

Risk assessment for M/S Surbhee Polymers (P) Limited, Dera bassi, Punjab.

RISK ASSESSMENT

1.1 OBJECTIVE:

The main objective of the Risk Assessment study is to determine damage due to major hazards having damage potential to life and property and provide a scientific basis to assess safety level of the facility.

The secondary objective is to identify major risk in manufacture of chemicals, storage of chemicals and provide control through assessment. To prepare on- site, off site, disaster management plan for control of hazards.

1.2 PHILOSOPHY:

The main philosophy of risk assessment is to find out the real cause of accident and then based on it to suggest appropriate remedial measures to prevent its recurrence.

1.3 DETAILS OF RAW MATERIALS

Table 1.1 Details of Raw Materials

S.No.	Name of raw material	Physical State	Capacity	Storage	Material of Construction	No.
1.	Formaldehyde	Liquid	160 KL	Tank	S.S.-304	4
2.	Methanol	Liquid	70KL	Tank	MS	6
3.	Caustic Soda	Solid	5Kg	Bags	HDPE	50 Bags
4.	Urea	Solid	10Kg	Bags	HDPE	50 Bags

1.4 DETAILS OF FINISHED PRODUCTS:

Table 1.2 Details of Finished Products

S.No.	Intermediate Product	Quantity (MT/D)	Storage	Physical state
1.	Formaldehyde (55%)	200	MS TANK	Semi-Liquid
2.	Urea Formaldehyde Resin	50	MS TANK	Semi-Liquid

1.5 LIST OF HAZARDOUS CHEMICALS ALONGWITH THEIR TOXICITY LEVEL AS PER MSIHC RULES

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Table 1.3 List of hazardous chemicals along with their toxicity levels as per MSIHC rules

S.No	Chemicals	TLV	Toxicity level			Flammable limit					Chemicals Class
			LD50 Oral mg/kg s	LD50 Dermal mg/kg s	LC50 Mg/l	LEL	UEL	FP°C	BP°C	Class	
1.	Formaldehyde	0.3/1 ppm	100	270	203	6	36.5	50°C	96°C	B	Flammable, toxic, hazardous.
2.	Methanol	200 ppm	5628	15800	64000 ppm/4 hr	6	36.5	12°C	64.5°C	A	Highly flammable
3.	Caustic Soda	2 mg/m ³	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	1388°C	-	Hazardous
4.	Urea	-	8741	-	-	N.A.	N.A.	N.A.	N.A.	-	N.A.

The Toxicity level of hazardous chemicals as per Manufacture, storage and import of Hazardous Chemical (Amendment) Rules, 2000 (MSIHC) is shown as below:

Table 1.4 Toxicity index as per MISHC rules 2000

S.No.	Toxicity	Oral Toxicity LD 50 (mg/kg)	Dermal Toxicity LD 50 (mg/kg)	Inhalation Toxicity LD 50 (mg/kg)
1.	Extremely	<5	<40	<0.5
2.	Highly	>5-50	>40-200	>0.5-2.0
3.	Toxic	>50-200	>200-1000	>2.0-10

1.6 HAZARD IDENTIFICATION AND PREVENTIVE MEASURES

1.6.1 Raw Material Storage hazards and controls:

Table 1.5 Raw material storage hazards and controls

S.No.	Name of material stored	Quantity (max.)	Operating press/temp	Hazard rating systems	Type of hazard or risks involved	Persons affected
1.	Formaldehyde	3×200 KL	NTP	TLV-0.3 ppm(1ppm) NFPA	-Flammable -Very toxic by inhalation	-Operators -Maintenance -Technicians

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				<p>ratings: Health-3 Flammability-2 Reactivity-0 Flash point-500°C</p>	<p>-Very toxic in contact with skin -Very toxic if swallowed -Causes burns -Limited evidence of carcinogenic effect -Risk of serious damage to eyes -May cause sensitization by skin</p>	
<p>Control measures: -Dyke provision to storage tank. -Safety board's displayed on the tank. -Good ventilation must be provided. -Trap and collect spills with sand or other inert solids.</p>						
2.	Methanol	3×100 KL	NTP	<p>TLV-200 PPM(8 hr TWA) STEL-250 PPM NFPA Ratings: Health-1 Flammability-3</p>	<p>-Highly flammable by inhalation -Toxic when contact with skin -Toxic if swallowed -Danger of very serious irreversible effects</p>	Operators Maintenance Technicians
<p>Control measures: -Keep away from sources of ignition, tight closed container and dyke provision to storage tank -Safety board's displayed on the tank. -Effective ventilation must be provided. -For accidental contact if you feel unwell, seek medical advice immediately -Handling of methanol with safety gloves and protective clothing.</p>						

