ON SITE & OFFSITE EMERGENCY PLAN

(INTEGRATED WITH QRA RESULTS)

TATA CHEMICALS,

SAFETY & HEALTH DEPARTMENT

MITHAPUR,
DevbhoomiDwarka District,
Gujarat - 361345.

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CHAPTER 1 - PRELIMINARY

1.1 INTRODUCTION TO THIS PLAN

This emergency plan is prepared to suggest detailed guidelines in our factory for on-site and off-site emergency planning.

Emergency planning begins with the identification and assessment of the principal hazard.

The first section explains basic requirements, definitions, objectives, hazard identification, risk analysis and environmental impact assessment, organizational set up, communication system, actions on site, link with off-site emergency plan and the aspect of training, rehearsal and records. The second section is given as `Annexure Section' containing 39 useful Annexures.

1.2 IDENTIFICATION OF THE FACTORY:

The full name and address of the factory is TATA CHEMICALS LIMITED, MITHAPUR (***DEVBHOOMI DWARKA DISTRICT***) GUJARAT STATE.
The name of the occupier is Mr. R Mukundan residing at Mumbai. The Factory Manager is *Mr. Bharat Bhushan Kathpalia*, residing at Mithapur Township.

The factory is located in the coast of the Arabian Sea; In the North - Surajkaradi Village, South - Mojap Dam, east side bittern Kyar and in the West side Mithapur Township is situated. The factory is situated near SH. No. 25. The residential areas are 500 mts. away from the premises. There are 2 other gates apart from the Main Gate for exit purpose at different places of the compound wall. Police Station is situated about 500 mts. away from the factory just as the hospital, railway station, bus station and Post/Telephone Office. The schools, home guards are about 500 mtr away and the experts in the field of safety reside about 500 Mtrs. Away the wind direction is normally towards the bittern kyaras i.e. towards Gulf of Kutch.

1.3 DEFINITIONS:

An **Incident** is an unplanned event which has a probability of causing personal injury or property damage or both. It may result in Physical harm (Injury or Disease) to person (s), damage to property, loss to the company, a near miss or any combination of these effects. A major accident is a sudden, unexpected, unplanned event, resulting from uncontrolled developments duringan industrial activity, which causes, or has the potential to cause:

i. Serious adverse effects immediate or delayed (death, injuries, poisoning or hospitalization) to a number of people inside the installation and/or to persons outside the establishment, or,

ii. Significant damage to Crops, Plants or animals, or significant contamination of land, water or air, or,

iii. An emergency intervention outside the establishment (ex. evacuation of local population, controlling of local traffic) or,

iv. Significant changes in the process operating conditions, such as stoppage or suspension of normal work in the concerned plant for a significant period of time, or

v. Any combination of above effects.

An emergency could be defined as any situation which presents a threat to safety of persons or / and property. It may require outside help also.

A major emergency occurring at a work is one that may affect several departments within it and / or may cause serious injuries, loss of life, extensive damage to property or serious disruption outside the works. It will require the use of outside resources to handle it effectively.

Disaster is a catastrophic situation in which the day-to-day patterns of life are, in many instances, suddenly disrupted and people are plunged into helplessness and suffering and as a result need protection, clothing, shelter, medical aid and social care and the necessities of life.

i. Disasters resulting from natural phenomena like earthquakes volcanic eruptions, storm, surges, cyclone tropical storms, floods, landslides, forest fires and massive insect infestation. Also in this group, violent draught which will cause a creeping disaster leading to famine, disease and death is included.

ii. Second group includes disastrous events occasioned by man, or by man's impact upon the environment, such as armed conflict, industrial accidents, factory fires, explosions and escape of toxic gases or chemical substances, river pollution, mining or other structural collapses; air, sea, rail and road transport accidents, aircraft crashes, collisions of vehicles carrying inflammable liquids, oil spills at sea, and dam failures.

EMERGENCY MAY BE CREATED DUE TO :

a. Fire / explosion in high-pressure vessel containing inflammable or toxic chemicals of the plant.
b. Toxic gas release -Heavy leakage of toxic chemicals for a long duration from pipeline or storage.
c. Collapsing of equipment or building.
d. Any of above situation arising out of nature's act
e. Natural Calamities like flood ,cyclone, earthquake, Tsunami, lightening, hunderstorm, etc.

