

*CHAPTER – 6*  
*RISK ASSESSMENT,*  
*OCCUPATIONAL HEALTH &*  
*SAFETY MANAGEMENT*

## **CHAPTER- 6**

# **RISK ASSESSMENT, OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT**

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### **6.1 INTRODUCTION**

Increasing use of hazardous chemicals as raw materials, intermediates and finished products has attracted attention of the Government and the public at large in view of the chemical disasters. The serious nature of the accidents, which cause damage to the plant, personnel and public, has compelled industries to pay maximum attention to the safety issues and also to effectively manage the hazardous material and operations. Identification analysis and assessment of hazard and risk are very useful in providing information to risk management. It provides basis for what should be type and capacity of its onsite and offsite emergency plan and also what types of safety measures are required. It is mandatory for the industries handling hazardous chemical to maintain specified safety standards and generate an on-site emergency plan and keep it linked with off site emergency plan.

The safety management includes the implementation of preventive methods or accident prevention methods to avoid incident or accident and handling of emergency in case of accident. The implementation of accident prevention methods needs the risk analysis, to identify the risk associated with handling, storage, operations and reaction in the process and from that to find out the prevention methods. The broadly the safety management may be divided in followings,

- ↳ Risk Analysis
- ↳ Emergency Preparedness

### **6.2 STORAGE OF HAZARDOUS CHEMICALS/SOLVENT**

Raw material used and product generated are hazardous & non hazardous in nature. The unit does not involve any process where phosgene used. The hazardous materials used may be corrosive, toxic and/or flammable. The details

of the storage of the hazardous material along with the storage details are given in **Table – 6.1**.

**Table – 6.1: Details of the storage of Hazardous Chemicals**

Sr. No.	Name of Hazardous Chemicals	Type of packing/ storage	Packing size	Maximum storage capacity, MT	Possible type of hazardous
1	Acetic acid	Bottle	35 lit	5.0	Corrosive, Flammable
2	Ammonia	Bottle	50 lit	6.0	Corrosive
3	Caustic Sda Lye	Tank	150000 lit	15.0	Corrosive
4	Mirthylene Di Chloride	HDPE Drums	250 lit	12.0	Corrosive
5	Hydro bromic acid	HDPE Drums	200 lit	25	Corrosive
6	Sulphuric acid	Bottle	60 lit	6.0	Corrosive
7	Chloro Benzene	MS Drum	250 lit	2.0	Flammable, toxic
8	Formic Acid	HDPE Carboy	35 lit	15.0	Flammable, toxic
9	Methanol	Tank	12000 lit	15.0	Flammable, toxic
10	Xylene	MS Drum	200 lit	5.0	Flammable, Toxic
11	Iso Propyl Alcohol	Tank	12000 lit	12.0	Flammable
12	Hydrogen Gas	Cylinder	1 Kg	6	Flammable
13	Tetra Hydro Furan	MS Drum	180 lit	5.4	Flammable
14	Hexane	MS Drum	200 lit	5.0	Flammable
15	Chloroform	MS Drum	300 lit	30.0	Toxic
16	Toluene	Tank	12000 lit	15.0	Toxic
17	Nitric acid	HDPE Carboy	50 lit	5.0	Corrosive, toxic
18	Oleum	Tank	12000 lit	12.0	Corrosive, toxic
19	Hydro-chloric Acid	HDPE Drums	200 lit	25	Corrosive, toxic
20	Triazol	Fiber/ HDPE Drum	25 kg	5	Corrosive, toxic

The unit is taking various precautions during the storage of hazardous chemicals which is given below.

- ↻ Tanks are located and marked in designated area of hazardous chemical storage.
- ↻ MOC of tanks is properly selected.
- ↻ All tanks are uniformly tagged.
- ↻ Level indicator is provided in all storage tanks.
- ↻ Dyke wall is provided to tank farm area where hazardous chemicals are stored.
- ↻ Spare barrels of sufficient quantity are kept ready for any emergency spillage or leakage.
- ↻ Drum trolley is used for the movement of drums of hazardous chemicals.
- ↻ Most of the liquid chemicals are transferred by mechanical seal pump through closed pipeline.
- ↻ Industrial type electric fittings are provided in whole plant area.
- ↻ Anti corrosive paint are applied in production plant.
- ↻ Safety instruction boards are displayed at prominent places.