1.6.2 Process hazards and controls:

Table 1.6 Process hazards and controls

Name of hazardous	Material in the process /operation	Type of hazard possible toxic gas	Control measures provided
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process and operation		release/fire /explosion /run away reaction /rupture, etc	
Chilling plant	Steam and cooled water	-Handling of refrigerant -Cold burns	-Annual inspections -Safety interlocks to be provided -Safety and pressure gauge valves fitted -Properly supported and protected against corrosion -Testing of jackets and joints of tubes regularly
Reactor Vessel	Formaldehyde, Urea	-Exothermic run away reaction -Release of heat and flammable gases -Fire, toxic gas release and explosion	-Raw materials quantity must be controlled either volumetrically or gravimetrically -Process control devices must be installed includes the use of sensors, alarms, trips and other control systems that either take automatic action or allow for manual intervention to prevent the conditions for uncontrolled reaction occurring. -High temperature indicator valve and alarm system must be provided -Auto cutoff system must be provided after reaching of predetermined maximum safe temperature. -Pressure gauge must be provided -Safety control valve must be provided -The vessel emergency relief vent should be discharged to suitably designed catch pot or should be so positioned that people working in the area and members of the public will not be in danger if the

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			contents of the vessel are discharged. -Use skilled worker -Proper selection of MOC -Mechanical seal in all pumps and reactors
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1.6.3 Safe Practice for Handling, Storage, Transportation and Unloading of Hazardous Chemicals:

• **For Storage/Handling:**

1. Separate from strong oxidant. & Keep it in well ventilated room.
2. Dyke wall shall be provided to all above ground storage tank.
3. Fire hydrant system shall be installed.
4. Safety shower and eye washer shall be installed near storage area.
5. Flame proof light fitting shall be provided at flammable storage area.
6. Proper selection of MOC for chemicals storage tank.
7. Sprinkler system shall be installed at flammable material storage area
8. Earthing/bonding shall be provided for static charges.
9. Flame arrestor shall be provided on flammable material storage tank vent.
10. Level gauge and level measurement instrument shall be provided on material storage tank.
11. Lightning arrestor on all chimney and building shall be provided.
12. Hazardous material should be stored away from the plant and safe distance shall be maintained.
13. Safety permit system shall be followed for loading, unloading of hazardous chemical.
14. Fencing, caution note, hazardous identification board should be provided.

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15. Only authorized person shall be permitted in storage tank area and register will be maintained.
 - **For Transportation & Unloading:**
 1. Solvent shall be received by road tanker and stored in above ground storage tank in separated bulk storage area.
 2. Loading and unloading procedure shall be prepared for material received through road tanker.
 3. Earthing/bonding shall be provided for static charges..
 4. Flexible steel hose shall be used for unloading from the road tanker.
 5. Flame proof electric motor shall be used during loading/unloading.
 6. NRV shall be provided on pump discharge line.
 7. Fixed pipeline with pumps shall be provided for transfer to vessel.
 8. TERM CARD will be provided to all transporters and shall be trained for transportation Emergency of hazardous chemicals.
 9. Personal Protective Equipment (safety goggles, hand gloves, apron, masks, gum boots etc.) shall be provided

1.7 OCCUPATIONAL HEALTH SURVEILLANCE PROGRAMME

Health surveillance is the monitoring of a person's health to identify changes in health status due to occupational exposure to a hazardous substance. It includes biological monitoring. Ideally, the avoidance of work-related diseases should be achieved by the prevention or controlling exposures to hazardous substances in the workplace. Where a process cannot be designed or maintained to eliminate the risk of exposure, it may be necessary for workers to undergo health surveillance.

1.7.1 Aims of health surveillance:

1. Identify those at increased risk

Health surveillance is used to identify workers who have an increased risk of developing an occupational disease. For example, people who have existing skin, kidney, liver and eye disorders, heart problem; additionally smokers and pregnant women are at increased risk of being severely affected if exposed to Methanol.

