

Risk Assessment and Disaster Management Plan

**Expansion of Viscose Staple Fibre (1,27,750 to 2,33,600 TPA),
Sulphuric Acid (1,46,000 to 2,19,000 TPA), Carbon-Disulphide (21,600
to 37,295 TPA) and Captive Power Plant (25 to 45 MW)**

At

**Birladham, Village: Kharach, Tehsil: Hansot, District: Bharuch
(Gujarat)**

M/s. Birla Cellulosic

(A Unit of Grasim Industries Ltd.)

1.1 RISK ASSESSMENT AND DISASTER MANAGEMENT PLAN

1.1.1 Risk Assessment and Damage Control

Risk assessment is the determination of quantitative or qualitative value of risk related to a concrete situation and a recognized threat.

Accidental risk involves the occurrence or potential occurrence of some accident consisting of an event or sequence of events resulting into fire, explosion or toxic hazards to human health and environment.

1.1.2 Hazard Identification & Preventive Measures

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

- Fire
- Explosion
- Accidental Spillage or Leak of Hazardous (Flammable, Toxic) Chemicals & Gases
- Contact with Flammable Toxic Chemicals and Gases
- Loading/ Unloading /Packaging Operations failures
- Electrocution/ Electrical Hazards.

Table - 1
Description of hazardous chemicals at Plant site

S. No.	Properties	Chemicals			
		CS ₂	H ₂ S	H ₂ SO ₄	NaOH
1.	Physical State	Liquid	Gas	Liquid	Liquid
2.	Odor	Rotten Egg type	Repulsive Rotten egg type	Odorless	Odorless
3.	Taste	-	-	-	Bitter
4.	Molecular Weight	76.139 g/mole	34.08 g/mole	98.079	39.99
5.	Color	Colorless	Colorless	Yellow	Colorless
6.	pH	Neutral	-	0.3	12
7.	Boiling Point at 1 atm	46.5 °C	-60 °C	290 °C	140 °C
8.	Melting/Freezing Point	-111.5 °C	-	10 °C	12 °C
9.	Critical Temperature	-	-	-	-
10.	Critical Pressure	-	-	-	-
11.	Specific Gravity	1.263 @ 20 °C	0.79 @ 15 °C	-	1.53
12.	Vapor Pressure at 25 °C	297 mmHg	394 psi @ 37.8°C	-	2.3 kPa @ 20°C
13.	Volatility	-	100% by Vol.	-	-
14.	Odor Threshold	0.1 ppm	-	-	-

S. No.	Properties	Chemicals			
		CS ₂	H ₂ S	H ₂ SO ₄	NaOH
15.	Solubility in water at 30 °C	0.2 gm/100 ml	Slightly	-	Soluble
16.	Stability	Stable	Stable	Stable	Stable
17.	Flammability	Yes	Yes	-	Non Flammable
18.	Auto Ignition Temp.	90 °C	-	-	-
19.	Flash Point	-30 °C	-	-	-
20.	Flammable Limits				-
21.	LEL	0.013	4%		-
22.	UEL	0.5	44%		-
23.	TLV-TWA	10 ppm	10 ppm	0.2 ppm	2 ppm
24.	TLV-STEL	-	15 ppm		2 ppm
25.	TLV-Ceiling	-	-		2 ppm
26.	IDLH	-	-	15 ppm	-
27.	LD ₅₀	1200 mg/kg (oral, rat)		2140 mg/kg (oral, rat)	-
28.	LC ₅₀	10 mg/m ³ /2h (mouse)			-

Table - 2
Possible Hazardous Locations Onsite

S. No.	Hazardous Area	Likely Accident
1.	CS ₂ storage area	Toxic & Flammable
2.	Caustic Storage Area	Toxic
3.	Sulfuric Acid Storage area	Toxic /Reactive
4.	Coal/ fuel storage area	Fire and spillage
5.	Boiler Area	Explosion
6.	Electrical rooms	Fire and electrocution
7.	Turbine room	Explosion
8.	Transformer area	Fire and electrocution
9.	Cable tunnel	Fire and electrocution
10.	Storage yard	Sliding/fall of material
11.	Crushing and grinding of Coal	Fatal accident
12.	Chimney/Stacks	Air pollution

1.1.2.1 SO₂ Emission from Stack Gases

Location: ACID Plant

Causes:

1. Excessive Sulphur to furnace.
2. Conversion Failure during start up (Process disturbance)

Emergency Planning:

- a) Stop the acid plant immediately as per the set emergency procedure.
- b) Remove the affected persons immediately to fresh air.
- c) SO₂ scrubbing system is to be commissioned before restarting the plant.
- d) Alkali solution of scrubber should be maintained at pH > 9.0.
- e) Continuous water makeup should be maintained in circulation tank.
- f) Person approaching the area should use gas mask, breathing apparatus if required. Use of wet cloth may also help.
- g) Plant is to be restarted with low sulphur feed and less air pressure (volume).

Method of control:

- a) Process temperatures are recorded hourly.
- b) Bort hole micas are provided for visual inspection of proper sulfur burning inside furnace.
- c) Alkali scrubber pH monitoring more than 9.