### **6.3 RISK ANALYSIS**

Risk and Safety is situation without unacceptable risk. Risk is defined as a likelihood of an undesired event (accident, injury or death) occurring within a specified period or under specified circumstances. This may be either a frequency or a probability depending on the circumstances. Hazard is defined as a physical situation, which may cause human injury, damage to property or the environment or some combination of these criteria.

The followings are the hazards associated in proposed project,

- ↻ Fire Hazard
- ↻ Toxicity Hazard
- ↻ Corrosive Hazard
- ↻ Electrical Hazard
- ↻ Mechanical Hazard

### 6.3.1 Fire Hazard

Since the Stone Age term 'fire' is associated with fear. It is very dangerous if occurs in uncontrolled manner. It should be clearly understood that Flammable Chemicals which have a flash point lower than 65°C and which remain liquids under pressure, where particular processing conditions, such as high pressure and high temperature, may create major accident hazards. The details of the chemicals are given in **Table-6.2**.

**Table-6.2 Details of Flammable Chemicals**

Sr. No.	Name of Chemical	Flash Point	Auto Ignition Temperature
1	Chloro Benzene	29.44 °C	638 °C
2	Hexane	15 °C	225 °C
3	Iso propyl Alcohol	12.77 °C	399 °C
4	Hydrogen Gas	--	570 °C
5	Formic acid	69°C	539°C
6	Methanol	16 °C	464 °C
7	Tetra Hydro Furan	20 °C	321 °C
8	Xylene	21-27 °C	432-530 °C
9	Toluene	16 °C	480 °C

❖ **The condition of events which can leads to fire:**

Equipment failures, presence of open flame or spark in the area, static charge accumulation, Leakage of gas and open live cables and reaction between incompatible chemicals are some of the reasons which lead to the occurrence of fire.

❖ **A brief description of the preventive measures roused to prevent fire.**

- ❖ Proper earthing connections for the all the equipments, i.e. lines and similar operations is given.
- ❖ The entire pipe lines and storage tanks have been provided with proper earthing to handle static charges safely.
- ❖ All the electrical connections have been done with flameproof fittings within the flammable area.

- ↪ At preset adequate nos. of fire extinguishers (CO<sub>2</sub> and DCP, Mechanical foam type) of various types are provided at prominent place in fire prone area and unit will install more nos. of fire extinguisher after proposed expansion.
- ↪ The unit has decided to provide automatic fire detection and control system to prevent spreading of fire due to leakage of gas.
- ↪ Storage and process areas are posed with "No Smoking" sign.
- ↪ All gas pipe joints are provided with heavy duty champion gaskets to prevent any leakage.
- ↪ First aids boxes are also provided at different places wherever required.
- ↪ The gas pipe lines are painted with different colors to distinguish it.
- ↪ The flanges are provided with Teflon washers for long life and efficiency.
- ↪ Pressure controllers and pressure safety locking are provided in the plant.

### **Fire protection system**

The plant's fire protection is consisting of structural solutions, hydrant system, fire extinguishing systems, and fire alarm systems.

### **Fire Hydrants**

Hydrant type Fire Protection System is consisting of a network of piping and hydrant valves- both indoor & outdoor. The distance between any two hydrants is not more than 45 meters. Each hydrant is provided with a hose cabinet (mounted along side the hydrant on a steel column, lockable type) containing two nos. of 15 M long hoses and branch pipes/nozzles.

The number and position of the hydrants are such that spray from at least two hoses with combined jet and water fog nozzles may reach any interior places. Some hydrants are also installed on an external wall, to allow the use of hoses outside a building.