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2. Compliance with regulations

Health surveillance is sometimes required by laws and codes of practice (for example, a worker exposed to lead in battery manufacture or a spray-painted exposed to isocyanates in two-pack paints). Each state or territory has regulations containing a schedule of hazardous substances for which health surveillance is mandated.

3. Early detection

The major purpose of health surveillance is to detect adverse health effects at an early stage so that the worker may be protected from further injury, either by control of the process or by removal from exposure.

4. Evaluating effectiveness of control measures

Health surveillance is not a control measure in itself and should not be the sole means of determining whether control measures are effective. However, it can provide useful information on the effectiveness of safe working practices.

5. Epidemiology and disease

Health surveillance can be used to evaluate the health experiences of groups of workers exposed to specific hazardous agents or working within a particular industry.

Workers should be made aware that health surveillance is sometimes necessary to ensure their ongoing health. Health surveillance is often used in addition to workplace monitoring. Workplace monitoring will only indicate the potential for exposure of workers to a hazardous substance. It can never be an indication of the actual amount of substance absorbed or the effect on the body of absorbing the hazardous substance.

When a toxic substance (such as an industrial chemical) is present in the environment, it contaminates air, water, food, or surfaces in contact with the skin: environmental monitoring evaluates the amount of toxic agent in these media.

As a result of absorption, distribution, metabolism, and excretion, a certain internal dose of the toxic agent (the net amount of a pollutant absorbed in or passed through the organism over a specific time interval) is effectively delivered to the body and becomes detectable in body fluids.

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Subsequent interaction with a receptor in the critical organ (the organ which, under specific conditions of exposure, exhibits the first or the most important adverse effect) leads to biochemical and cellular events. Both the internal dose and the elicited biochemical and cellular effects may be measured through biological monitoring.

1.7.2 OCCUPATIONAL HEALTH PROGRAMME

- The health & physical hazards caused due to toxic, irritant, corrosive, flammable materials. All chemicals are within Threshold Limit Value as per ACGIH.
- Monitoring of occupational hazards like noise, ventilation, chemical exposure etc. will be carried out regularly and its record will be maintained.
- Good housekeeping, use of PPE, Engineering controls, Enclosure processes, scrubber system, display of safety boards, SOP of loading / unloading, local exhaust ventilation, safety shower etc. are important safety measures have taken to keep these chemicals within TLV.
- Appropriate personal protective equipment will be provided & ensure the usage of them.
- Workers will be trained on safe material handling of hazardous chemicals.
- Prepare & display the safe operating procedure for hazardous chemicals storage, handling & transporting or using.
- Periodical medical examination of the workers & Liver Function Testes will be done.
- Employee training and education will be carried out.
- Control the noise at source by substitution, isolation, segregation, barriers etc.
- Local Exhaust ventilation and scrubber should be installed where it is required to reduce fumes, vapors, temperature and heat stress.
- Insulate all hot equipment to reduce air temperature.
- Reduce the level of physical activity by sharing workload with other or by using mechanical mean

1.8 TREATMENT OF WORKERS AFFECTED BY ACCIDENTAL SPILLAGE OF METHANOL

❖ Hazards With Acute Exposure

€ Contact with skin may cause severe burns or systemic poisoning.

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€ Systemic effects may occur from any route of exposure, especially after skin absorption.

❖ Hazards With Chronic Exposure

€ Repeated or prolonged exposure to Ammonia may harm the respiratory system. Can irritate and inflame the airways.

€ Methanol affects the central nervous system, liver, and kidneys.

❖ Special Safety Precautions

€ Prevent contact with skin by wearing neoprene gloves, lab coat, and resistant apron.

€ Wear safety glasses or a face shield if splashing may occur.

€ Store in a cool, dry, well-ventilated area, away from heated surfaces or ignition sources.

€ Skin contact requires immediate washing of the affected area with soap and water.

€ Remove contaminated clothing and launder before wearing again.

❖ Procedure for treating workmen after skin contact

Skin contact requires immediate flushing of the contaminated area with soap and water at a sink or emergency shower for a good fifteen minutes. Remove contaminated clothing. In case of eye contact, promptly flush the eyes with copious amounts of water for 15 minutes (lifting upper and lower lids occasionally) and obtain medical attention. If methanol is ingested, obtain medical attention immediately. If large amounts of methanol are inhaled, move the person to fresh air and seek medical attention at once. It is recommended to provide the safety shower and eyewash station in plant.

