

RISK ASSESSMENT REPORT AND DISASTER MANAGEMENT PLAN

1.0 RISK ASSESSMENT AND DISASTER MANAGEMENT PLAN

(A) RISK ASSESSMENT

Risk assessment is the determination of quantitative or qualitative value of risk related to a concrete situation and a recognized threat. The common terms used in risk assessment are elaborated below:

Risk: Risk is defined as the combination of Chance or Frequency or Probability of Occurrence of an Accident and its damage consequences to life and property. So Risk has two parameters:

- Frequency of Occurrence of an accident,
- Damage Consequences to life and Property.

Risk Analysis: A systematic approach for describing and/or calculating risk. Consequence Analysis determines the damage consequences to life and property from an accident. And QRA determines the following: Frequency of occurrence, Risk of Fatality to employees, Individual Risk-Risk of Fatality to neighboring population, Acceptability of Risk through ALARP-At Least as Low as Reasonable Practical. Risk analysis involves the identification of undesired events, and the causes and consequences of these events. Risk Assessment is a Proactive Accident Prevention technique.

1.1 SCOPE OF THE STUDY

Risk involves occurrence or potential occurrence of some accidents due to an event or sequence of events. The risk assessment study covers the following:

- Identification of potential hazard areas;
- Identification of representative failure cases;
- Visualization of the resulting scenarios in terms of fire (thermal radiation) and explosion;
- Assess the overall damage potential of the identified hazardous events and the impact zones from the accidental scenarios;
- Assess the overall suitability of the site from hazard minimization and disaster mitigation points of view;
- Furnish specific recommendations on the minimization of the worst accident possibilities;
- Preparation of On-site and Off-site Emergency Plan, which includes Occupational and Health Safety Plan.

There is always possibility of occurrence of incidents in an industry which requires proper risk assessment and proper safety preparedness. Activities requiring assessment of risk due to occurrence of most probable instances of hazard and accident are both onsite and off-site.

1.1.1 On-site

- Exposure to fugitive dust, noise, and other emissions
- Housekeeping practices requiring contact with solid and liquid wastes
- Emission/spillage etc. from storage & handling

1.1.2 Off-site

Exposure to pollutants released from offsite/ storage/related activities. Contamination due to accidental releases or normal release in combination with natural hazard. Deposition of toxic pollutants in vegetation / other sinks and possible sudden releases due to accidental occurrences.

1.2 LIST OF CHEMICALS USED OR HANDLED

The table below gives the list of various chemicals used in paper mill:

TABLE 1
List of Chemicals Used

| S. No. | Name of the Chemical | Existing Requirement (MT) | Total Requirement after expansion (MT) | Use |
|--------|--|---------------------------|--|--------------------|
| 1 | Cooking chemicals (Caustic & white Liquor) | 24750 TPA | 42900 TPA | For Pulp Cooking |
| 2 | Oxygen Gas | 445 TPA | 2850 | For Pulp Bleaching |
| 3 | ClO ₂ | Nil | 1650 | For Pulp Bleaching |
| 4 | Total Chlorine (Elemental & Hypochlorite) | 4650 TPA | 3050 TPA | For Pulp Bleaching |

1.3 DESCRIPTION OF PROCESS REACTIONS

As such there are no hazardous chemicals used in manufacturing paper. There are no such chemicals used, which may lead to polymerization reaction or may lead to hazardous combination when mixed with any other chemical used in the plant.

1.4 DESCRIPTION OF ANY PROBABLE RUNAWAY REACTION

No chemicals used in the mill have any runaway reactions. The safety measures for all the chemicals used in the plant are described in MSDS of the chemicals.

1.5 HAZARD IDENTIFICATION

The technique employed for the hazard identification is MCA (Maximum Credible Accident) analysis. MCA is defined as an accident with the maximum damage distance, which is believed to be probable. MCA analysis does not include quantification of the probability of occurrence of an accident. It is judged on the basis of engineering capability and expertise in the field of risk analysis. The rules laid by Government of India are also the methods used in hazard identification.

1.6 HAZARD ASSESSMENT & EVALUATION

Ranking & safety of each unit in hazard prone sections is studied using Preliminary Hazard Analysis (PHA). The PHA consists of formulating a list of hazards related to:

- Plant equipment
- Interface among system components

- Operative environment
- Operations (tests, maintenance etc.)
- Facility
- Safety equipments.

Identification of hazards in pulp & paper mill is of prime significance in the analysis, quantification & cost effective control of accidents involving chemicals and process. Estimation of probability of an unexpected event and its severity form the basis of quantification of risk in terms of damage to property, environment or personnel as:

$$\text{Risk} = \text{Probability} \times \text{Severity}$$

Therefore, the type, quantity, location and conditions of release of a toxic or flammable substance have to be identified in order to estimate its damaging effects, the area involved and the possible precautionary measures required to be taken. The following two methods for hazard identification have been employed in the study:

- Identification of major hazardous units based on Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989 of Government of India; and
- Identification of hazardous units and segments of plant and storage units based on relative ranking technique, like fire explosion and toxicity index.

1.7 IDENTIFICATION OF MAJOR HAZARDOUS UNITS

1.7.1 Classification of Major Hazardous Substance

Hazardous substances may be classified into two main classes: Flammable substances and Toxic substances. Flammable substances or the vapors arising in some reaction require interaction with air for their hazard to be realized. Toxic substances are those whose exposure may result in occupational diseases in the human beings in vicinity. Hazardous characteristics of the major flammable/ toxic materials employed in different stages of production are listed in Table 7.3.