1.1.2.2 SO₂ Emission due to Fire in Sulphur Pit

Location: CS₂ /Acid plant

Cause:

1. High steam pressure.
2. Combustible materials (as plastic / polythene bags) in sulphur being fed.

Emergency Planning:

- a) Area is to be evacuated by shift engineer / Incident controller seeing the wind direction.
- b) Inform Safety & Firefighting department.
- c) In the meantime, water to be sprayed using nearby water taps.
- d) Stop steam supply to Sulphur pit.
- e) Firefighting personnel to start firefighting seeing the wind direction.
- f) Remove the affected persons to fresh air & provide first aid if required.

Method of control:

- a) Temperature indicators are provided.
- b) Water taps are provided nearby.
- c) Fire Hydrant System is installed

1.1.2.3 H₂S Gas leakage from service lines.

Location: CS₂ Plant

Causes:

1. Pipeline leakage due to corrosion

Emergency Planning

- a) Stop power & sulphur feed to furnaces.
- b) Final gas seals of all running furnaces are to be filled with water.
- c) Leaking lines to be isolated from gasholders & flushed with water.
- d) Area to be evacuated & persons approaching the area should use gas masks / Breathing Apparatus.
- e) Persons affected should be given artificial respiration and first aid if required.
- f) Damaged pipeline to be replaced immediately.

Method of control

- a) All H₂S pipelines are of SS material
- b) Pipelines are welded to safeguard leakage from flanges (minimum flanges are used)

1.1.2.4 Acid / Caustic leakage from storage tank:

Location: Acid Plant, Viscose, Auxiliary and WTP / ETP.

Causes:

1. Damage to tank body / supply pipeline.

Emergency Planning:

- a) Area is to be evacuated immediately and cordoned off.
- b) Any person approaching the area should use safety apron, gumboot, and safety goggles.
- c) Chemical should be transferred to another tank kept empty for emergency.
- d) Dyke should be emptied out with the help of recovery / sump pump.
- e) First Aid should be given to affected persons.

Method of control:

- a) Dyke of adequate capacity has been provided.
- b) One tank is always kept empty for transfer.

1.1.2.5 Acid leakage from acid circulation tanks

Location: Acid Plant

Emergency Planning:

- a) Stop the acid plant immediately and transfer acid from circulation tank to storage tank up to minimum possible level.
- b) Area is to be cordoned off.
- c) Area is to be washed with water.
- d) Injured persons affected area should be bathed with plenty of water and then should be sent to hospital.

1.1.2.6 CS₂ leakage from CS₂ Storage tanks

Location: CS₂ Plant & Spinning

Causes:

1. Corrosion in storage tanks.

Emergency Planning:

- a) Firefighting personnel shall be called immediately.
- b) CS₂ tank, which has developed leak, is to be immediately depressurized and isolated from incoming and outgoing lines.
- c) Water to be sprayed continuously over the tank using nearby water monitors.
- d) Area is to be cordoned off.
- e) CS₂ in the leaking tank is to be transferred to an empty tank kept for such emergency.
- f) Persons approaching the area should use safety gears as Safety goggles, hand gloves, and gumboot.

Method of control:

- a) Sump dyke is always kept full of water.
- b) One CS₂ tank is always kept empty for such emergency.
- c) Corrosion resistant paint is used.
- d) No welding / cutting work permitted within 20 m radius of the tank farm.
- e) Regular testing of tanks is carried out by NDT and records maintained.

1.1.2.7 Eventuality in Xanthation Section

Location: Viscose Department

A) Splashing of CS₂ on the floor:

Causes:

1. Leakage from any Pipelines or dislocation of level tube of measuring vessel.

Emergency Plan:

- a) Operate the emergency tripping switch from DCS room to cut off CS₂ supply from CS₂ department.
- b) Inform to Safety & firefighting department.
- c) Wash the floor with a water jet liberally.
- d) Suspend welding / gas cutting work in complete viscose department.

B) Fire or Explosion

Emergency Plan:

- a) Stop the work in the section.
- b) Move to a safer place as directed by Incident Controller.

- c) Operator- the emergency tripping switches available in HOD's office to cut off supply of CS₂ from CS₂ department.
- d) Inform to Firefighting department immediately.

Method of control:

- a) Emergency CS₂ tripping switch made available in HOD's office.
- b) All electrical fittings installed in xanthator section are flame proof.
- c) Sprinkler system provided.
- d) Rupture disc provided.
- e) Additional CS₂ overflow tank provided with double safety alarm.

1.1.2.8 H₂S/CS₂ Gas leakage for Spin Bath Section:

Location: Auxiliary dept. (Spin Bath area)

Causes:

- 1. Power Failure
- 2. Circulation pumps tripping.
- 3. Exhaust Fan Tripping.

Emergency Planning

- a) Area to be evacuated & persons approaching the area should use Breathing Apparatus.
- b) Persons affected should be given artificial respiration and first aid if required.
- c) Use Breathing Apparatus Set for emergency operation like closing Valve, Provide Damper in exhaust line and start up stand by exhaust fan/pumps.
- d) Close the Top tank feed line valve, MSFE return line valve, spin bath filter feed valve.
- e) All hot job activity in section should be stopped for prevention of fire.
- f) Use PPE's like rubber hand gloves, goggles and gumshoes for avoiding body contact of spin bath.

