premises. The following basic facilities are available in the Occupational Health Centre.

a) Equipment /items as specified for an Ambulance Room

b) Oxygen administering equipment as well as spare cylinders

c) A Refrigerator for keeping critical medicines.

d) Stretchers for handling casualties.

e) Bed for casualty till shifted for further medical attention.

f) Facilities for carrying out routine medical examination.

g) Antidotes, Medicines, bandages etc., for necessary first-aid.

h) Proper washing facility and an attached toilet.

i) An Ambulance Van with necessary first-aid equipment is available in the premises round the clock to take care of any medical emergencies.

5.11 Training & Mock Drill

All the rescue and firefighting teams must be properly trained to carry out their duties in an emergency. Similarly, the key personnel and essential personnel will be trained in the operations.

As emergency preparedness is an important part of planning in Industrial Emergency Management, practice drills will be carried out once in every six months to ensure that persons are fully conversant with their duties and can carry them out efficiently when the need arises. Personnel will be trained suitably and prepared mentally and physically in emergency response through carefully planned, simulated procedures. A record of all such drills and meetings will be maintained.

5.12 Offsite Emergency Preparedness Plan

The offsite plan in detail will be based on those events, which are most likely to occur, but other less likely events, which have severe consequence, will also be considered. Incidents which have very severe consequences yet have a small probability of occurrence will also be considered during the preparation of the plan. However, the key feature of a good offsite emergency plan will be the flexibility in its application to emergencies other than those specifically included in the formation of the plan.

The roles of the various parties who will be involved in the implementation of an Offsite Plan/Disaster Management Plan are described below. The plan will identify an emergency coordinating officer, who will take the overall command of the offsite activities. As with the onsite plan, an emergency control center will be setup within which the emergency coordinating officer can operate.

An early decision will be required in many cases on the advice to be given to people living "within range" of the accident - in particular whether they should be evacuated or told to go indoors. In the latter case, the decision can regularly be reviewed in the event of an escalation of the incident.

Although the plan will have sufficient flexibility built in to cover the consequences of the range of accidents identified for the onsite plan, it will cover in some detail the handling of the emergency to a particular distance from each spot of disaster.

Aspects Proposed to be considered in the Offsite Emergency Plan

The main aspects, which should be included in the emergency plan, are:

- **ORGANIZATION**
  - Detail of command structure, warning systems, implementation procedures, emergency control centers.
  - Names and appointments of incident controller, site main controller, their deputies and other key personnel.
- **COMMUNICATIONS**
  - Identification of personnel involved, communication center, call signs, network, list of telephone numbers.
- **SPECIALIZED KNOWLEDGE**

- Details of specialist bodies, firms and people upon whom it may be necessary to call e.g. those with specialized fuel knowledge, laboratories.

- **VOLUNTARY ORGANIZATIONS**
  - Details of organizers, telephone numbers, resources etc
- **INFORMATION ON HAZARDOUS SUBSTANCES STORED**
  - Details of the hazardous substances stored and a summary of the risk associated with them.
- **METEOROLOGICAL INFORMATION**
  - Arrangements for obtaining details of weather forecasts and weather conditions prevailing at that time
- **HUMANITARIAN ARRANGEMENTS**
  - Transport, evacuation centers, emergency feeding, treatment of injured, first aid, ambulances and temporary mortuaries.
- **PUBLIC INFORMATION**
  - Arrangements for (a) Dealing with the media press office; (b) Informing relatives, etc
- **ASSESSMENT OF EMERGENCY PLAN**
  - Arrangements for:
  - Collecting information on the causes of the emergency; and
  - Reviewing the efficiency and effectiveness of all aspects of the emergency plan.

5.12.1 Role of the Emergency Coordinating Officer

The various emergency services will be coordinated by an Emergency Coordinating Officer (ECO), who will be designated by the District Collector. The ECO will liaison closely with the site Main Controller. Again depending on local arrangements, for very severe incidents with major or prolonged offsite consequences, the external control will be passed to a senior local authority administrator or even an administrator appointed by the central or state government. The ECO will be equipped with address and phone numbers of important agencies.

5.12.2 Role of the Local Authority

The duty to prepare the offsite plan lies with the local authorities. The emergency planning officer (EPO) appointed will carry out his duty in preparing for a whole range of different emergencies within the local authority area.

It will be the responsibility of the EPO to ensure that all those organizations which will be involved offsite in handling the emergency, know of their role and are able to accept it by having for example, sufficient staff and appropriate equipment to cover their particular responsibilities. Rehearsals for offsite plans will also be organized by the EPO.

5.12.3 Role of Police

Formal duties of the police during an emergency include protecting life and property and controlling traffic movements.

Their functions will include controlling bystanders, evacuating the public, identifying the dead and dealing with casualties, and informing relatives of death or injury.