TABLE: 2

Properties of Storage Chemicals Used At the Pulp & Paper Mill

| Chemical | Codes/Label | TLV | BP | MP |
|------------------|-------------------------|---------------------|-------|--------|
| | | | °C | |
| Sodium Hydroxide | Corrosive | 2 mg/m ³ | 1390 | 318.4 |
| Chlorine | Non- Flammable Class-II | 1ppm | -34.0 | -101.0 |

TLV: Threshold Limit Value, BP: Boiling Point, MP: Melting Point

1.7.2 Identification of Major Hazard Installation Based On GOI Rules, 1989

Following accidents in the chemicals industry in India over a few decades, a specific legislation covering major hazard activities has been enforced by the Government of India in 1989 in conjunction with Environment Protection Act, 1986. This is referred here as GOI Rules, 1989.

1.7.3 Analysis of Units of Different Processes

A systematic analysis of the chemicals and their quantities of storage has been carried out, to determine threshold quantities as notified by GOI Rules, 1989 and the applicable rules are identified. The results are summarized in Table below.

1.7.4 Fire Explosion and Toxicity Index (FE & TI) Approach

Fire Explosion and Toxicity Indexing is a rapid ranking method for identifying the degree of hazard. The application of FE & TI would help to make a quick assessment of the nature and quantification of the hazard in these areas. However, this does not provide precise information.

1.7.5 Fire Explosion and Toxicity Index (FE & TI) Methodology

Dow's Fire and Explosion Index (F & E) is a product of Material Factor (MF) and Hazard Factor (HF). While MF represents the flammability & reactivity of the substance, HF is itself a product of general process hazard (GPH) and Special Process Hazard (SPH).

1.7.5.1 Computation and Evaluation of Fire & Explosion Index

The Fire and Explosion Index (F&EI) is calculated from –

$$F\&EI = MF \times GPH \times SPH$$

The degree of hazard potential is identified, based on the numerical value of F&EI as per the criteria given below:

TABLE 3
Criteria for Hazard Potential

| F&EI Range | Degree of Hazard |
|------------|------------------|
| 0-60 | Light |
| 61-96 | Moderate |
| 97-127 | Intermediate |
| 128-158 | Heavy |
| 159-up | Severe |

1.7.5.2 Toxicity Index

The Toxicity Index (TI) is primarily based on the index figures for health hazards established by the NFPA in codes NFPA 704, NFPA 49 and NFPA 345m.

1.7.5.3 Classification of Hazard Categories

By comparing the indices F&EI and TI, the mill is classified into one of the three categories established for the purpose (Table 7.7):

TABLE 4

Fire Explosion and Toxicity Index

| Category | Fire and Explosion Index (F&EI) | Toxicity Index (TI) |
|----------|---------------------------------|---------------------|
| I | F&EI < 65 | TI < 6 |
| II | F&EI 65 or <95 | TI 6 or < 10 |
| III | F&EI >95 | TI >10 |

1.7.5.4 Results of FE and TI for Storage/ Process Units

Based on the GOI Rules, 1989, the hazardous chemicals used by the pulp & paper mill were identified. Fire and Explosion are the likely hazards which may occur due to the fuel and chemical storage. Hence, fire and Explosion Index has been calculated for in-plant storage.

As no toxic chemicals are handled in the mill, the Toxicity Index has been calculated for these chemicals only.

1.7.6 Visualization of MCA Scenario

1.7.6.1 Introduction

A Maximum Credible Accident (MCA) can be characterized as an accident with a maximum damage potential, which is still believed to be probable.

As an initial step in this study, a selection has been made of the processing and storage units and activities, which are believed to represent the highest level of risk for the surroundings in terms of damage distances. For this selection, the following factors have been taken into account:

- Type of compound (flammable or toxic);
- Quantity of material present in a unit or involved in an activity; and
- Process and storage conditions such as temperature, pressure, flow, mixing and presence of incompatible materials.

1.7.6.2 Methodology

The following steps are employed for visualization of MCA scenario:

- Chemical inventory analysis;
- Identification of hazardous processes in individual units;
- Identification of chemical release and accident scenario;
- Analysis of past accidents of similar nature to establish credibility to identified scenario;
- Short listing of MCA scenario.

1.7.6.3 Common Causes of Accidents

- Poor housekeeping
- Improper use of tools, equipments and facilities
- Unsafe or defective equipment facilities

- Lack of proper procedures
- Improvising unsafe procedures
- Failure to follow prescribed procedures
- Jobs not understood
- Lack of awareness of hazards involved
- Lack of proper tools, equipments, facilities
- Lack of guides and safety devices
- Lack of PPEs.

1.7.6.4 Failures of Human Systems

An analysis of the past chemical accidents reveals the human factor to have caused for over 60% of the accidents, while the rest are due to other plant component failures. This percentage will increase if only major accidents alone are considered for analysis. Major causes for human failures reported are due to:

- Stress induced by poor equipment design, unfavorable environmental conditions, fatigue etc.
- Lack of training in safety & loss prevention
- Indecision in critical situations
- Inexperienced staff being employed in hazardous situations.

Often, human errors are not analyzed while reporting accidents and accident reports only provide information about equipment failures.

1.7.6.5 Short listing of MCA Scenarios

Based on the storage quantities and properties of the chemicals, the hazard identification has been done and given as follows for carrying out MCA analysis studies:

- Toxic dispersion due to leaks in caustic storage tanks; and
- General fire hazards.

1.7.6.6 Conclusion

Results of FE&TI analysis show that process & stored materials/ chemicals does not pose any fire hazard but falls into *MEDIUM* category toxicity index and caustic have neither fire hazard nor included in toxicity index.