1.8.1 ANTIDOTES

❖ Antidotes for Methanol

€ Ethanol (30 % solution from inside, 5 % solution from outside i.e. by intravenous injection)

€ Epicake syrup

€ In case of acidosis give sodium bicarbonate

€ In case of delirium give diazepam 10 mg by intravenous injection

€ Folinic acid (leucovorin 1 mg/kg iv, 4 hourly)

❖ Antidotes for Formaldehyde

€ Milk

€ Activated Charcoal or Water

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1.8.2 Minimization of the manual handling of hazardous substance

- € Whether moving materials manually or mechanically, your employees should know and understand the potential hazards associated with the task at hand and how to control. Their workplaces to minimize the danger.
- € Employers and employees should examine their workplaces to detect any unsafe or unhealthful conditions, practices, or equipment and take corrective action.
- € Provide flameproof electrical motor & transfer chemicals through the pipelines.
- € Use specially designed pallets to hold, move raw materials, finished products through work areas.
- € Minimize lifting of raw materials, heavy loads by using appropriate platforms, trolleys etc.
- € Avoid the moving, manual handling of hazardous material.

1.9 DO'S AND DONT'S'

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1.9.1 Handling of Chemicals

Do's	Don'ts
<ul style="list-style-type: none">• Know the hazards of the chemical before handling.• Know the antidotes for chemical, which is to be handled.• Do keep material safety data sheet in locations where chemicals are being handled and study it.• Use appropriate personal protective equipment like gloves, aprons, and respirator; face shield etc. depending upon nature of the work.• Label every chemical that you use and tightly close the container.• Use eye wash fountain / safety shower in case of splash of chemicals in the eye or body for at least 15 minutes.• Segregate toxic, flammable chemicals and keep them under control.• In addition to draining and closing valves, lines should be blanked before taking up maintenance work.• Provide proper ventilation at the chemical handling area to limit their concentration within prescribed level.	<ul style="list-style-type: none">• Do not store the chemicals that are incompatible with other chemicals.• Do not spill the chemicals.• Do not dispose chemical without neutralizing.• Do not keep large inventory of chemicals.• Do not allow empty containers of hazardous chemicals to be used by others.• Do not use compressed air for transferring chemicals.• Do not stand near chemical transfer pump while it is in operation with temporary hose connection.• Pouring of chemicals by hand or doing siphoning by mouth should never be adopted.• Chemicals drums should never be moved without protection.• Do not attempt to neutralize the acid / alkali on the skin. Use water only. Do not use solvent for cleaning hands.

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1.9.2 Material Handling

Do's	Don'ts
<ul style="list-style-type: none">• Use proper lifting tool and tackle having adequate capacity.• Only authorized persons should operate material handling equipments.• Each tool, tackle or equipment should have number and safe working load (SWL) marked on it.• Assess weight of the material, distance to be carried and hazards etc. before lifting the load.• Inspect and test all the lifting tools and tackles regularly as per Factory Rules.• Wear Personal Protective Equipments while handling of material.	<ul style="list-style-type: none">• Do not use the equipment for the purpose other than its design intention.• Do not allow personnel to move underneath lifted load.• Do not load the equipment above its safe working load.• Do not use makeshift arrangements for lifting equipment without inspection and test.• Do not use defective tool and tackles.• Keep the tools & tackles free from adverse effect of atmosphere by applying suitable protective coating.

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1.9.3 Fire Prevention

Do's	Don'ts
<ul style="list-style-type: none">• Follow 'NO SMOKING' sign.• Deposit oily rags and waste combustible material in the identified containers and dispose them suitably.• Fire Hose used for any other purpose should be permanently marked and taken out of fire hydrant system.• Keep minimum inventory of flammable and combustible substances.• Take permission before breaking or removal of fire barrier and ensure subsequent relocation of fire barrier.• Check periodically the operability of fixed fire fighting system.• Attend any abnormality / deficiency with fire protection system promptly.• Provide earthing or bonding to prevent accumulation of static charges to tanks where flammable chemicals are stored / handled.• Use instruments that are intrinsically safe in explosive atmosphere.	<ul style="list-style-type: none">• Do not leave flammable material like acetone, kerosene etc. used as cleaning agent at the work area.• Do not over tighten fire hydrant valves with F-lever.• Do not allow wild grass growth around storage of the gas cylinders and switchyard.• Do not obstruct accessibility to the fire related equipment.• Do not destroy the inspection tag provided with the fire equipment.• Do not misuse fire-fighting equipment other than intended purpose.• Do not store the flammable material in the open container.• Do not use instruments that are not intrinsically safe in the explosive atmosphere.