Emergencies are categorised into three levels *(Also Refer ANNEXURE : 38 – EMERGENCY THRESHOLD MATRIX)*

Level – I : Affecting only the concerned department
Level – II : Affecting other departments but within factory boundary
Level – III : Emergency which may have likelihood of cloud formation of toxic / Flammable Gases affecting general public outside the factory Boundaries & external help Is needed.

Environmental pollutant defined by the same Act as any solid, liquid or gaseous substance present in such concentration as may be or tend to be injurious to environment.
Chemical Hazards a hazard due to Chemicals (including its storage, process, handling etc.) and it is realised by fire, explosion, toxicity, corrosive environment, radiation etc.
Risk is the likelihood of an undesired event (i.e. accident, injury or death) occurring within a specified period or under specified circumstances. It may be either a frequency or probability depending on the circumstances.
The on-site emergency plan deals with measures to prevent and control emergencies within the factory and not affecting outside public or environment.
The off-site emergency plan will deal with measures to prevent and control emergencies affecting public and the environment outside the premises. The manufacturer should provide the necessary information on the nature, extent and likely effects of such incidents.

1.4 OBJECTIVES OF THE EMERGENCY PLAN:

- To define and assess emergencies, including risk and environmental impact assessment.
- To control and contain incidents.
- To safeguard employees and people in vicinity.
- To minimize damage to property or / and the environment.
- To inform employees, the general public and the authority about the hazards / risks assessed, safeguard provided, residual risk if any and the role to be played by them in the event of emergency.
- To be ready for 'Mutual Aid' if need is arise to help neighboring unit. Normal jurisdiction factor in arriving the external help or off-site plan agency, the jurisdiction must be extended outside to the extent possible in case of emergency occurring outside.
- To inform authorities and mutual aid centers to come up for help.
- For effective rescue and treatment of casualties and to count the injured.
- To identify and list if any dead.
- To inform and help relatives.
- To secure the safe rehabilitation of affected areas and to restore normalcy.
- To provide authoritative information to the news media.
- To preserve records, equipment s etc. and to organize investigation into the cause of the emergency and preventive measures to stop its recurrence.
- To ensure safety of the works before personnel re-enter and resume work.

- To work out a plan with all provisions to handle emergencies and to provide for emergency preparedness and the periodical rehearsal of the plan.

CHAPTER 2 - RISK & ENVIRONMENTAL IMPACT ASSESSMENT

2.1.1 STORAGE HAZARDS AND CONTROLS

Details of quantity, storage, handling and precautions etc...

A. Pressure storages and gases handled.
B. Explosive, hazardous, Toxic and Hydrocarbon substances.

2.1.2 STORAGE FACILITIES OF GASES, QUANTITY, NO. OF TANKS:

The only gases stored are Ammonia and Chlorine. The details of the storage facilities for Chlorine and Ammonia are given below:

CHLORINE

1	No. of Tanks	Four
2.	Capacity of each tank	Four tanks of 70 Tons capacity each.
3.	Testing procedure prescribed by	Competent Authorities approved by DISH & PESO. Periodically inspected as per rule (Third party inspection as per static pressure vessel (unfired) rules 1981).Installation is approved by Chief Controller of Explosives.
	Third party inspections includes	a) Internal and external inspection as per Rule 19 of SMPV. b) Measurement of thickness of shell and dished ends with T-meter (NDT test) c) Hydraulic Test at 320 psig.
4.	Safety measures for tank	Spring type safety valves fitted on the tank.
	Safety measures	Fitted with two safety valves, pressure gauges and level indicator, feed & outlet pipe and other fittings as per code; Safety shower & Eye spray provided. Tanks are lagged
5.	Exact location of the tank	See Location Map/site plan attached Periodically inspected as per rule (Third party inspection as per static pressure vessel (unfired) rules 1981). Installation is approved by Chief Controller of Explosives

AMMONIA: We have two stationary Ammonia Storage Tanks, one commissioned in December 1994 and the other in 1997. The details are as under.

1.	No. of tanks	Two
2.	Capacity	50 Tons each
3.	Testing Procedure	Lloyds (tested before installation). Shanti Consulting Engineers (after installation)

	Frequency of Testing	Once in two years
4.	Safety measures	Specified area around the tank isolated by providing fencing as approved by the Chief Controller of Explosives. Fitted with a four Pot safety valve and a spring type safety valve approved by CCE Nagpur. Pressure gauges, inlet, output pipes & other fittings are as per code.
5.	Exact location of such tanks	See Location Map/site map attached.
6.	Security Measures	The factory premises is completely surrounded by continuous compound wall and fencing. Security personnel man all entry points and access is strictly controlled. A full-fledged Fire & Safety Dept. under Chief Fire & Safety is deployed. Fire Brigade & Security Personnel are trained in firefighting.