1.7.7 Hazard Assessment and Evaluation

Preliminary Hazard Analysis (PHA) is based on the philosophy "Prevention Is Better than Cure". Safety is relative and implies freedom from danger or injury. But there is always some element of danger or risk in anything we do or build.

The purpose of preliminary hazard analysis is to identify early in the design process the potential hazards associated with, or inherent in, a process design, thus eliminating costly and time consuming delays caused by design changes made later. This also eliminates potential hazard points at design stage itself.

Hence, preliminary hazard analysis is more relevant when a plant is at design/ construction stage. This technique, applied early in the project life cycle, helps eliminating hazard and, thus, to avoid costly design modifications later. This analysis fortifies the proposed process design by incorporating additional safety factors into the design criteria.

1.7.8 Preliminary Hazard Analysis (PHA)

A preliminary hazard analysis is carried out initially to identify the major hazards associated with storages and the processes of the plant. This is followed by consequence analysis to quantify these hazards. Finally, the vulnerable zones are plotted, for which risk reducing measures are deduced and implemented. The various process activities involved in this pulp and paper mill operations are:

- Raw material handling and preparation
- Chemical Pulping
- Stock Preparation
- Paper Making & Processing

Except for chemical pulping and chemical recovery from black liquor, all the other processes involve purely mechanical operations that are not complex or hazardous. Chemical pulping involves cooking of raw material with sodium hydroxide at temperatures below 175°C. No major hazards are expected from this process. Sodium hydroxide is a mildly hazardous chemical in nature. Hence, no major hazards with the potential for any emergency situation exist in the process plant.

1.7.9 Maximum Credible Accident Analysis (MCAA)

1.7.9.1 Damage Criteria

Unloading at the storage facility may lead to fire. The damage criteria due to an accidental release of any hydrocarbon arise from fire is not toxic and hence no effects of toxicity are expected.

1.7.9.2 Fire Damage

The fire in the solid raw material can be of point of consideration. The liquid chemicals are non-flammable in nature and the lubricant oils can also be considered in the same context.

TABLE 5

Preliminary Hazard Analysis for Process and Storage Areas

| Equipment | Process | Potential Hazard | Provision |
|--------------------------|---------|-------------------------------------|---|
| Power Transformer | -- | Fire & Explosion | All electrical fittings and cables are provided as per the specified standards. |
| Switch Yard Control Room | - | Fire in cable trenches and switches | All electrical fittings and cables are provided as per the specified standards. |

| | | | |
|-------------------|--------------------------|---------|---|
| Raw Material Yard | Storage of Raw Material | Fire | The yard is encircled with pressurized pipeline fire hydrant system to deal with emergencies. |
| Caustic | Used in chemical pulping | Leakage | Standby storage tank provided to empty up the leaking tank. |

TABLE 6

Preliminary Hazard Analysis for the Whole Plant in General

| Major Hazard | Level of Risk | Area of Interest | Recommended Control/Mitigation |
|----------------------|---------------|---|--|
| Chlorine Gas Leakage | Medium | Bleach Plant (leakage from pipeline/Tonner) | <ol style="list-style-type: none"> 1. Due to corrosive environment the pipeline, structure, supports and tank needs painting at regular intervals 2. The electric wire rope hoist used for handling chlorine tonners should be always maintained in very good condition. |
| | Medium | Chlorine storage area (leakage from Cl ₂ tonner) | <ol style="list-style-type: none"> 1. The chlorine tonner storage area should be isolated and barricaded 2. The tonners should be periodically inspected with Ammonia for chlorine leakage detection. 2. Chlorine tonners should be stored away from the inflammable material. 3. Regular checking of pipeline carrying chlorine 4. Instructions for the safe use and handling of chlorine should be displayed in chlorine handling areas. |
| Corrosive Spillage | Medium | Acid/Caustic Storage Area | <ol style="list-style-type: none"> 1. Dyke wall of sufficient height should be provided around HCL storage tank of 20 KL capacity. 2. Tanks should be regularly painted. 3. Strict implementation of SOP's to be ensured by Employees/Drivers. |
| Fire | Low | Oil Tank area | <ol style="list-style-type: none"> 1. Regular maintenance procedure must be in place to reduce likelihood of failure of valves, flanges or pipes. 2. Foam water system must be in place and functions to control escalation of pool fire scenarios in the tank dyke. 3. PPE must be in place to facilitate human operation of the valves in case of emergency. 4. Workers should be trained regularly for all emergency |

| | | | scenarios. |
|--------------------|--------|--|--|
| Electrical Hazards | Medium | <ol style="list-style-type: none"> Compressor House Electrical Panel Rooms Transformer Area | <ol style="list-style-type: none"> Proper electrical insulation mats should be maintained. Compliance of work permit system and SOPs must be ensured. Displays regarding artificial respiration and preventing electrocution must be available in all such areas. Training regarding providing CPBR should be given all essential persons. |
| Dust Hazard | Medium | Handling Area | <ol style="list-style-type: none"> Use of dust masks must be ensured. Cleaning with mechanized dust collectors can be explored. |

This will help to decide the location of the other storage/ process vessel besides the type of protective clothing the workers/ fire fighters need, the duration of time for which they can be in the zone, the fire extinguishers measure needed and the protection methods needed for the nearby storage/ process vessels.

1.7.10 Effect due to Toxic Gas Release

Toxic gas likely to be released is from liquefied chlorine gas stored in Chlorine tonner. Chlorine concentration greater than 1 ppm can have detrimental effect on human health and corrosive effects on the outer surface of equipments or pipeline only when exposed for longer duration due to acidic nature of Cl_2 and HCL.

1.8 EMERGENCIES AND EMERGENCY MANAGEMENT

The most common emergencies that arise due to operation in Pulp & Paper mills are fire, rupture of tanks due to pressure and mechanical damages to the human body due to fire, personal accidents & violence.