Fire hoses are cotton and nylon jacket seamless woven and rot proofed material equipped with quick couplings and adjustable water fog nozzles. Hose

couplings and nozzles throughout the fire line are completely interchangeable. Hose couplings are made of a copper alloy or other approved material.

Hose length: 15 m

Hose diameter: 63 mm

Busting pressure test: 32 kg/cm<sup>2</sup>

The unit has already provided under ground water tank of **100 KL** and overhead tank of **30 KL**.

### **Fire extinguishing equipment**

Extinguisher, preferably wall mounted type, are located such that they are not far from each other at max distance of 15 m.

#### **CO<sub>2</sub> extinguishers**

Fire extinguisher contains extinguishing carbon dioxide which under expected conditions of use gives off to prevent fire to get oxygen. CO<sub>2</sub> extinguishers are meant to extinguish mainly fire caused by electric devices. Capacity of extinguisher is Min. 4.5 kg.

#### **Dry powder extinguishers**

Dry powder extinguisher contains extinguishing medium which either by itself or under expected conditions of use gives off fine powder to prevent fire to get oxygen. Dry powder extinguishers are suitable for all kinds of fires. Capacity of one extinguisher will be Min. 5 kg Dry powder type ABIII-E.

#### **Fire alarm system**

The fire alarm system is a part of the primary systems and will take care of the places which are unmanned or do not have any fixed fire extinguishing system. **Three** nos. of fire alarms are provided to prevent spreading of fire in the plant area.

### **6.3.2 Toxicity Hazard**

The chemicals which create adverse effect to human body are called Toxic Chemicals and hazard is Toxicity Hazard. The Toxicity of chemicals is defined

based on their Threshold Limit Value on 8 hrs Time Weighted Average. The unit uses toxic materials like Hydrochloric Acid, chloroform, Methylene chloride, nitric acid, oleum, furan, hydrogen cyanide, benzyle cyanide, xylene and toluene etc. in the manufacturing process. The detail of toxic chemical is given in **Table-6.3**.

**Table-6.3 Details of Toxic chemical**

Name of Chemical	TLV*, ppm		
	IDLH	STEL	TWA
Hydrochloric Acid (HCl)	100	5	5
Chloform	1000	--	10
Methylene chloride	5000	500	75
Nitric acid	216	4	2
Oleum	--	3	1
Tetra Hydro Furan	20000	--	200
Toluene	2000	150	100
Xylene	10000	150	100
Benzyle cyanide	--	--	25
Sodium Cyanide	10	10	--
<p><b>*Note:</b> TLV data are taken from "Fundamentals Of Industrial Safety and Health" compiled by Dr. K. U. Mistry and "NIOSH Pocket Guide To Chemical Hazard" published by U.S. Department Of Health and Human Services.</p> <p><b>TLV</b> = Threshold Limit Value  <b>IDLH</b> = Immediately Dangerous To Life Or Health  <b>STEL</b> = Short Term Exposure Limit  <b>TWA</b> = Time Weighed Average</p>			

**⚠ The condition of events which can leads to Toxic Hazards**

Incase of failure of bottom valve or overflow of the reaction vessel, the chemicals will splash /fall on the employees. The leakage can also be taken place during pumping of liquid and failure of any component during transferring.



### ❧ A brief description of the measures roused to prevent spillage / leakage of toxic chemicals

The preventive maintenance is planned and carried out as per plan to avoid the failure of valve, pipe lines and other component of transferring line. The spillage will be confined to the dyke area underneath the vessel. The resultant splash of such chemicals will result in exposure of toxic chemicals to employees. Decontamination facilities (**Safety shower and eye wash fountains**) are provided in the plant area, which can be used to decontaminate the affected employees.

Suitable decontamination procedure is used to decontaminate the spilled or leaked material. The SOP for decontamination is reared with all related department. The followings are some measured taken for handling the toxic chemicals safely.