BROMINE

1.	Produced	5000 kg. / Day
2.	Quantity handled	2 Nos. = 300 kg each Stoneware (USA) (Ceramic Type) 1 Nos. = 400 kg. = M.S with PVDF Lining 2 Nos. = 3 ton (Total) = M.S with Glass lining. 1 No ISO tank = 37 ton
3.	Handling	It is handled in glass lines and packing is done in 3 kg. Glass bottle using siphoning effect, by ISO Tanker
4.	Precautions	The glass lines are properly protected. Drums containing hypo solutions are kept at site to neutralize. PPE s are also kept at site. Exhaust system is provided with caustic scrubber. Safety shower and Eye spray provided

Hydrochloric Acid

1.	Quantity	707.55 tons/day
2.	Storage	Stored in three 150 tons FRP storage tanks in C.C Group & one 100 tons capacity, One 22.8 tons capacity and One 09 tons capacity FRP storage tanks in Water Softening Plant in Marine Group.
3.	Handling	A 33 % solution is prepared by absorbing the gas in water. It is mainly used for regeneration of resins in water treatment plant and for acidification in Bromine plant and rest of the product we are selling out to parties through tankers.
4.	Precautions	Level indicators are provided for each tank. Vent scrubbers are provided. Safety shower with eye spray provided.
5.	Precautions	It is kept in remote and isolated place.

		`No Welding Area˘ 'No Smoking Zone' People working there are highly trained & Work permit system is strictly followed.

PURITY DROPS OF HYDROGEN:
Impure hydrogen can cause explosion.

Cause	Suction header of hydrogen compressor is in negative pressure.
Prevention	Take the suction header of hydrogen compressor always at positive pressure. Alarm is provided

EXPLOSIVE, HAZARDOUS, TOXIC AND HYDROCARBON SUBSTANCES:
Gases like Hydrogen and Carbon Dioxide are not stored but used as they are generated.

CCD & LIQUID Cl_2 PLANT

DESCRIPTION IN BRIEF:

Cl2 gas liberated at 90º C. in Cell House by electrolysis of brine. Suction in Cl2 header in Cell House is maintained at 2" H2O column by the by-pass valve of Cl2 blower. This 90º C Cl2 gas is passed in Cl2 cooler when it gets cooled up to 35 to 40º C. Then it goes to H2SO4 drying tower. Then this compressed by Cl2 blower and again cooled down in Cl2 cooler up to 20º C. Then this dried Cl2 gas is being compressed in compressor up to 50 psig. Some compressed Cl2 gas is being used in Br2 plant and HCL plant. Compressed Cl2 gas is being fed to Cl2 liquefier where it gets liquefied by Freon refrigeration system. Freon temperature is maintained at 20º C. Liquid chlorine leaves the liquefier at 8 to 10º C. and stored in M.S. storage tank (4 in No˘s). Uncondensed Cl2 gas (called sniff gas) is being used for making HCl. Cl2 blower outlet wet Cl2 is used for making HCl in new HCl plant.

2.2 HAZARDS IN THE WORKS

2.2.1PROBABLE HAZARDS IN CAUSTIC CHLORINE PLANT

CHLORINE LINE LEAKAGE - Leakages are detected with NH_3 torch.
If any line leakage is detected, operator closes the cut off valves and leakages are attended to.

SUDDEN POWER FAILURE

- HCL units are stopped.
- Freon refrigeration system gets tripped.
- Caustic circulation pump in Cl_2 absorption tower gets tripped and immediately auto start by DG set after 10 sec.
- Cl_2 compressor gets tripped.
- Rectifier gets tripped.

In this situation operator closes the suction valve and bypass valve of Cl_2 compressor to prevent backward flow.

LIQUID CHLORINE STORAGE TANK

Utmost care is taken on liquid chlorine storage tank. Every day one competent Fitter checks all valves mounted on storage tank. Chlorine leak detectors are mounted on each storage tank which can detect 1 PPM chlorine and give warning alarm. Operator takes the corrective action. Storage tanks are provided with safety valves which are connected with caustic neutralizer.