Method of control

- a) Close the Top tank feed line valve, MSFE return valve, spin bath filter feed valve with the use of BA set.
- b) Spin bath overflow tank should be kept empty in idle condition.
- c) Provide damper in exhaust line for isolated from other M/C exhaust gas.

1.1.2.9 Fire:

Location: Anywhere in plant area

Emergency Planning

- a) Area to be evacuated immediately & persons approaching the area should use Breathing Apparatus.
- b) Inform Fire control Centre with complete details, e.g. location, type of fire, fuel.

- c) Use portable fire extinguisher for emergency control based on type of fire. Close Valves and isolate equipment to avoid its further spread.
- d) All hot job activity in section should be stopped for prevention of fire.
- e) Use PPE's like hand gloves, goggles and dust / gas masks to avoid any injury during firefighting.

Method of control

- a) Isolate the equipment properly to stop supply of fuel.
- b) Start firefighting immediately and inform fire control center.

1.1.2.10 Storage Hazard & Control

S. No.	Name of the hazardous substance	Place of its Storage	Type of hazards possible	Control measures / Protection system
A	RAW MATERIALS			
	Pulp	Pulp Godown	Fire	Sprinkler System
	Caustic		Spills	Dyke provided, one tank kept empty to attend any spills.
	Sulphur	Acid Plant	Fire	Hydrant System & Extinguishers, PPE's.
	Charcoal	CS ₂ Plant	Fire	Storage in shed
	Coal	Coal yard	Fire	Water spraying
B	FINISHED PRODUCTS			
	Viscose Staple Fibre	Fibre Godown	Fire	Flame proof Electrical fittings, Sprinkler system
	Sulphuric Acid 98%	Acid Plant	Spills	Dyke provided, one tank kept empty to contain any spills.
	Carbon Di Sulphide	CS ₂ Plant	Fire	Storage under water, Dyke provided, one tank kept empty to contain any spills, Sprinkler system at storage area.
C	INTERMEDIATE			
	Hydrogen Sulphide (H ₂ S)	CS ₂ Plant	Fire, explosion, toxic release	Flaring system, Gas Holder, catalytic convertor
D	By Products			
	Anhydrous Sodium Sulphate	Salt Godown	No Hazards	NA

1.1.2.11 Preventive Measures for Electrical Hazard

- a) All electrical equipments are provided with proper earthing. Earthed electrode are calibrated, periodically tested and maintained.
- b) Emergency lighting are available at all critical locations including the operator's room to carry out safe shut down of the plant, ready identification of fire fighting facilities such as fire water pumps and fire alarm stations.
- c) All electrical equipments are free from carbon dust, oil deposits, and grease.

- d) Use of approved insulated tools, rubber mats, shockproof gloves and boots, tester, fuse tongs, discharge rod, safety belt, hand lamp, wooden or insulated ladder and not wearing metal ring and chain is insured.
- e) Flame and shock detectors and central fire annunciation system for fire safety are provided.
- f) Temperature sensitive alarm and protective relays to make alert and disconnect equipment before overheating are provided.
- g) Dangers from excess current due to overload or short circuit are prevented by providing fuses, circuit breakers, thermal protection.
- h) Carbon dioxide or dry chemical fire extinguishers are for electrical fires.

1.1.2.12 Emergency due to Natural calamities

Following types of risk are possible:

A. Earthquake:

As per the latest Seismic Zoning done by the Bureau of Indian Standards (BSI) which is the official agency for publishing seismic hazard maps and codes in India, in the year 2000, the District Bharuch including Kharach is lying in the Zone III i.e. moderate risk zone. So, low risk to the plant installations. However, all the Plant Structures, the Building Structures, Storage tanks foundations are of sound strength & good design practices & are approved by Team of Expert Engineers.

During such emergency, employees are to gather at assembly points. Senior members are to be watchful for any hazardous material overflow & to take appropriate measures to neutralize hazardous material.

B. Lightening:

To avoid this type of natural risk, the lighting arresters are placed on the top of high buildings.

After than taking preventive actions, if lightening happens it may result in firing of hydrogen system or hydrocarbons storage inside the factory. The action will be taken as Fire emergency control plan.

C. Major Flood:

The Major flood may result due to heavy rain. The plant has storm water drainage system. In case of major Flood following actions to be taken.

- Declaration of emergency
- To ensure that there is no blockage of drain at any where
- Safe assemble of plant employees and vehicles available inside the plant

- Head counting of all employees.
- Continuous cleaning at water out lets
- Shifting of legal and important documents at other safe places.
- Shut down of computers and shifting at heightened place or other dry place.
- JCB and other heavy machinery to be kept ready to break any blockages of water flow.
- Ensure availability of diesel engine Pump in sufficient qty. to clear out accumulated water in diff. area.
- Safe shutdown of plant
- Power back up from DG for emergency equipments operation.
- Maintain enough stock of diesel, emergency lights, foods and PPEs
- Extraction of chlorine gas from system in hypo plant.
- Chlorine filling in tonners from bullets
- Degassing of chlorine bullets and make pressure minimum in bullets.
- Isolation of pipe lines from manual valves.
- To make diesel operated pumps ready to pump the accumulated water
- To update the situation time to time to Site Main Controller.
- The plant people will ensure that there will be no over flow of any material from storage tanks.