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1.9.4 House Keeping

Do's	Don'ts
<ul style="list-style-type: none">• Assign places for everything and maintain things at assigned places.• Clean the area after completion of work.• Use aisle space free for personnel and material movement.• Ensure adequate illumination and ventilation for the job.	<ul style="list-style-type: none">• Do not leave combustible materials in the work area.• Do not smoke in the area of work.• Do not allow dust bin to overflow.• Do not generate extra waste.• Do not disturb the safety equipment from assigned location.• Do not block emergency switches and on/off

1.10 RISK REDUCTION MEASUREMENT & RECOMMENDATION IN VIEW OF SAFETY CONSIDERATION

- Storage tank of Formaldehyde and Methanol should be installed away from the plant area.
- Wind indicator should be provided at the highest level of the plant to know the wind direction.
- Automatic sprinkler system for the flammable material tanks (over ground tanks only) may be provided as knock on effect in case of fire is possible.
- Containment dyes with proper sloping and collection sumps should be provided so that any spillages in the bulk storage and other handling areas shall not stagnate and shall be quickly lead away to a safe distance from the source of leakage. This reduces the risk of any major fire on the bulk storages and the risk to the environment shall be minimized/ eliminated.
- Inspection of the storage tanks as per prefixed inspection schedule for thickness measurement, joint and weld efficiency etc.
- Provision of flameproof electrical fittings /equipment's.
- Proper maintenance of earth pits.
- Strict compliance of security procedures like issue of identity badges for outsiders, gate passes system for vehicles, checking of spark arrestors fitted to the tank lorries etc.

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- Strict enforcement of no smoking.
- Periodic training and refresher courses to train the staff in safety fire fighting.
- Employee training and education will be carried out.
- Structural fireproofing in the process area could be considered as a safety measure in the light of probable spill and fires in the area.
- Emergency drills should be carried out periodically to ensure preparedness must continue.
- Wind indicator should be provided at the highest level of the plant to know the wind direction.
- Many operations involve use of highly toxic/flammable materials and these needs to be documented as SOPs. These must be made and kept updated on priority.
- Extensive training on use of Self Contained Breathing apparatus (SCBAs) must be ensured for emergency control.
- Many of the raw materials used for resin are either toxic or flammable. It is therefore important to ensure that these materials are stored in closed, well ventilated totally safe areas. A fire alarm system (heat and smoke detection) should be provided for the storage area where the material is stored as toxic fumes arise on combustion.
- Loose drums of waste materials, often solvent laden, must be removed from the working areas and close watch kept.
- Proper Earthing needs to be provided through plug type systems or through the agitators/liquid.
- Ventilation should be provided for any enclosed are where hydrocarbon or toxic vapors may accumulate. Several such areas were noticed- these may be surveyed and tackled accordingly.
- All personnel should be trained in handling emergency situations and should be apprised of their role in handling emergency situation and to ensure adequacy of the emergency procedures simulated exercise should be carried out. This was found wanting.
- Flame arrestor should be provided.
- Adequate number of caution boards highlighting the hazards of chemicals should be provided at critical locations.
- The health & physical hazards caused due to toxic, irritant, corrosive, flammable materials.

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All chemicals are within Threshold Limit Value as per ACGIH.