5.12.4 Role of Fire Authorities

The control of a fire will be normally the responsibility of the senior fire brigade officer who will take over the handling of the fire on arrival at the site. The senior fire brigade officer will also have a similar responsibility for other events, such as explosions. Fire authorities in the region will be appraised about the location of all stores of flammable materials, water and foam supply points, and firefighting equipment. They will be involved in off-site emergency rehearsals both as participants and, on occasion, as observers of exercises. The flow chart for offsite emergency plan is given in **Figure-1.**

5.12.5 Role of Health Authorities

Health authorities, including doctors, surgeons, hospitals, ambulances and so on, will have a vital part to play following a major accident, and they will form an integral part of the Disaster Management Plan Major off site incidents are likely to require medical equipment and facilities additional to those available locally, and a medical

"mutual aid" scheme should exist to enable the assistance of neighboring authorities to be obtained in the event of an emergency.

5.12.6 Role of Government Safety Authority

This will be the factory inspectorate available in the region. Inspectors are likely to satisfy themselves that the organization responsible for producing the Disaster Management Plan has made adequate arrangements for handling emergencies of all types including major emergencies. They may wish to see well documented procedures and evidence of exercise undertaken to test the plan.

In the event of a Disaster, local arrangements regarding the role of the factory inspector will apply. These may vary from keeping a watch, to a close involvement in advising on operations.

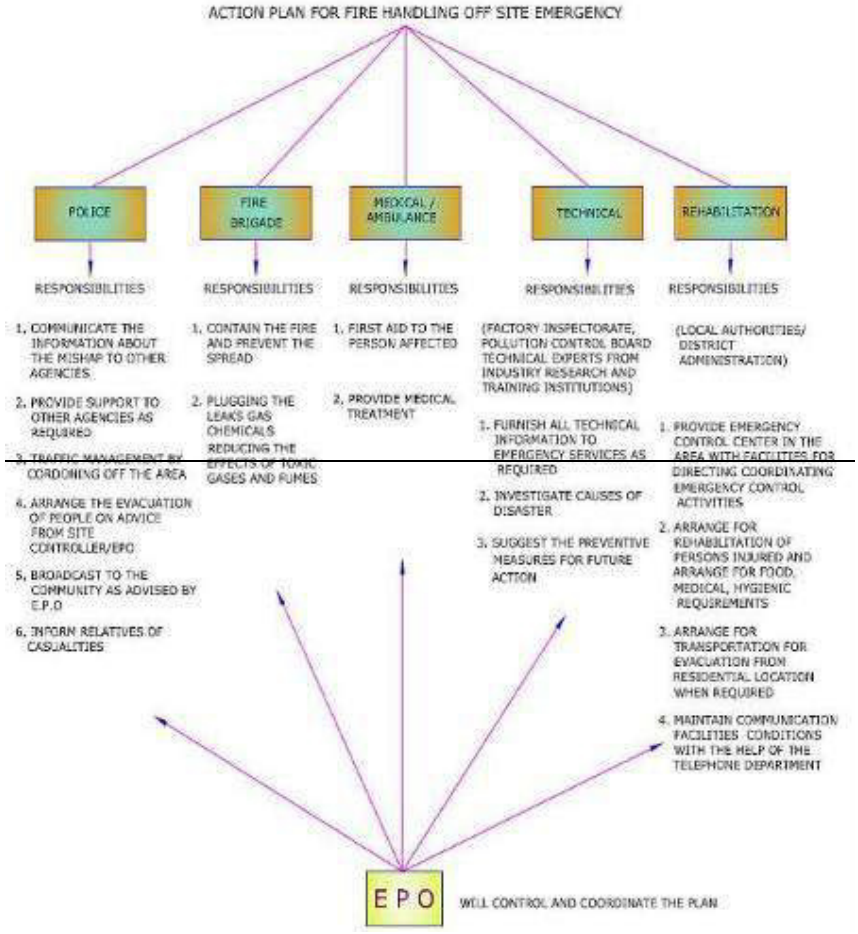

FIGURE 1 OFFSITE EMERGENCY PLAN

6. Assembly Point

In view of the size of plant, Administration office & main gate will be ear marked as assembly points. Depending upon the location of hazard, the assembly points are to be used. The same assembling points can be considered during emergencies in future. Designated persons would take charge of these assembly points and mark presence of the people assembling at the point. Department & shift wise, list of employees, are available at these points and roll call would be taken by the designated person.

7 Emergency Power Supply

Plant facilities would be connected to Diesel Generator and would be placed in auto mode. Thus plants lighting, administrative building and other auxiliary services are connected to emergency power supply. In all the sections flame proof type emergency lamps would be provided.

8 Fire Fighting Facilities

First aid and firefighting equipment to meet class A, B & C fires will be placed within the plant area suitable for emergency.

9 Emergency Medical Facilities

Gas masks and general first aid materials for dealing with chemical burns, fire burns etc. will be maintained in the in the emergency control room. Private medical practitioners help would be sought. Government hospital would be approached for emergency help.

Apart from plant first aid facilities, external facilities would be augmented. Names of Medical Personnel, Medical facilities in the area would be prepared and updated. Necessary specific medicines for emergency treatment of Burns patients and for those affected by toxicity would be maintained.

Breathing apparatus and other emergency medical equipment would be provided and maintained. The help of nearby industrial management's in this regard would be taken on mutual support basis.

First aid center with trained First Aid Assistants is available round the clock. Besides this, Government Hospital nearby will also be consulted in case of emergency.

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