2.2.2 PROBABLE HAZARDS IN SODA ASH PLANT

2.2.2.1 Sudden power failure in Soda Ash Plant when units are operating at peak capacity of 2,000 TPD.

(A). Consequent slight pressure development in the Ammonia recycles plant system may cause ammonia leakage.

At normal operation, the absorber is under suction. So the suction pressure conditions of the system will be normal as indicated.

When power fails, all vacuum pumps will trip (which create the suction conditions) and there would be heavy pressure development in the system. The ammonia liquor storage and sulphide absorber overflow causing hazardous situation. Gases escape through minor cracks in the system-causing nuisance in the surrounding.

In case of sudden power failure, steam valves of all the stills are immediately closed and stills and absorber system are vented to the atmosphere (at approx. 120 ft. height) thus releasing the pressures in the system.

The Management of **TATA CHEMICALS** is well aware of potential risk involved in the manufacturing process and acknowledge due importance to Safety, Health & Environment protection.

Characteristics wise following chemicals are handled which may be considered having potential risk to human being.

A. Chlorine **B. Ammonia**

A. FOR CHLORINE

a. Safety valve vents of chlorine storage tanks are connected to an independent scrubber.

b. Releases / sniff of Cell House, Chlorine cooling and drying section and of HCL plant are connected to a separate absorption tower having an overhead tank of caustic soda solution in sufficient quantity to make the tower work even under the condition of power failure.

c. A separate absorber is provided to take care of HCL and hypochlorous vapours from ejector vent of HCL plant.

c. Sniff / releases of HCL vapours from HCL storage tank are diverted to a separate absorption tower provided for the purpose.

B. FOR AMMONIA

A. Semi Auto operated water spray is provided on the Ammonia storage tank and over the mobile tanker unloading points.

b. Fire Hydrant points are provided around the storage tank, which can facilitate additional water spray over the tank if required.

C. FIRE IN LIME SILO BELT

Sudden power failure and pressure will development in stills and absorber system. We suggest two actions to prevent disaster when the above situation occurs.

2.3. PROCEDURE FOR CONTAINING CHLORINE EMERGENCY

NORMAL LEAKAGE:

Any minor leakage is detected by sensor or ammonia torch immediately without any delay, the senior operator rushes to the spot to assess the situation. In the majority of the cases, he is capable of controlling the leakage himself. In the meantime, the second operator contacts the shift engineer by phone, shift engineer also reach the spot at once. All the operating staff is well trained and capable of using all safety appliances according to need.

If there is a line, operating the isolating valves immediately cuts it off and gas is released by opening the releases valve to chlorine absorption tower. Depending upon the extent of leakage, operator / shift engineer use gas mask, cartridge gas mask, air blower or self-contained breathing apparatus sets. Depends upon the gravity of the situation, shift engineer will inform his superiors. He contacts his Sectional Manager and Head. Head ¯ Safety & Health is also intimated and the incident is recorded.

UNCONTROLLABLE LEAKAGE:

In case of a disaster, that is heavy and uncontrollable leakage, operator shall go to the spot with safety appliances and the second operator informs the Shift Engineer and Sectional Head immediately. He isolates leaking point from the liquefier and the storage tanks by shutting off valve. He also alerts the other operator by intercom to the Chlorine Cooling and drying section and trigger off the emergency siren. He then joins the senior operator. The drying section operator immediately informs the Dy. Manager /Asst. Manager - Safety, who shall rush to the spot.

Hearing the emergency siren all the other Sectional Head & Manager shall rush to the trouble area if they are nearby. If their help is required especially out of working hours they are summoned by the Head. All these personnel are well versed & trained in handling chlorine emergency

In case of any failure on storage tank, storage in use is immediately isolated and the liquid is transferred to empty storage. If the pressure is high it is released to chlorine absorption tower which in continuous operation. The chlorine drying section operator/helper informs the firefighting squad, requisitioning an ambulance. Firefighting squad also joins the operation. The neighbouring plants are alerted by the emergency siren.

As our installation is located in an isolated area, chances of escaping gasses drifting to any residential area is very rare, even in case of heavy leakages. However, security Department will take charge of the situation and initiate appropriate action. They will also contact outside agencies for necessary assistance, if the situation demands.