- Monitoring of occupational hazards like noise, ventilation, chemical exposure etc. will be carried out regularly and its record will be maintained.
 - Good housekeeping, use of PPE, Engineering controls, Enclosure processes, scrubber system, display of safety boards, SOP of loading / unloading, local exhaust ventilation, safety shower etc. are important safety measures have taken to keep these chemicals within TLV.
 - Appropriate personal protective equipment will be provided & ensure the usage of them.
 - Workers will be trained on safe material handling of hazardous chemicals.
 - Prepare & display the safe operating procedure for hazardous chemicals storage, handling & transporting or using.
 - Local Exhaust ventilation and scrubber should be installed where it is required to reduce fumes, vapors, temperature and heat stress.
 - Reduce the level of physical activity by sharing workload with other or by using mechanical means.
 - Pre-employment medical checkup and periodically medical examination will be done.
- Following Fire safety devices will be provided to protect from any malfunctioning of plant equipments. Following fire protection systems will be provided:
- Water storage of adequate capacity to meet the requirements of water for firefighting purposes.
 - Fire hydrants and automatic sprinkler system. Diesel driven pumps and headers to supply water to fire hydrant network.
 - Adequate Portable fire extinguishers, sand bucket, wheeled fire & safety equipment should be provided at the required places.
 - Equipment required for personal safety like blankets, gloves, apron, gum boots, face mask helmets, safety belts, first aid boxes etc. are provided. Proximity suits and self-contained breathing apparatus to be provided.

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1.11 ON SITE EMERGENCY PLAN INTRODUCTION:

An emergency in the premises has the potential to cause serious injury or loss of lives or extensive damage to the property and/or environment and serious disruption both inside and outside the plant. In such cases sometimes outside agencies are required to call for help in handling the situation. The causative factors like plant/equipment failure, human error, earth quake, sabotage etc. will normally manifest in various forms viz. Fire, Explosion, Toxic release, structure collapse etc.

This OEP lays down the code of conduct of all personnel in the Plants and the procedures to be adopted by them in the event of an "Emergency". These procedures have been prepared taking into account the minimum strength of manpower available at all times in the premises. The individuals under the direction of the respective Team Leaders shall carry out the responsibilities assigned.

The emergency procedures outlined are suitable for round the clock coverage including holidays. These emergency procedures shall be followed as outlined in the OEP during general shifts as well.

OBJECTIVES:

The overall objectives of OEP are:

- To control the situation and if possible eliminate as quickly as possible.
- To avoid confusion/panic and to attend the emergency with clear-cut line of action.
- To minimize the loss of property to the plant as well as to our neighborhood.
- To safe guard the non-affected areas.
- To alert the neighborhood.
- To arrange head-count and rescue operations.
- Treatment of the injured.
- To safeguard others by timely evacuation.
- To prevent any cascade of emergencies.

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DEFINITIONS:

- **Environment** as defined u/s 2(a) of the environment Protection Act includes water, air and land and the inter relationship which exists among and between water, air and land and human beings, other living creatures, plants, micro organism and property.
- **Environment pollutant** defined by the same Act as any solid, liquid or gaseous substances present in such concentration as may be tend to injurious to atmosphere.
- **Hazardous substance** is also defined by the same Act and hazardous process is defined by sec.2 (b) of the Factories Act. 1948.
- **Hazard** is a physical situation, which may cause human injury, damage to property or the environment or any combination of these criteria.
- **Chemical Hazard** is a hazard due to chemical (including its storage, process, handling etc.) and it is realized by fire, explosion, toxicity, corrosivity, radiation etc.
- **Risk** is a likelihood of an undesired event (i.e. accident, injury or death) occurring within a specified period or under specified circumstances.
- **Individual risk** is the frequency at which any individual may be expected to sustain a given level of harm from the realization of specific hazards.
- **Social risk** is a measure of chances of a number of people being effected by a single event or set of events and is often presented as f/n curves (i.e. frequency v/s number of people effected).
- **Disaster** is a catastrophic situation in which the day-to-day patterns of life are, in many instances, suddenly disrupted and people are plunged into helplessness and suffering and as a result need protection, clothing, shelter, medical and social care and other necessities of life, such as: -
 - i. Disasters resulting from natural phenomenon like earthquake, volcanic eruptions, storm, surges, cyclones, tropical storms, floods, landslides, forest fires and massive insect infestation. Also in this group, violent draught which will cause a creeping disaster leading to famine, disease and death must be included.
 - ii. Second group includes disastrous events occasioned by man, or by man's impact upon the environment, such as armed conflict, industrial accidents, factory fires, explosion and escape of toxic gases or chemical substances, river pollution, mining and other structural collapses; air, sea, rail and road transport accidents, aircraft crashes,

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collision of vehicles carrying inflammable liquids, oil, spills at sea, and dam failures.