- ❧ Suitable personal protective equipment like splash goggles, gloves and protective clothes are provided while handling the toxic chemicals and details of the same are given in **Table-6.4**.
- ❧ The installation of all the equipment is as per guidelines of provision of Gujarat Factories Rule 1963.
- ❧ All the toxic chemicals are being stored under adequate safe condition.
- ❧ The storage of corrosive and toxic chemicals is segregated from each other.
- ❧ The piping is examined thoroughly every year for finding out any defects; and a defect is removed forthwith. The record of such examination is maintained.
- ❧ Smoking is prohibited inside the factory. Train employees are employed for handling of toxic and corrosive chemicals.
- ❧ All pipe joints are provided with heavy duty champion gaskets to prevent any leakage.
- ❧ Self breathing apparatus are provided and workers are trained about their use also.
- ❧ Dyke wall is provided to tank farm area where hazardous chemicals are stored.

- ☞ Spare barrels of sufficient quantity are kept ready for any emergency spillage or leakage.
- ☞ Dyke wall is provided to tank farm area where hazardous chemicals are stored.
- ☞ Drum trolley is used for the movement of drums of hazardous chemicals.
- ☞ Most of the liquid chemicals are transferred by mechanical seal pump through closed pipeline.

**Table -6.4: The Details of Personal Protective Equipments**

Sr. No.	Type Of PPE	Name Of PPE
1.	Hand Protection	Hand gloves
		Shock proof hand gloves
2.	Head Protection	Helmet
		Helmet ring
		Helmet with welding face shield
3.	Face Protection	Face shield
4.	Eye Protection	Safety goggles
5.	Ear Protection	Ear muff
		Ear plug
6.	Body Protection	Chemical resistance apron
		PVC apron
		Boiler suit - Blue color
7.	Respiratory Protection	Cotton Mask
		Dust mask
8.	Fall Protection	Safety harness belt
		General Purpose safety belt
		Rope ladder
9.	Industrial Hazard Protection	Wind socks - 5ft
		Folding stretcher
		First aid box
		Rubber mat
		Barricaded tape ( red color )
10.	Foot Protection	Electrical safety shoes
		Safety shoes
		Half gum boot

### 6.3.3 Corrosive Hazardous

Unit uses corrosive substances viz. Caustic Lye, sulfuric acid, ammonia, Methylene chloride, Hydro-bromic acid and Hydro-chloric acid in the

manufacturing process. If corrosive substances are not handled properly it can cause eye irritation and Skin allergy. Sometimes ingestion and inhalation of such chemical can cause gastro-intestinal irritation and damage to the central nervous system. The unit is taking following precautions while handling corrosive chemicals.

- ↳ Corrosive chemicals are transferred to another vessel by pumping to avoid splash and manual handling.
- ↳ Corroded valves, pipelines are periodically changed.
- ↳ Personal Protective equipments are provided to all the workers who handle such chemicals.
- ↳ Pressure test, wall thickness test of each and every vessel is regularly carried out.
- ↳ Painting of equipment is being done on periodical basis with anti corrosive paint.
- ↳ All protective and safety precautions are observed while cleaning up spills and chemical goggles are also used.
- ↳ Corrosive substances are stored away from the moisture.

#### **6.3.4 Electricity Hazard**

- ↳ Electrical Installation is carried out as per Indian Electricity Act 1910 and The Indian Electricity Rules, 1956.
- ↳ Monitoring of earth pit resistance is carried out.
- ↳ Safety tag out system under the electric work permit is done for electric isolation.
- ↳ Marking of under ground path of the cable from substation to the transformer.
- ↳ Proper earthing is provided to pump body, drive motor and electrical switch.
- ↳ Provision of Rubber mats is made in working platforms of control room.
- ↳ The ELCB is installed for human safety as and when required.