1.8.1 Action Plan

In case of emergency (accident/gas leakage/failure of pressure vessel/major fire, etc.) which can turn into a disaster, concerned Operator or Asstt. Operator/Watchman on duty will inform Shift In charge/Supervisor/security Officer on duty and thereafter he shall return back to control the emergency until his superiors arrive at the spot. Shifr in charge/Security Officer will pass on necessary information to the SMC and SIC who is the concerned DEptt. Head. He shall then move back immediately to control the emergency and shall have full control until concerned Deptt. Head (SIC) and his Controlling Crew reach the Spot.

The SIC shall inform the SMC regarding the details of emergency and will advise the Security Deptt. to blow a siren according to the nature of mishap.

1.8.2 Declaration of Emergency

The Site main controller (SMC) will inform the Manager Security or his deputy to raise alarm as per the Siren-coding given below. Announcement on public address (P.A) system will follow and shall be made about the exact type of emergency to prevent any panic or spread of wrong information.

| S. No. | Type Of Hazard | Type of Siren Sounding |
|--------|-------------------------|---|
| 1. | Fire | Two minutes continuous siren |
| 2. | Leakage of Chlorine | One Minute continuous siren 2 times with 10 seconds break |
| 3. | Pressure Vessel Failure | One Minute continuous siren 3 times with 10 seconds break |
| 4. | All Clear | Continuous siren for 3 minutes |

1.8.3 First Aid Measures

In all first aid measures, the speed with which they are taken is of utmost importance. All persons connected with any sphere of activity involving storage or use of caustic should be educated of the urgent necessity of reporting immediately. All accidents however, minor they might be, in their own interest. They should also be suitably trained in imparting appropriate first aid measures.

In case of minor accidents, first aid facilities are being available in the dispensary inside the plant premises and in case of major accident; the victim will be immediately rushed to the nearby hospital after providing the first aid on the site.

1.9 EMERGENCY PREPAREDNESS PLAN RELATING TO SODIUM HYDROXIDE

1.9.1 Protective Clothing

While handling caustic solution, care should be taken to prevent splashing or contact with skin. It is particularly necessary to protect the eyes and the wearing of comfortable goggles or eye shields during discharge from tankers and the subsequent handling and use of the liquor.

Wool is readily attacked by caustic soda, so cotton clothing should be used while handling the caustic. Rubber gloves and gum boots gives good protection to hands and feet.

1.9.2 First Aid Treatment for Caustic Burns

Wherever there is a risk of caustic burns occurring by spillage, splashing, spurling or any other means, a 5% solution of ammonium chloride be ready available in such quantities that the skin or clothing may immediately be drenched with. If this action be taken without delay, it is unlikely that serious damage will occur. The ammonium chloride solution is stored most effectively in a vessel holding 20 liters. The vessel has a bottom outlet.

If there has been such delay in the application of the solution that some destruction of the epidermis has taken place and there is actually a burn, the part affected should be drenched with ammonium chloride for 10-15 minutes and then washed continuously with running water or saline-boric solution for a period of one hour. The burn should then be dressed with a four- fold pad of lint soaked in Bonny's blue paint.

This dressing should be left undisturbed until it drops off without aid. When the burns will be found to

have healed completely, no infection can possibly take place if the tissues have been thoroughly dyed by blue paint.

If the caustic soda gains access in the eyes or splashed in the eyes, the eyes should be washed immediately with the complete contents of one eyewash bottle of 5% ammonium chloride solution. Such bottles are placed in boxes in the plant so as to be immediately available when needed. This treatment should be carried out on the spot by one of the man's mate. The man should then be removed from works to the nearby hospital for further treatment. If the ammonium chloride solution or saline-boric solution is not available on the spot, the eyes should be thoroughly irrigated with fresh water of ambient temperature continuously for one hour. This prolonged irrigation is of extreme importance and must be done at once.

An alternative first aid treatment for the eye burns which is less painful than the application of 5% ammonium chloride solution is as follows:

The eyes should be washed out with buffered phosphate solution containing potassium hydrogen ortho-phosphate 27.22 gm, di-sodium hydrogen ortho-phosphate 71.63 gm in one litre of distilled water having 0.01 gm of brilliant green color as indicator. This treatment should be followed by the prolonged irrigation treatment with saline-boric solution under medical supervision. In order to prevent eye burns, the most satisfactory precaution is to insist on the use of chemical splash proof goggles.

1.10 DISASTER MANAGEMENT PLAN

1.10.1 Disaster

A disaster is a catastrophic situation in which suddenly, people are plunged into helplessness and suffering and, as a result, need protection, clothing, shelter, medical and social care and other necessities of life.

Disaster can be divided into two main groups. In the first are disasters resulting from natural phenomena like earthquakes, volcanic eruptions, storm surges, cyclones, tropical storms, floods, landslides and forest fires. The second group includes disastrous events occasioned by man, or by man's impact upon the environment. Examples are war, industrial accidents, factory fires, radiation accidents, explosions and release of toxic gases or chemicals, river pollution, mining or other structural collapses etc.

There can be no set criteria for assessing the gravity of a disaster since this depends to a large extent on the physical, economic and social environment where it occurs.

1.10.2 Objective of Disaster Management Plan

The disaster Management Plan is aimed to ensure safety of life, protection of environment, protection of installation, restoration of production and the salvage operation in the same order of priorities. For effective implementation of Disaster Management Plan, it should be widely circulated and personnel training through rehearsals/ drills.

To tackle the consequences of major emergencies inside the factory or immediate vicinity of the factory, a Disaster Management Plan has to be formulated and the planned emergency document is called “DISASTER MANAGEMENT PLAN”.