- **An accident** is an unplanned event, which has a probability of causing personal injury or property damage or both. It may result in physical harm (injury or disease) to person (s), damage to property, loss to the company, a near miss or any combination of the effect.

A Major accident is a sudden, unexpected, unplanned event, resulting from uncontrolled developments during and industrial activity, which causes or has a potential to cause

- i. Serious adverse effects immediate or delayed (death, injuries, poisoning or hospitalization) to a number of people inside the installations and/ or to persons outside the establishment.
- ii. Significant damage may be caused to crops, plants or animals or significant contamination of land waters or air.
- iii. An emergency intervention outside the establishment (evacuation of local population, stopping of local traffic).
- iv. Any combination of above.

EMERGENCY:

- **An emergency** is the situation, which has potential to cause a large-scale damage or destruction to life or property or Environment or combination of these within or outside the factory. Therefore it is essential to have a laid down procedure to meet emergency systematically.
- In any industry, emergency can arise at any moment and this depends on the type of:
 - Structure
 - Raw materials
 - Machines
 - Nearby Industries
 - Location of the Industry etc.

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NATURE OF EMERGENCY:

The "Emergency" specified in this plan will refer to occurrence of one or more of the following natural/manmade events.

- Fire
- Explosion
- Release of Toxic Gas/Vapour
- Spillage of flammable liquid/gas
- Deliberate Sabotage, Terrorism, Air Raid etc.
- Natural Calamities: - Lightning, Storm, Earthquake, Flood etc.
- Collapsing of structure
- Overturning of tanker containing flammable / toxic substances.

MEDICAL HELP:

First Aid Boxes have been provided at various strategic locations. Requisite number employees are trained about First Aid, Liaison with nearest hospitals.

COMMUNICATION SYSTEM:

- Alarm Raising for Emergency by blowing the sirens installed
- The siren will be used for raising the emergency alarm and also for all clear signals.
- Emergency Siren: The wailing alarm will be sounded intermittently at fixed interval of 30 seconds for a period of two minutes in case of emergency, such alarm will signify the employees that an emergency has occurred and that the emergency services should be put into operation.
- Incident Controller after assessing the situation will declare that emergency is over. Till the Incident Controller issues the declaration, all the leaders will adhere to the task and be present at the prescribed location.
- All clear signal will be sounded through continuous siren for 1 minute. Even after the emergency is over a skeleton staff of the Rescue/Evacuation Team will be available at the site of emergency for at least 30 minutes to ensure that the situation is absolutely free from danger.
- After the emergency is over, all the team leaders should meet at the Emergency Control Center and each team leader should submit a report to the Incident Controller about team

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performance and other details observed.

- In addition to the above systems, internal telephones, P.A.System, Mobile telephones, Computer System etc. will be used for communication.
- If situation is beyond the control, the external agencies will be informed accordingly and asked for the help. Direct telephone, cell phone or messengers / runners may achieve this.

ASSEMBLY POINT:

In case of emergency some locations are considered as Assembly Points. Depending on the wind direction and location of emergency, Assembly Point will be declared. The employees should run across the wind direction and not against the wind direction. Depending upon the location of the emergency the Incident Controller will fix the Assembly Point and Officer will announce the location of the Assembly Point. Employee's attendance, visitors and contractors workmen register will be made available at the Assembly Point for head count.

EMERGENCY CONTROL CENTER:

Factory Manager Office will be declared as an Emergency control center. Emergency control center is facilities with:

1. Address and Telephone numbers of the Factory Inspectorate, Punjab Pollution Control Board, Police, Fire Brigade, Hospitals and OEP Team Member
2. Plant layout-indicating storage of hazardous materials, layout of fire Hydrants/extinguishers, entrances/exits, roads etc.
3. Portable P.A. System, Manual Siren, flood lights, Torches, Pickaxe, Saw, Nylon Ropes.
4. Fire Blankets / Fire Proximity Suit, Breathing Apparatus, First Aid Box etc.
5. List of employees with address, telephone number, blood group etc.
6. Material Safety Data Sheets of all chemicals handled.

WIND SOCKS:

Wind direction will be determined with the help of installed windsocks.

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MOCK DRILL:

Mock drills are carried out regularly to familiarize the staff with their roles, fire protection equipment/system installed in the plant and use of personnel protective equipment. Senior officials monitor this and shortcomings are thoroughly studied and necessary corrective measures are taken.