### 6.3.5 Mechanical Hazards

The following general precautions are being taken during the project stages to minimize and control the hazards due to mechanical failure,

#### Equipment

- ✚ Vendors for fabrication are selected based on the exposure in the related field. During fabrication the inspections are done at every stage like material checking, weld joint checking, dimensions like thickness, diameters. All The installation is as per the related standards and codes of fabrication.
- ✚ Safety guards (Enclosures) are provided on the moving parts of the machines.
- ✚ Safety hand rails are provided around the heavy machineries.
- ✚ Standard operating procedures (SOP) are provided near the machines to read before operation. All are available in Gujarati and English Language and easily readable to the workers.
- ✚ Safety shoes, helmets & other precautionary equipment are provided to the workers at the time of operation in the plant.
- ✚ First aid kit is provided at every working location.
- ✚ Hand trolley is used for manual handling and movement of the raw material and products.

#### Civil

- ✚ In principal R.C.C. frame structure / steel structure design is considered.
- ✚ To go for more precise design some where mix design, R.C.C. frame structure and steel structure, is considered.
- ✚ Architectural views, Wind directions, Safety for escape at the time of accidents, Bylaws of factories inspector's office and site development is taken for consideration of design in view of Equipment's live loads, loads, working space and other related details of equipments.
- ✚ Roads, Drainage, mechanical and electrical layouts are planned in easy and safe handling from maintenance consideration.

Following accident prevention methods are used during the operation stages to minimize and control the hazards due to mechanical failure,

### Maintenance and inspection schedules

- ↳ Regular maintenance and preventive maintenance are carried out as per schedule.
- ↳ All the rotating parts are guarded properly.
- ↳ The high pressure storage tank thickness is tested by the outside agency after every 6 months.
- ↳ The crane, lift, hoist, fork lift system is also tested by the competent person every year.

### Description of responsibility for plant safety

- ↳ Safety committee is formed which comprises of senior persons with officers and workers from each field.
- ↳ Safety department consist of **nine** management level employee & **nine** workers.
- ↳ This committee meet minimum once in every three months.
- ↳ The points raised in the committee are ill implemented based on the evaluation.

### Work permits system

The meaning of work permit is the permit or approval for the work other than the manufacturing process or routine manufacturing jobs. This is one type of accident prevention technique. The main objectives of the permit systems are as follows,

- ↳ To ensure the safe working place
- ↳ To ensure that all necessary precautions are taken
- ↳ To prevent the human error
- ↳ To prevent the unsafe condition
- ↳ To prevent the incidents / accidents
- ↳ To give information to the plant personnel
- ↳ To make the hazardous operations smooth and tension free

The various work permits will be introduced according to the requirement.

## 6.4 OCCUPATION HEALTH HAZARDS AND SAFETY MANAGEMENT

Health hazards associated with the occupation are called occupational hazard. An occupational hazard is a thing or situation with the potential to harm a worker. Occupational hazards can be divided into two categories:

- ↪ Safety hazards, that cause accidents that physically injure workers,
- ↪ Health hazards which result in the development of disease.

Hazards can be rated according to the severity of the harm they cause - a significant hazard being one with the potential to cause a critical injury or death.

### 6.4.1 Safety Hazards

Safety of plant personnel and equipment's is of utmost importance irrespective of plant size. Units will bring its environment, health and safety policy and follow it. The need of safety is to protect and serve the mankind, to search and suggest the safe ways of behavior and keeping the safe working.

Unit has already taken various preventive measures for plant safety. All the existing practices will be continued after proposed expansion also.

- ↪ Various emergency spots in plant area are identified and kept in sharp and alert watch.
- ↪ Fire and sand bucket and hose reels are provided to withstand the fire or explosion conditions.
- ↪ Min 6 nos. of ammonia torches are available at the operation plant to identify chlorine gas leakage.
- ↪ Various types of fire extinguishers such as (Foam type, water type, CO<sub>2</sub> type) are also provided inside the factory premises. Unit will also increase the no. of extinguishers after proposed expansion.
- ↪ On site/off site emergency plan is also in practice.
- ↪ Annual mock drill is carried out to train and aware the workers and other employees in case of emergency situation as a part of on-site emergency. Record of the same is maintained regularly.
- ↪ Open space near security gate is decided as Assembly Point where all the employees and worker are meet at the time of emergency

occurrence. Counting of workers and employees take place immediately at assembly point and compared with those present.