Post flood activities:

- Dewatering of accumulated water from blocked area, pits, dyke wall of storage tanks, underground cable tranches.
- Cleaning of roads, plant buildings and offices.
- Checking of electrical equipments and instruments
- Maintenance or repairing of damage equipments
- Startup of plant as per Safe operating procedure

D. Storm:

Following measures are to be taken in case of storm:

- Remain in the building and keep well clear of windows / openings.
- In storey buildings, move to the lower floors.
- Follow the instructions of relevant Building Emergency Services personnel.
- Evacuate the building only if instructed to do so by Emergency Services personnel and assist with the evacuation of disabled occupants if any.
- If evacuation is ordered, move to the nominated Emergency Assembly Area, and do not leave the Emergency Assembly Area until advised to do so.

1.2 Disaster Management Plan

“Disaster Management Plan” (DMP) means a well-coordinated, comprehensive response plan to contain loss of life, property, environment and provide speedy and effective recovery by making the most effective use of available resources in case of a disaster. The purpose of DMP is to give an approach to detail organizational responsibilities, actions, reporting requirements and support resources available to ensure effective and timely management of emergencies associated to production and operations in the site.

Onsite and offsite emergency plans have been defined, documented and implemented in the industry. Onsite Emergency plan of Grasim Industries is duly approved by Deputy-Director (Industrial Safety and Health) Government of Gujarat. They follow these emergency preparedness plans and carryout periodic mock-drills and onsite mock drill every month.

The overall objectives of DMP are to:

1. Ensure safety of people, protect the environment and safeguard commercial considerations.
2. Immediate response to emergency scene with effective communication network and organized procedures.
3. Obtain early warning of emergency conditions so as to prevent impact on personnel, assets and environment.
4. Safeguard personnel to prevent injuries or loss of life by protecting personnel from the hazard and evacuating personnel from an installation when necessary
5. Minimize the impact of the event on the installation and the environment, by:
 - Minimizing the hazard as far as possible
 - Minimizing the potential for escalation containing any release

1.2.1 Key Elements

Following are the key elements of Disaster Management Plan:

6. Basis of the plan
7. Pre-Emergency Planning
8. Accident/emergency response planning procedures
9. On-site Disaster Management Plan
10. Off-site Disaster Management Plan

1.2.2 Basis of the Plan

Identification and assessment of hazards is crucial for on-site emergency planning and it is therefore necessary to identify what emergencies could arise in production of various

products and their storage. Hazard analysis or consequence analysis gives the following results.

1. Hazards from spread of fire or release of flammable and toxic chemicals from storage and production units.
2. Hazards due to formation of pressure waves due to vapour cloud explosion of flammable gases and oil spill hazards.

1.2.3 Emergency Planning and Response Procedures

Emergency rarely occur, therefore activities during emergencies require coordination of higher order than for planned activities carried out according to fixed time schedule or on a routine day-to-day basis. To effectively coordinate emergency response activities, an organizational approach to planning is required. The emergency planning includes anticipatory action for emergency, maintenance and streamlining of emergency preparedness and ability for sudden mobilization of all forces to meet any calamity.

1.2.4 Onsite Disaster Management Plan

Onsite Emergency/disaster is an unpleasant event of such magnitude which may cause extensive damage to life and property due to plant emergencies resulting from deficiencies in Operation, Maintenance, Design and Human error, Natural Calamities like Flood, Cyclone and Earthquake; and deliberate and other acts of man like Sabotage, Riot and War etc. An Onsite Disaster may occur all of a sudden or proceeded by a Major Fire.

The Onsite Emergency Management Plan is a master plan which contains the emergency organization structure, responsibilities of key members, communications means and emergency response strategies to control a range of major incidents.

In order to handle disaster / emergency situations, an organizational chart entrusting responsibility to various personnel of the Company showing their specific roles are available as shown below:

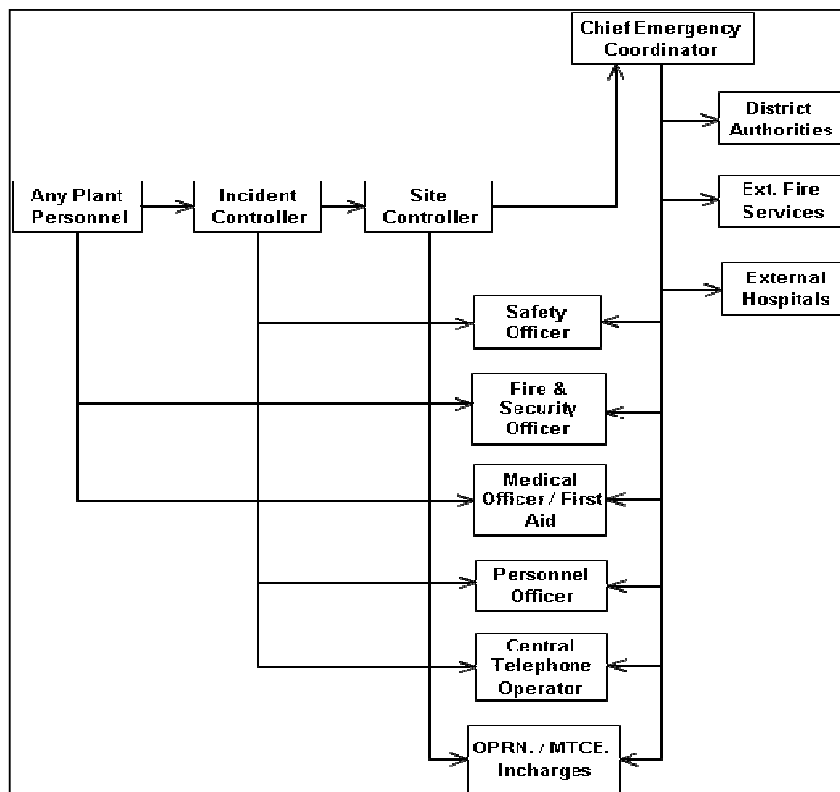


Figure - 1: Organizational chart for handling emergency situations

1.2.4.1 Emergency Responsibility

Roles & responsibilities of the key personnel are as follows:

A. Site Main Controller

Sr. Vice President (Technical) /Sr. Vice President (HRM) The Declarer of Emergency will:

- Assess the situation and declare the emergency through a coded siren.
- Call the incident controller for taking the responsibility for overall control of the situation.
- Inform neighboring factories
- Inform fire brigade for fighting the fire and for rescue operations.
- Call factory doctor for ambulance and for treating the injured.
- Inform security for evacuation, law & order, counting of persons.
- Make continuous review of possible developments and assess to determine most probable course of events.
- Inform Police, Director of Factories and Pollution Control Board
- Nominate person to give information to media, families of workers etc.
- Get in touch with outside experts for assistance if necessary.
- Give all clear signals when emergency is controlled.
- Make a detailed report

B. Chief Incident Controller

Assistant Vice President (Engineering) / Assistant Vice President (Process)

Incident Controller will;

- a. Direct all operations within the affected area with the following priorities
 - Secure safety of personnel.
 - Minimize damage to Plant, Property and Environment.
 - Minimize loss of property.
- b. Arrange repair team to control the emergency.
- c. Direct the rescue team to remove the injured persons to safe place.
- d. Direct the emergency squad to search and rescue the personnel in the plant who are trapped.
- e. Arrange for head count at assembly point to ascertain the injured.
- f. Arrange safety equipment, tools etc. for the persons involved in the emergency operations.
- g. Direct the medical personnel to attend the injured and to take them to medical center by ambulance if necessary.
- h. Ensure that the evacuation paths are illuminated and guide the people (evacuated personnel) to safe place – (Assembly Point).
- i. Keep in touch with the declarer of emergency and inform him as soon as the emergency is controlled.

C. Hospital Team

Chief Medical Office / Occupational Health Physician

- a. Send assistants to the place where evacuated persons are reporting.
- b. Arrange treatment at site / first aid center / medical center.
- c. Send injured persons if necessary to other identified hospitals.
- d. Supply antidotes to the outside hospitals if required.

D. Security Team

Manager Administration / Manager Security

- a. Rush to the spot of emergency immediately.
- b. Cordon off the affected area wearing appropriate PPE
- c. Help the medical personnel in First Aid.
- d. Look after law and order in the factory.

E. Safety & Fire Fighting Team

HOD / Manager / Safety Officer

- a. Rush to the spot of emergency immediately.
- b. Cordon off the affected area wearing appropriate PPE
- c. Help the Incident / Main incident controller in his job of emergency control.
- d. Look after law and order in the factory.
- e. Take care of firefighting & emergency evacuation and rescue.
- f. Ensure the necessary education, training & rehearsal.

F. ER and HR Team

HOD/ER

- a. Rush to the spot of emergency immediately.
- b. Help the medical personnel in First Aid.
- c. Look after law and order in the factory.
- d. Check total manpower available in the plant
- e. Look after the welfare of injured person.

G. Service Department Team

Manager

- a. To arrange Ambulance & other vehicles for shifting of injured & non-essential employees.
- b. Help the medical personnel in First Aid.

1.2.4.2 Emergency Communication

Communication process in case of emergencies is as follows:

FIRST ACTION PLAN

The person who first observes the emergency is called the “**First Observer**”. The first observer noticing an unusual occurrence should – immediately inform the concerned section in charge / security / activate the fire alarm system.

While giving information about the emergency, the First observer should:

- Identify himself (Name, Department / or guest who has visited the plant)
- State briefly the type of emergency whether fire / explosion etc.
- Give the location of the incident / emergency.

After receiving information from First Observer, the Firefighting department at site should notify key personnel by Telephone / PA system. The following information would be conveyed.

- Location of emergency.
- Type of emergency.
- Severity of emergency.

In case of an emergency during night hours / holidays / after general shift hours the shift in charge at site would notify key personnel over telephone.

INFORMING THE EMERGENCY

First Level Warning

In this case the emergency is confined to the affected section and it is required to alert personnel of that shift in charge.

The hooter / electric bell is located within the department. The sounding should be **short and intermittent**.

Second Level Warning

When the incident controller perceives the emergency may affect part / sections, but which can be confined within plant limits, he will ask the shift in charge to announce the emergency on the PA system which should be **long and intermittent**.