PROCEDURES FOR MOCK DRILLS

- € Inform all the employees about mock drills and the signal to be given.
- € Fix the date and location of the emergency for mock drills.
- € Mock drills will be monitored by observers.
- € Raise the siren for emergency.
- € After hearing the siren the Incident Controller, Site Controller, Officers and Team Members should actuate the “On-site Emergency Plan”.

PROCEDURE ON NOTICING AN EMERGENCY

- If anybody notices any situation, which may lead to a disaster, should be immediately inform the Shift In-charge / site controller / Incident Controller / Fire & Safety Supervisor / Security.
- Take charge of the situation as Incident Controller.
- Rush to the site of emergency to get the correct picture and then to Emergency Control Center for speedy control over the situation by making an arrangement for raising the alarm.
- On arrival of Team members, he shall assign duties as required and activate the On-Site Emergency Plan.
- Ensure safety of the plant and the personnel in the plant. He will make an assessment of the emergency and decide on external assistance.
- Communicate and Coordinate among the Incidents Controller/ Site Controller/ Factory manager/ fire safety supervisor etc. and will be the final authority on all matters related with management of emergency such as:
 - € Fire fighting.

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- € Welfare and rescue operations.
- € Arrange for Civil/Mechanical/Electrical work during emergency.
- € Transport.

INCIDENT CONTROLLER / SITE CONTROLLER:

Rush immediately to the scene of the fire/emergency, select and set out appropriate fire/emergency equipment. He will take the below mentioned actions at the earliest opportunity, if the fire/emergency is not controlled.

He will:

- € Call the security personnel from their residences for additional manpower if required.
- € Regulate entry and exit of personal required for controlling the fire/emergency.
- € Restrict exit of personal required for controlling the fire/emergency.
- € Arrange for Personnel Protective Equipment required for the emergency.
- € Call, the local Fire Brigade, Police in case of necessity in consultation with the Incident controller.
- € Arrange transport facilities for removal of casualties to dispensary / hospital.
- € Take responsibility of law and order.
- € Keep detailed records of the incident and progress of operations to fight the emergency.

FACTORY MANAGER:

He will rush to the Emergency Control Centre and collect the information from the Incident Controller. Further he will,

- ✓ Announce the location of the Assembly Point after getting information from Incident Controller / site controller.
- ✓ Take the list of persons to be communicated internally and externally.
- ✓ Maintain liaison with the press, government agencies i.e. Police, Fire Brigade etc. and the neighborhood regarding the emergency under instructions from Incident Controller.

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- ✓ Courteously Receive officers from the State Government or neighbors to the Administration Block only and inform to Incident Controller that they can be taken care off.
- ✓ Take all the steps required for the welfare such as providing tea, snacks, emergency temporary Medical Center in consultation with the incident controller/site controller.
- ✓ Disclose all the necessary information in the plant and media so as to avoid rumors and Confusion.
- ✓ Also be responsible for the head counts at the Assembly Points.

FIRE & SAFETY SUPERVISOR/ SHIFT INCHARGE & SECURITY:

- Proceed to the scene; establish contact with firemen and incident controller to supplement efforts in fire fighting.
- Assist in searching casualties and help to remove them to the medical center.
- Organize outside assistance in fire fighting and rescue operations if required.
- Mobilize personal protective equipment and safety appliances and assist personnel handling emergency in using them.
- Keep and check on any new development of unsafe situation and report the same to Site Main Controller.
- Collect and preserve evidence to facilitate future inquiries.
- Effectively cordon off the emergency area and will prevent unauthorized people entering the scene.
- Permit the Fire tenders or Ambulance requisitioned by Incident Controller to the plant.
- Ensure that vehicles and trolleys are sent out of the plant premises.
- Ensure that all the employees are conducted out of plant and assembled at Assembly Point.
- Control Traffic Movement.
- Remove tankers, tanker drivers outside.
- Entry of unauthorized public to be prevented.
- Arrange for vehicles for shifting casualties and essential workers to safe assembly

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points.

ENGINEERING/ OPERATION & MAINTENANCE:

- Ensure the safety of the remaining part of the plant.
- Take necessary steps for plant shutdown in consultation with the site controller.
- Ensure that an Operator is immediately available at the Water Pump House for fire fighting.
- Mobilize with necessary tools and tackles to handle any repair work on an emergency basis