- ↳ Safety guards (Enclosures) are provided on the moving parts of the machines.
- ↳ Safety hand rails are provided around the heavy machineries.

#### 6.4.2 Occupational Health Hazards

Health hazards associated with the occupation are called occupational hazard. Hazard identification is carried out through careful study of plant process. Since chemical and fuel poses different kind of hazard, both have been separately associated. The chemical poses more of Occupational Health Hazard, while fuel poses more of safety / accidental hazards. Hazard and risk assessment has been carried out for exposure to harmful dust / vapors, liquid pool evaporation or boiling and leakage's in confined space.

From the preliminary risk assessment study carried out for the unit some of the possible hazards have been identified which are mentioned in **Table 6.5**.

**Table 6.5: Accident Scenarios**

Sr. No.	Scenario	Vulnerability Zone	Control Measures
1.	Spill of Acids	Area close to spill area	Isolate the area immediately and ensure no ignition source comes near by. Reclaim the material if possible or cover the spill with sand/mud /foam (to be safely disposed off later)
2.	Toxic Liquid Leakage/ Spillage in Confined Space	Confined Area	Spillage to be mopped up, decontaminated (if required) and disposed of as per norms. Fresh Air inlet / Ventilation System to be fully opened. Ventilation Exhaust will carry harmful vapors. Personnel to avoid contact with exhaust vapors. Exhaust to be released at safe elevation.

The above mentioned hazards scenarios can further aggravate into much more serious incidents if not intercepted in time. The vapors of toxic chemicals if carried away by wind above TLV concentrations may further enlarge the vulnerability zone. Similarly, toxic chemical spillage and all wastes leaving the

live processing zone if not decontaminated properly can cause serious health hazard to plant personnel and persons in nearby area.

#### **❧ A brief description of the measures roused to prevent health hazard**

The potential health aspects, impacts and remedies are shown in **Table - 6.6**.

Some of the safety measure carried out by **M/s. Sam Fine O Chem Ltd.** to ensure prevention of occupational hazards is delineated below.

- ❧ Suitable personal protective equipment like water jet blankets, gloves, helmets, safety belts, first aid boxes is provided to personnel in the plant & detail of the same is given in **Table-6.4**.
- ❧ Use of protective equipments is regularly checked and will be kept easily accessible and easily workable during emergency.
- ❧ Monitoring of occupational hazards like noise, ventilation is carried out at frequent intervals.
- ❧ The workers exposed to higher noise level are provided with ear muffs/ear plugs.
- ❧ Drinking water supply for the employees is provided by the project proponent and the standard of the drinking water is as per WHO guidelines.
- ❧ Proper sanitary facilities are made available by the project proponent so that employees do not suffer from any health ailments.
- ❧ Training includes information on accident prevention, proper control and maintenance of equipment, first aid training and safe material handling practices.
- ❧ MSDS of the chemical used are made available at the place of use.
- ❧ Storage and process areas are posted with "No Smoking" signs. Smoking is prohibited throughout the factory. All management staff, Executives on their rounds to factory ensures the compliance.
- ❧ Adequate ventilation is provided in process area so that airborne concentration does not exceed threshold limit value.
- ❧ Few common antidotes will be available all time at site, and we will keep more antidotes as per requirement after proposed expansion.



Recommended actions to prevent exposure to gas are as follows:

- ↻ Design facility ventilation to maximize air circulation.
- ↻ Installed exhaust ventilation at the significant point sources of gas emissions.
- ↻ Provided a sealed cabin with filtered air conditioning for an operator needed in a contaminated area.
- ↻ Provided separated eating facilities that allow for washing before eating.
- ↻ Provided facilities that allow work clothes to be separated from personal clothes, and for washing / showering after work.
- ↻ Implemented a policy for periodic health checks.