Third Level Warning

When the main controller considers the accident would assume off – site implications, the PA addressing system should be wailing long and short intermittent siren. **(3 times 10 sec ON and 5 sec OFF)**

All Clear Signals

The signals should be long continuous lasting 1 min.

1.2.4.3 Emergency Facilities

A. Emergency Control Centre (ECC)

During an emergency, the Emergency Management Staff, including the main controller will gather in the ECC. Emergency Control Centre is located at Safety & Fire Fighting Office at the plant site.

Items kept in the Emergency Control Centre are as follows:

1. Internal telephone numbers.
2. External telephone numbers.
3. Walkie Talkie sets
4. First Aid medicine
5. Complete Plant Layout
6. Adequate stock of Fire Extinguishers
7. Full Fledge Pump – House
8. Note Pads, Pencils & other Stationary

9. Personal Protective Equipment, such as Hand Gloves, Safety Goggles, BA Sets, Safety Belts, etc.
10. Water Reservoir for fire fighting
11. Plant sirens annunciator panel

B. Fire Fighting

The fire protection system is in the form of Hydrant system and Hand-held fire extinguishers. All fire Hydrant are single type; Utility & Plant are total covered by Hydrant lines. Total Number of Hydrant Points in the plant is 205 Nos.

There are various types (CO₂/DCP) hand – held fire extinguishers kept at different locations. Total Number of fire extinguishers in the plant & colony area is 904 Nos.

C. Medical Facilities

Jan Kalyan Hospital is present in the plant premises with all basic facilities including 20 Beds, 4 nos. Oxygen cylinder, Well quipped OT, Laboratory, X ray-machines. 2 doctors & 2 nos. ambulance are available round the clock at the hospital. Total 31 first aid boxes are located at different locations at the plant premises.

D. Personnel Protective Equipment (PPE)

Personnel Protective Equipment (PPE) provides additional protection to workers exposed to workplace hazards in conjunction with other facility controls and safety systems.

PPE is considered to be a last resort that is above and beyond the other facility controls and provides the worker with an extra level of Personnel protection. Table below presents general examples of occupational hazards and types of PPE available for different purposes. Recommended measures for use of PPE in the workplace include: Proper maintenance of PPEs, including cleaning, when dirty and replacement when damaged or worn out. Proper use of PPE is a part of the recurrent training programs for Employees.

Selection of PPE is based on the hazard and risk ranking described earlier in this section, and selected according to criteria on performance and testing established.

Table - 3

Summary of Personnel Protective Equipment According to Hazard

Objective	Workplace Hazards	PPE
Eye and face protection	Flying particles, molten metal, liquid chemicals, gases or vapours, light radiation	Safety glasses with side-shields, protective shades, etc.
Head protection	Falling objects, inadequate height clearance, and overhead power cords	Plastic helmets with top and side impact protection

Objective	Workplace Hazards	PPE
Hearing protection	Noise, ultra-sound	Hearing protectors (ear plugs or ear muffs)
Foot protection	Falling or rolling objects, points objects. Corrosive or hot liquids	Safety shoes and boots for protection against moving and falling objects, liquids and chemicals
Hand protection	Hazardous materials, cuts or lacerations, vibrations, extreme temperatures	Gloves made of rubber or synthetic material (Neoprene), leather, steel, insulation materials, etc.
Respiratory protection	Dust, fogs, fumes, mists, gases, smokes, vapours	Facemasks with appropriate filters for dust removal and air purification (chemical, mists, vapours and gases). Single or multi-gas personal monitors, if available
	Oxygen deficiency	Portable or supplied air (fixed lines). Onsite rescue equipment
Body / leg protection	Extreme temperatures, hazardous materials, biological agents, cutting and laceration	Insulating clothing, body suits, aprons etc. of appropriate materials

E. Coordination with Local authorities

Following outside organizations are involved in annotating during on-site emergency.

S. No.	Contact Location	Name and Number
1	Nearest Hospital	Ashirvad Hospital, Kosamba and Dr Vadodaria Hospital, Kosamba at a distance of 9 kilometers from the plant
2	Nearest Police Station	Hansot at a distance of 10 kilometer. Telephone: 02646-262033
3	Nearest Fire Brigade	GSFC and Gujarat Glass Fire Station is at distance of 10 and 6 kilometers.
4	Police Control Room	Hansot out post at Kharach Village distance 2 Km.

1.2.4.4 Offsite Disaster Management Plan

Emergency is a sudden unexpected event, which can cause serious damage to personnel life, property and environment outside the boundary wall of the industry as a whole, which necessitate evolving Off-site Emergency Plan to combat any such eventuality. In Offsite disaster management plan, many agencies like Revenue, Public Health, Fire Services, Police, Civil Defence, Home Guards, Medical Services and other Voluntary organization are involved. Thus, handling of such emergencies requires an organized multidisciplinary approach.

Evacuation of people, if required, can be done in orderly way. The different agencies involved in evacuation of people are Civil Administration (both state and central), non Govt. organizations, factory Inspectorate and Police authorities.