The objective of the Industrial Disaster Management Plan is to make use of the combined resources of the plant and the outside services to achieve the following:

- Effect the rescue and medical treatment of the casualties;
- Safeguard other people;
- Minimize damage to property & environment;
- Initially contain and ultimately bring the incident under control;
- Identify any deceased;
- Provide for the needs of relatives;
- Provide authoritative information to the news media;
- Secure the safe rehabilitation of affected area;
- Preserve relevant records and equipment for the subsequent inquiry into the cause and circumstances of the emergency.

1.11 EMERGENCIES

1.11.1 General & Industrial Emergencies

The emergencies that could be envisaged in the plant are as follows:

- Slow isolated fires;
- Fast spreading fires;
- Structural failures;
- Natural Calamities;
- Contamination of food/ water; and
- Sabotage/ social disorder.

1.12 SPECIFIC EMERGENCIES ANTICIPATED IN PULP & PAPER MILL

1.12.1 Chemical spills

Chemicals are stored in bunded areas and any spills will be contained in a controlled area. Safety gear and training is provided to all staff who handles chemicals or dangerous goods and the likelihood of injury to person is very low due to training and procedures. The chemicals and dangerous goods are kept away from moving machinery to reduce the risk of fire. The mill has a first aid officer on every shift.

1.12.2 Injury to person

Safety gear and training is provided to all employees. Affected employees are trained in safe handling of chemicals, dangerous goods, machinery (fixed and moving), their surrounding and their work environment. Safety guards, light curtains and other safety measures have been implemented and the likelihood of injury to person is very low due to training and procedures.

1.12.3 Damage to machinery and property

Whilst the likelihood is very low, there is always a small risk of fire. Our site is fitted with fire sprinklers, has several fire extinguishers fire hoses and emergency fire warnings. Our fire system is linked to the fire brigade and all employees are trained to follow emergency procedures.

1.12.4 Fire & Explosion

Fire consequences can be disastrous, since they involve huge quantities of fuel either stored or in dynamic inventory in open yard. Preliminary Hazard Analysis has provided a basis for consequence estimation. During the study of risk assessment, the natures of damages are worked out and probability of occurrence of such hazards is also drawn up. Therefore the risk assessment report is to be essentially studied in conjunction with the Disaster Management Plan.

1.12.5 Emergency Organization

An Emergency Organization is working in the plant. The Vice President of the factory is heading this organization. He is also designated as site controller. The person not below the designation of General Manager and who are working as department heads are designated as Incident Controllers. Each Incident Controllers are reporting to the Site Controller.

Each Incident Controller, for himself, organized a team responsible for controlling the incidence with the personnel under his control. Shift In charge in each department is the Reporting Officer, who would bring the incidence to the notice of the Incidence Controller and Site Controller.

Emergency coordinators are appointed who would take the responsibilities like fire fighting, rescue and rehabilitation, transport and provide essential & support services. All these personnel are designated as Key Personnel. In case of power or communication failure during any incident, some of the staff members in the office or plant offices would be drafted and their services would be utilized as messengers for quick passing of the communications. All these personnel would be declared as essential personnel.

1.12.6 Emergency Communication

Whoever notices an emergency situation such as fire, growth of fire, leakage of chemicals etc. would inform his immediate superiors and emergency control centre. The person on duty in the emergency control centre would appraise the Site controller. Site Controller verifies the situation from the Incident controller of that area or the shift In charge and takes a decision about an impending On-Site Emergency. This would be communicated to all the Incident Controllers and Emergency Coordinators. Simultaneously, the emergency warning system would be activated on the instruction of the Site Controller.

1.13 EMERGENCY RESPONSIBILITIES

1.13.1 Site Controller

On receiving information about emergency, he would rush to the emergency control centre and take charge of ECC and the situation and;

- Assesses the magnitude of the situation on the advice of the Incident Controller and decides;
- Whether the affected area needs to be evacuated;
- Whether personnel who are at assembly points need to be evacuated;
- Declares emergency and order for operation of emergency siren;
- Organizes announcement by public address system about location of emergency;
- Assesses which area are likely to be affected, or need to be evacuated or are to be alerted;
- Maintains a continuous review of possible development and assesses the situation in consultation with incident controller and other key personnel as to whether shutting down the plant or any section of the plant required and if evacuation of persons is required;
- Direct personnel for rescue, rehabilitation, transport, fire brigade, medical and other designated mutual support system locally available for meeting emergencies;
- Control evacuation of affected areas, if the situation is likely to go out of control or affects are likely to go beyond the premises of the factory, inform to district emergency authority, police, hospital and seeks their intervention and help;
- Informs inspector of factories, deputy chief inspector of factories, UEPPCB and other statutory authorities;
- Gives a public statement, if necessary;
- Keeps record of chronological events and prepares an investigation report and preserve evidence;
- On completion of On-Site Emergency and restoration of normalcy, declares all clear and order for all clear warning.

1.13.2 Incident Controller

- Assembles the incident control team;
- Directs operation within the affected areas with the priorities for safety to personnel minimize the damage to the plant, property and environment and minimize the loss of materials;
- Directs the shutting down and evacuation of the plant and areas likely to be adversely affected by the emergency;
- Ensures that all key personnel's help is sought;
- Provides advise and information to the fire and security officer and the local fire services as and when they arrive;
- Ensure that all non-essential workers/ staff of the affected areas are evacuated to the appropriate assembly points and the areas are searched for casualties;

- Has regard to the need for preservation of evidence so as to facilitate any inquiry into the causes and the circumstances which caused or escalated the emergency;
- Co-ordinates with emergency services at the site;
- Provides tools and safety equipments to the team members;
- Keeps in touch with the team and advises them regarding the method of control to be used;
- Keeps the site controller of emergency informed of the progress being made.