Recommended actions for respiratory protection include the following:

- ↻ For light, metallic dust and gases, fresh-air supplied respirators are used.
- ↻ Alternatively, a complete facial gas mask (or an "overpressure" helmet) are used.

**Table - 6.6: Prospective of Health Aspects, Impact and Remedies**

Potential Health Aspect	Potential Health Effect	First Aid Measures	Remedies
INHALATION (acute)	Severe Irritant & Pneumonitis may occur. Severe respiratory disturbances. Effects from inhalation of dust or mist to serious damage of the upper respiratory tract causing coughing, burns, breathing difficulty and possible coma. Symptoms may include sneezing sore throat or runny nose. Lack of sufficient oxygen may cause serious injury or death.	Remove to fresh air, if not breathing give artificial respiration. Get medical attention immediately.	A system of local/general exhaust is recommended. Wear a NIOSH approved respirator when exposed to dust above exposure limits.
INHALATION (chronic)	Prolonged contact with dilute solutions or dust has a destructive effect upon tissue. Repeated exposure may cause erosion of teeth. May cause conjunctivitis and photosensitization. Prolonged inhalation can cause irritation of mucous membranes.		
EYE CONTACT (acute/ chronic)	May cause eye irritation, severe burns and damage to cornea. That may result in permanent impairment of vision, even blindness.	Immediately flush eyes with plenty of water. Lifting upper and lower eyelids immediately. Get medical aid.	Wear safety goggles and/or full face shield to prevent contact with eyes. Maintain eye wash fountain and quick-drench facilities in work area.
SKIN CONTACT (acute/ chronic)	May cause irritation, severe burns scarring with greater exposures and photosensitization in certain individuals.	Immediately flush skin with soap and plenty of water. Remove contaminated clothing and shoes. Get medical advice if irritation develops.	Wear impervious gloves, shoes and protective clothing to prevent skin contact
INGESTION (acute/ chronic)	Swallowing may cause severe burns of mouth, throat and stomach. May cause permanent tissue destruction of the esophagus and digestive tracts. Symptoms may include Bleeding, Vomiting, Diarrhea and possible death.	Do not induce vomiting, but drink plenty of water or milk. Never give anything by mouth to an unconscious person. Seek Medical attention for discomfort.	Wear face mask to prevent contact with mouth.

In addition to regular control measures to prevent the health hazards to the workers, the following check-up are carried out regularly to avoid occupational hazard.

- ↳ Pre-employment medical check-up at the time of employment.
- ↳ The unit has appointed the medical officer cum industrial hygienist for the regular medical examination and treatment of the employee.
- ↳ Certificate of fitness of employ is maintained. Reference medical check up report of an employ is attached as **Annexure-XVI**.

Unit has also taken Steps to avoid musculo-skeletal disorders (MSD), backache, pain in minor and major joints, fatigue etc.

- ↳ Crane/fork lift/trolley for Loading, unloading & movement of the heavy containers/bags etc. of raw material as well as product which ever is appropriate.
- ↳ Suitable flooring to allow easy movement of equipment. Earmarked/Anti skid flooring is provided for the movement of the plant personnel.
- ↳ Adequate ventilation and temperature control to ensure the comfort of user.
- ↳ Adjustable room lighting with easily accessible dimmer controls; shaded windows to eliminate light.
- ↳ Accessories that improve posture and reduce muscular force should be available and easily accessible to the user.
- ↳ Adequate rest breaks between working hours is provided particularly for procedures comprised of similar postural and muscular force attributes.
- ↳ Regular shift changing is maintained to reduce mental physical burden on the workers.
- ↳ Maintain all equipment in good working order.

Unit has also planned to take following measures during proposed expansion.

- ↳ Appropriate training will be given to workers on the risk & prevention of muscular disorder.
- ↳ Perform risk assessments in consultation with the users on a regular basis to identify musculoskeletal disorders and formulate and implement controls for the prevention and/or reduction of these disorders.
- ↳ Task rotation will be encouraged in the workplace as much as possible.