Various organizations involved during emergencies are shown below:

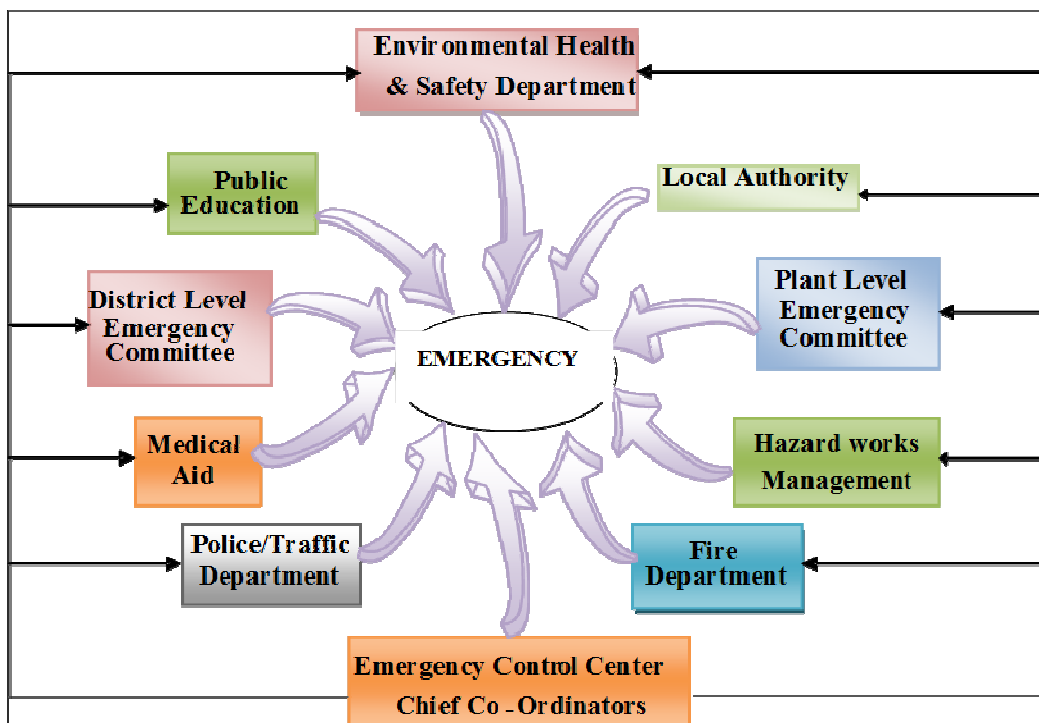


Figure - 2: Various Organizations Involved During Emergency

1.2.4.4.1 Mock Drills

As per the Industrial Major Accident Hazard Rules, the occupier has to ensure that a mock drill of the on-site emergency plan is conducted every six months. A detail report of the mock drill conducted under sub-rule (4) is made immediately available to the concerned authority. Accordingly, Fire mock drills are conducted once in three months.

1.2.4.4.2 Evacuation Plan

To establish method of systematic, safe and orderly evacuation of all the occupants in case of fire or any emergency, in the least possible time, to a safe assembly point through nearest safe means of escape. Additionally, to use available fire appliances provided for controlling or extinguishing fire and safeguarding of human life.

1.2.4.4.3 Training

On job training to the engineers on various facets of risk analysis would go a long way in improving their horizon which in turn is expected to reflect in the operation of plant, especially from the safety stand point. In order to combat with emergency situations

arising out of accident release of hazardous chemicals, it is necessary for industries to conduct on job trainings. The fire crew belonging to the firefighting department is given intensive training for the use of all equipment and in various firefighting methods for handling different types of fires.

1.2.4.4.4 Voluntary Organizations

Details of Voluntary organizations, telephone numbers nearby of hospitals, Emergency helpline, resources etc. are available with chief authorities. In case of emergency these organizations are contacted.

1.2.4.4.5 Non-governmental Organizations (NGO)

NGO's could provide a valuable source of expertise and information to support emergency response efforts. Members of NGOs could assist response personnel by performing specified tasks, as planned during the emergency planning process.

- Evacuation of personnel from the affected area.
- Arrangements at rallying posts and parking yards.
- Rehabilitation of evacuated persons.

1.2.4.4.6 Chemical information

Details of the hazardous substances (MSDS information) and a summary of the risks associated with them are made available at respective site.

1.2.4.4.7 Meteorological information

There are arrangements for obtaining details of weather conditions prevailing at/before the time of accident and weather forecasts updates.

1.2.4.4.8 Humanitarian Arrangements

Transport, evacuation centres, emergency feeding, treatment of injured, first aid, ambulances, temporary mortuaries are made available at plant site.

1.2.4.4.9 Public Information

It includes dealing with the media-press office & Informing relatives, etc.

1.2.4.4.10 Assessment

- Collecting information on the causes of the emergency.
- Reviewing the efficiency and effectiveness of all aspects of the emergency plan.

1.2.4.4.11 Role of local authority

Local Authorities like Panchayat, Sabha, Samity, Municipalities can help in combating emergency situation after assessing the impact scenario in rescue phase.

1.2.4.4.12 Role of police

- The police will assist in controlling of the accident site, organizing evacuation and removing of any seriously injured people to hospitals.
- Co-ordination with the transport authorities, civil defence and home guards.
- Co-ordination with army, navy, air force and state fire services.
- Arrange for post mortem of dead bodies.
- Establish communication centre with easy contact with ECC.