1.13.3 Emergency Co-ordinators – Rescue, Fire Fighting

- On knowing about emergency, rushes to ECC;
- Help the incident controller in containment of the emergency;
- Ensure fire pumps in operating conditions and instruct pump house operator to be ready for any emergency with stand-by arrangement;
- Guides the fire fighting crew i.e. firemen, trained plant personnel and security staff;
- Organizes shifting the fire fighting facilities to the emergency site, if required;
- Takes guidance of the incident Controller for firefighting as well as assesses the requirements of outside help;
- Arrange to control the traffic at the gate and the incident area;
- Directs the security staff to the incident site to take part in the emergency operations under his guidance and supervision;
- Evacuates the people in the plant or in the nearby areas as advised by Site Controller;
- Searches for casualties and arrange proper aid for them;
- Assembles search and evacuation team;
- Arrange for safety equipments for the members of this team;
- Decides which paths the evacuated workers should follow;
- Maintains law and order in the area, and if necessary, seeks the help of police.

1.13.4 Emergency Co-ordinator – Medical, Mutual Aid, Rehabilitation, transport and Communication

In the event of failure of electric supply and thereby internal telephones, sets up communication points and establishes contact with the Emergency Control Centre (ECC).

- Organizes medical treatment to the injured and if necessary, will shift the injured to nearby hospitals;
- Mobilizes extra medical help from outside, if necessary;
- Keeps a list of qualified first aiders of the factory and seeks their assistance;
- Maintains first aid and medical emergency requirements;
- Makes sure that all safety equipments are made available to the emergency team;
- Assist Site Controller with necessary data and in coordinating the emergency activities;
- Assist site controller in updating the emergency plan, organizing mock drills, verification of inventory of emergency facilities and furnishing report to Site Controller;

- Maintains liaison with civil administration;
- Ensure availability of canteen facilities and maintenance of rehabilitation centre;
- He will be in liaison with site controller/ incident controller;
- Ensures transportation facilities;
- Ensure availability of necessary cash for rescue/ rehabilitation and emergency expenditures;
- Controls rehabilitation of affected areas on discontinuation of emergency.

1.13.5 Emergency Co-ordinator – Essential Services

- He would assist site controller and incident controller;
- Maintains essential services like water, fire water, compressed air/ instrument air, power supply for lighting;
- He would plan alternate facilities in the event of power failure to maintain essential services such as lighting, drinking water etc.;
- He would organize separate electrical connection for all utilities and emergency services so that in the event of emergencies or fire, essential services and utilities are not affected;
- Gives necessary instructions regarding emergency electrical supply, isolation of certain instructions etc. to the shift in charge and electrician;
- Ensure availability of adequate quantities of protective equipments and other emergency materials, spares etc.

1.13.6 General Responsibilities of employees during an emergency

During an emergency, it becomes more enhanced and pronounced when an emergency warning is raised, the workers, if they are in charge of process equipment, should adopt safe and emergency shut down and attend to any prescribed duty as an essential employee. If no such responsibility is assigned, he should adopt a safe course to assembly point and await instructions. He should not resort to spreading panic. On the other hand, he must assist emergency personnel towards objective of DMP.

1.14 EMERGENCY FACILITIES

1.14.1 Emergency Control Centre

An office at the administrative block on main gate is working as Emergency Control Centre. The internal and external telephone facilities, fax etc. are available in the block. During an incident, Site Controller and all the Incident Controllers are assembled here. The materials available in the ECC are:

- Internal & External telephone facility;
- Hand tools;
- Telephone directories;

- Factory layout and site plan;
- Emergency lamp/ torch light/ batteries;
- Plan indicating locations of hazard inventories, plant control room, sources of safety equipments, work road plan, assembly points, rescue location vulnerable zones, escape routes;
- Hazard chart;
- Emergency shut-down procedures;
- Nominal role of employees;
- List of key personnel, list of essential employees, list of emergency co-ordinators;
- Duties of key personnel;
- Address with telephone numbers and key personnel, emergency co-ordinators, essential employees;
- Important address and telephone numbers including government agencies, neighboring industries and sources of help, outside experts, chemical fact sheets, population details around the factory.

1.14.2 Assembly Point

Numbers of assembly points depending upon the plant location are identified wherein employees who are not directly connected with the disaster management would be assembled for safety and rescue. Emergency breathing apparatus minimize facilities like water etc. are provided. In view of the size of plant, different locations are ear marked as assembly points. Depending upon the location of the hazards the assembly points are to be used.

1.14.3 Emergency Power Supply

Water pumps, plants lighting and emergency control centre, administrative building and other auxiliary services are connected to emergency power supply. Also, in case of turbine failure, DG sets are also available to illuminate the area.

There is plan to procure the flame proof emergency lighting system for each of the sections.

1.14.4 Fire Fighting Facilities

First Aid & fire fighting equipments suitable for emergencies are being maintained in each section in the plant. This would be as per statutory requirements. Also, fire hydrant network is laid in the raw material yard and excise godown. The pressure in the fire hydrant lines is maintained at 6 kg/cm².

1.14.5 Emergency Medical Facilities

First aid facilities are provided at Emergency Control Centre and at main gate of the mill to deal with chemical burns and fire burns etc. Private and government medical hospital's help would be sought in case of emergency.

Apart from first aid facilities, external facilities would be augmented. Names of the medical personnel and details like phone number etc. are displayed at main gate of the mill and the details of facilities available are maintained and updated at main gate of the mill.

1.15 EMERGENCY ACTIONS

1.15.1 Emergency Warning

Communication of emergency is familiar to the personnel inside the plant and people outside. An emergency warning system is provided at the main gate.

1.15.2 Emergency Shutdown

Whenever a given method is appropriate depends on that particular case, cessation of the process is the best action in some instances but not in all. Emergency shutdown switches are provided to all those machinery that pose hazard in any condition.

1.15.3 Evacuation of Personnel

There could be more number of persons in the storage area and other areas in the vicinity. The area would have adequate number of exits, stair cases. In the event of an emergency, unconnected personnel have to escape to assembly point. Operators, if needed, have to take emergency shutdown procedure and escape. Based on these requirements, evacuation of the personnel is drafted and emergency exits are provided in the plant. Time office maintains a copy of deployment of employees in each shift. If necessary, persons can be evacuated by rescue teams. Evacuation plans of the company meets the international standards and is regularly audited by international organizations such as Walmart.

1.15.4 All Clear Signal

Also, at the end of an emergency, after discussing with Incident Controllers and Emergency Coordinators, the Site Controller orders an all clear signal. When it becomes essential, the Site Controller communicates to the District Emergency Authority, Police and Fire Service personnel regarding help required or development of the situation into an Off-Site Emergency.

1.16 GENERAL

1.16.1 Employees Information

During an emergency, employees would be warned by raising siren in specific pattern. Employees are given training on escape routes, taking shelter, protecting from toxic effects. Employees are provided with information related to fire hazards, and first aid measures. The key personnel and essential employees are given training in responding to emergency (emergency response).

1.16.2 Public Information and Warning

The industrial disaster effects related to this plant may mostly be confined to the plant area. The detailed risk analysis has indicated that the pool fire effects would not be felt outside. However, as an abundant precaution, the information related to chemicals in use would be furnished to District Emergency Authority for necessary dissemination to general public and for any use during an off-site emergency.

1.16.3 Co-ordination with Local Authorities

Keeping in view the nature of emergency, two levels of co-ordination are proposed. In case of an On-site Emergency, resources within the organization would be mobilized and, in the event of an extreme emergency, local authority's help would be sought.

In the event of an emergency developing into an off-site emergency, local authorities and District Emergency Authority would be appraised and under his supervision, the Off-site Disaster Management Plan would be exercised.

1.16.4 Mutual Aid

Mutual aid in the form of technical personnel, runners, helpers, special protective equipment, transport vehicles, communication facilities would be sought from neighboring industrial establishments.

1.16.5 Mock Drills

Emergency preparedness is an important task in planning of Industrial Disaster Management. Personnel in the mill are trained suitable and prepared mentally and physically in emergency response through carefully planned, simulated procedures. Similarly, the key personnel and essential employees are trained in the operations.

1.16.6 Important Information

Important information such as names and address of key personnel, essential employees, medical personnel outside the plant etc. are maintained in the mill.

An on-site emergency organization chart for various emergencies is shown in Figure below.