1.2.4.4.13 Role of Fire Brigade

The fire brigade is to be organized to put out fires and provide assistance as required during emergency.

1.2.4.4.14 Role of Media

The media is to have ready and continuous access to designated officials with relevant information, as well as to other sources in order to provide essential and accurate information to public throughout the emergency and to avoid commotion and confusion.

Efforts are made to check the clarity and reliability of information as it becomes available, and before it is communicated to public.

Public health authorities are consulted when issuing statements to the media concerning health aspects of chemical accidents.

Members of the media are to facilitate response efforts by providing means for informing the public with credible information about accidents involving hazardous substances.

1.2.4.4.15 Role of health care authorities

- Hospitals and doctors must be ready to treat all type of injuries to casualties during emergency.
- Co-ordinate the activities of Primary Health Centres and Municipal Dispensaries to ensure required quantities of drugs and equipments.
- Securing assistance of medical and paramedical personnel from nearby hospitals/institutions.
- Temporary mortuary and identification of dead bodies.

1.2.4.4.16 Facilities available at site for offsite emergency

Sr.No.	Utilities	Quantity	Responsible Person	Remarks
1.	Internal Telephones	2 Nos.	Fireman	
2.	External Telephone	1 Nos.	Safety Officer	
3.	Walkie Talkie sets	2 Nos.	Fireman	

Sr.No.	Utilities	Quantity	Responsible Person	Remarks
4.	First Aid medicine	Available	First Aider	Available at plant level
5.	Complete Plant Layout	Available	Fireman	
6.	Adequate stock of Fire Extinguishers		Fireman	
	CO2	475 Nos.		Available in 2 kg, 4.5 kg, 9 kg and 22.5 kg
	Dry Chemical Powder	50 Nos.		Available in 5 kg and 10 kg
	Mechanical Foam type	25 Nos.		Available in 9 ltrs and 50 ltrs.
	Water type	27 Nos.		9 ltrs and 200 ltrs
7.	Full Fledge Pump - House		Fireman	
	Jockey Pumps	2 Nos.		10.8 m3/hr capacity
	Electrical Pumps	5 Nos.		273 m3/hr capacity
	Diesel Pump	1 No.		
8.	Personal Protective Equipment at ECC,		Fireman	
	Hand Gloves	200 pairs		
	Safety Goggles	50 Nos.		
	Gum Boot	20 Pairs		
	Safety Belt	30 Nos.		
	PVC apron	5 Nos.		
	Dust Mask	50 Nos.		
9.	Self-Contained Breathing Apparatus	13 Nos.		
10.	Water Reservoir for fire fighting	2669 m3	Fireman	
11.	Plant Sirens Annunciator panel	Available	Fireman	
12.	Fire Tender	2 No.	Fire man	FIREX make with 3500 ltrs water tank, 500 ltrs Foam tank, Resenbauer make pumps of output 3000 lpm at 7 kg/cm2.
13.	Alternate power arrangement	01 alternate	Energy Centre	From GEB

1.2.4.5 Role of Grasim(GIL) in case Off-Site Emergency

The Main Controller will assess the magnitude of the accident and will declare the 'Emergency'. If the situation is of such that it likely to affect the general public living in the vicinity also or cannot be controlled by the resources available at the site, in such case, role of Grasim will be as follows:

- Site Main Controller will instruct the Security Gate to raise the Main Gate Siren frequently with a wailing sound to warn the public in the vicinity. The Site Main Controller will instruct to call outside help if necessary and will arrange to inform about the emergency to Crisis Control Room, SDM Chairman of Local Crisis Group, District Emergency Authority, Directorate Industrial Health & Safety and other Government Authorities about offsite Emergency. He will co-ordinate with local crisis group and District crisis group site main controller team. After controlling of Emergency and as instruction given by district authority he will declare All clear and instruct to security about all clear siren and also ensure that all clear information reach to the nearby villages, Hospitals, school, neighboring industries etc. Who had informed about the emergency.
- The Incident site teams will continue their role and responsibilities as prescribed in On Site Emergency Plan and act as per instructions received from Chief Incident Controller of GIL, Kharach or SMC of Off Site controller. The IC of GIL will help to Incident Control team, Fire & Rescue Control team, the emergency services and technical expert teams of District crisis group to control the emergency.
- HR will co-ordinate and help to Health / Medical Control team, Evacuation, Traffic control, Public Warning, Security, Law and Order and Cordon of area team, Communication team, Public Relation & Mass Media Communication team, Rehabilitation & Voluntary Organizations team.
- Pollution control team of GIL will work together with Pollution control team of DCG or LCG and Civil department of GIL will help Demolition & Reconstruction team of LCG or DCG

1.3 CONCLUSION

As discussed in above sections, adequate risk mitigation measures for process are considered for to say that the Existing project is not likely to cause any significant risk to onsite, offsite & environment. In the event of disaster onsite, offsite and all the emergency planning procedures are to be followed so as to minimize the impact on working personnel, plant surrounding and environment.

Hence, it is safe to say that there is being/ will be no major risk involved due to the proposed expansion project.