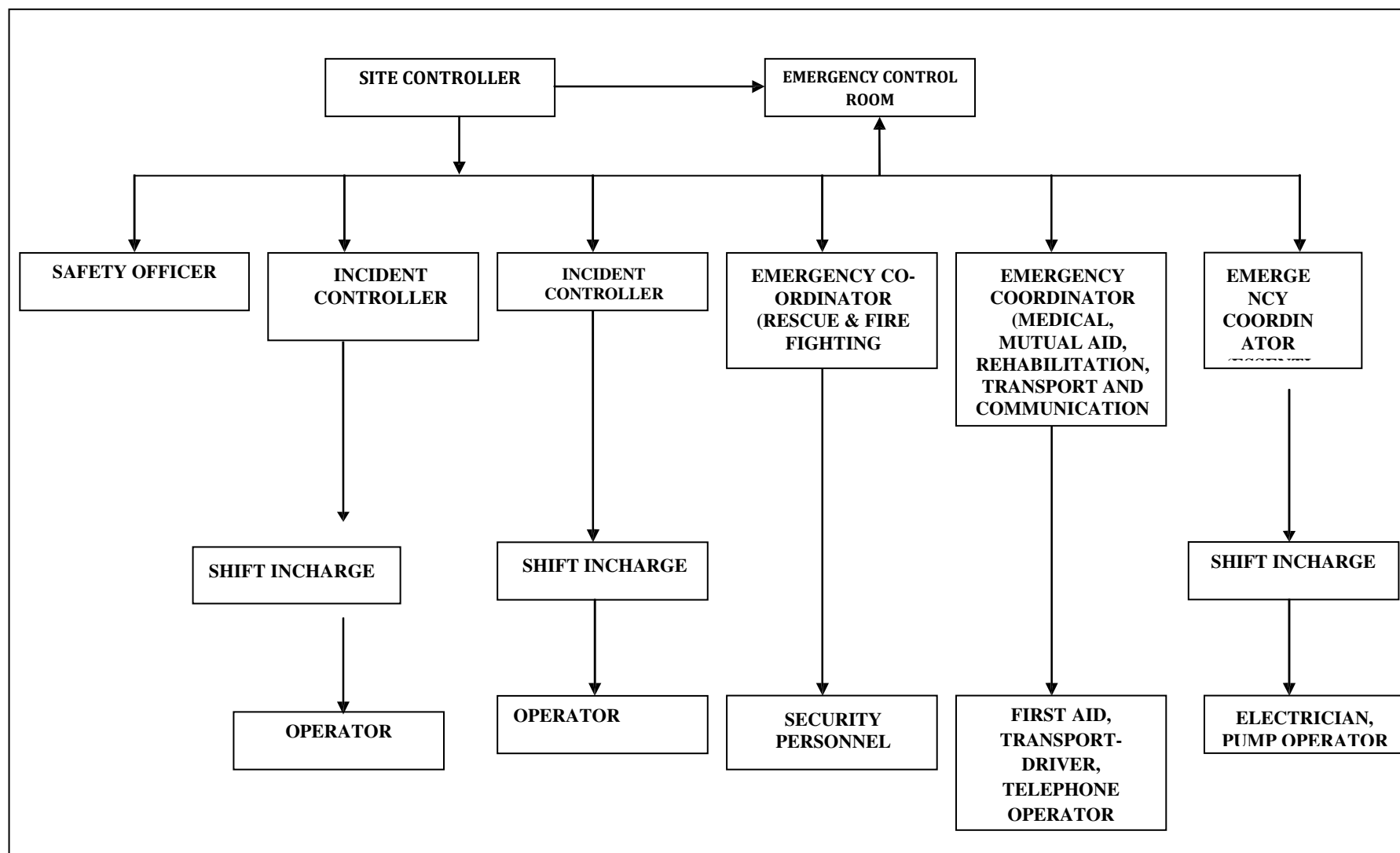


Figure : On Site Emergency Organization Chart

1.17 OCCUPATIONAL HEALTH AND SAFETY

Large and medium scale 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, the 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 & erection and operation & maintenance. Sidharth Papers Limited has prepared its own safety plan which is being implied during construction & erection and operation & maintenance phases. The safety plan is as follows:

1.17.1 Occupational Health

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

1.17.1.1 Construction and Erection

- The occupational health problems envisaged at this stage mainly be due to constructional accidents and noise.
- To overcome these hazards, personal protective equipments (PPEs) are provided to all the employees. These includes helmets, gum boots, dust masks, ear plugs, safety goggles, rubber and asbestos gloves, safety belts etc. Depending upon the work an employee is doing and the location where he is working, necessary PPEs are provided to them.

1.17.1.2 Operation and Maintenance

The problem of occupational health, in the operations and maintenance phase, is due to many factors. It may be chemical or toxic gas leakages from any tank or vessel, heat, fire, noise etc. Following is a list of PPEs that are provided to the employees working in the factory premises:

- Industrial Safety Helmets
- Face Shields with Replaceable Acrylic Vision
- Punk Type Safety Goggles for Dust Protection
- Chemical Splash Proof Goggles
- Welder's Equipments for Eye and Face Protection
- Cylindrical Type Earplugs
- Ear Muffs
- Canister Gas Masks
- Self Contained Breathing Apparatus
- PVC Aprons

- Aluminized Fiber Glass Fix Proximity Suits with Hood, Gloves & Boots
- Boiler Suits
- Safety Belts
- Asbestos and Rubber Hand Gloves
- Acid/ Alkali Proof PVC Hand Gloves
- Electrically Tested Electrical Resistance Hand Glove
- Eye/ Face Shower
- Gum Boots
- Eye Wash Bottles

Full-fledged hospital facilities are available round the clock in Kashipur town, approx. 7 k.m. from the factory site, to attend the emergency arising due to any kind of accidents, if any. One number of vehicles is available for attending emergencies arise due to accidents round the clock in the factory.

1.17.1.3 Safety Plan

Safety of both men and materials during construction and operation phases is of concern. The preparedness of any industry for the occurrence of possible disasters is known as emergency plan. The disaster in Pulp and Paper Mill is possible due to leakage of hazardous chemicals like caustic, collapse of structures and fire/ explosion etc.

Keeping in view the safety requirement during construction, erection, operation and maintenance phases, Sidharth Papers Limited has formulated a safety policy with the following regulations:

- To allocate sufficient resources to maintain safe and healthy conditions of work
- To take steps to ensure that all known safety factors are taken into account in the design, construction, operation and maintenance of plants, machinery and equipment
- To ensure that adequate safety instructions are given to all employees
- To provide wherever necessary protective equipment, safety appliances and clothing, and to ensure their proper use
- To inform employees about materials, equipments or processes used in their work which are known to be potentially hazardous to health or safety
- To keep 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
- To provide appropriate facilities for first aid and prompt treatment of injuries and illness at work
- To provide appropriate instruction, training, retraining and supervision to employees in health and safety and first aid
- To ensure proper implementation of fire prevention methods and an appropriate fire fighting service together with training facilities for personnel involved in this service

- To organize collection, analysis and presentation of data on accident, sickness and incident involving personal injury to health, with a view to take corrective, remedial and preventive action
- To promote through the established machinery, joint consultation in health and safety matters to ensure effective participation by all employees
- To publish/ notify regulations, instructions and notices in the common language of employees
- To prepare separate safety rules for each type of processes involved in a project
- To ensure regular safety inspection by a competent person at suitable intervals of all buildings, equipment, work places and operations.

In operation, the safety guidelines are framed in consultation with department heads and are tested under their guidance.

1.17.1.4 Safety Circle

In order to fully develop the capabilities of the employees in identification of hazardous processes and improving safety and health, safety circle is constituted in the mill. The circle consists of equal representation of workers & staff members of the mill and comprise of 14 members headed by GM (HR & Admin.).

The mill has also obtained OHSAS certification from BSI, UK and is following all the international guidelines for occupational health and safety.

1.17.1.5 Safety Training

A full fledged training centre with proper sitting capacity, overhead projector etc. is constructed in the mill and the trainings are given by the GM (HR & Admin.) with the assistance of subject matter expert from different departments. In addition to regular employees, contract laborers are also provided with safety training. To create safety awareness among all members, competition among safety circles are organized, during the celebration of National Safety Day/Week.