Besides the First Aid Centre known as Occupational health centre, Township has a well-equipped modern hospital with highly qualified doctors to attend emergencies day and night. Ambulance is available all the time within the premises in state of readiness. Within few minutes any victim can be transferred to the hospital.

During the period of emergency if the operating staffs is not able to contact their next superiors immediately they are instructed to inform the other Sectional Manager who are well versed in chlorine handling.

In case of heavy leakages all the concerned persons including the Vice President-Mfg. are informed about the incident without delay.

2.4 CALAMITIES AND THEIR CONTROLS MEASURES

Calamities could occur mainly due into: (1) Manmade (2) Natural

(1). Manmade

- Toxic Gases Leakages
- Fire & Explosions
- Aircraft Crash
- Sabotage
- Terrorist attack

To handle manmade calamities depending on type & severity of incident appropriate level of emergency will be declared and available resources shall be utilized to combat the to restore normalcy as mentioned in subsequent pages.

(2) Natural

- Cyclones
- Earth quakes
- Floods
- Tsunami
- Thunder Storm
- Lightening

As obvious natural calamities are not under the control of man and only way to combat is for the man to protect vulnerable points. Detailed plan with do's & don'ts to combat such emergencies has been given in chapter 7. This is drought-prone area due to poor rainfall. Enough storm water drains are provided to take care of heavy rains. There are no rivers in whole of OkhamandalTaluka.

OTHER MISHAPS: A few cases of calamities are attributed to:
1. Human negligence
2. Improper maintenance
3. Faulty operations and instruments etc.

Necessary corrective actions are taken at proper time to avoid such occurrence and necessary training to the personnel is organized from time to time.

2.5 EMERGENCY ACTION PLANNING FOR SNAKE BITE & DOG BITE IN THE COMPANY PREMISES:

2.5.1 SNAKE BITE:

Do's:
- Immediately call to ambulance ¯ Phone no. 5333 for chemical plant & 5908 for cement plant, Mithapur Hospital casualty No. 5461
- Seek immediate medical treatment for any snakebite meanwhile do followings...
- Get the victim away from the snake
- Keep the victim warm, as comfortable as possible, and offer reassurance
- Keep a record of the victims symptoms and allergies
- Remove bracelets, rings, and constrictive clothing
- Keep the bite area lower than the victims heart
- Wash the bite wound with soap and water

DO Not:
- Wait for symptoms to develop
- Apply `traditional_ remedies
- Attempt to catch or kill the snake
- Use an arterial tourniquet.
- Remove the bandage and splint once it has been applied.
- Cut the bitten area.
- Suck the bitten area.

First Aid Measures:
- ð Ensure safety.
- ð Reassure and rest the Patient.
- ð Apply direct pressure over the bitten area.
- ð Obtain a History.
- ð Apply a pressure immobilization bandage (PIB) starting from over the bite site, and then wind as far up the limb as possible to the armpit or groin.
- ð Apply a second PIB commencing at the fingers or toes of the bitten limb and wind as far up the limb as possible to the armpit or groin.
- ð Immobilize the limb with a splint.
- ð Send any evidence of the snake to the hospital only if safe to do so.

- ð Avoid washing the bitten area, as a venom sample may be obtained.
- ð Avoid elevating the limb.
- ð The main treatment for a snake bite is the application of a :**Pressure Immobilization Bandage**¨. This bandage is applied as firmly as bandaging a sprained ankle, and is designed to slow the movement of venom through the lymphatic system which helps to slow or prevent the venom from leaving the bite site.
- ð Necessary medical treatment will be given at Mithapur hospital, Antidotes are available at Mithapur Hospital

2.5.2 DOG BITE

What Are the Signs That a Dog is going to Bite?

One of the best ways to prevent a dog attack is to know the difference between a dog that is relaxed and calm, and a dog that is showing signs of aggression. A dog's body language is the key to understanding when it may be preparing to bite. Here are some common signs that a dog is relaxed and not planning to bite:

- A relaxed dog will hold its head up.
- The dog's tail with either be resting, pointing down, or gently wagging back and forth.
- The ears should be neither back nor forward.
- The dog's hair will lay smooth along its back.
- Its mouth and lips are relaxed, almost appearing as if the dog is smiling.
- You can see the dog's tongue.

Here are some signs that a dog may be getting ready to bite:

- The dog's nose may be pulled back and wrinkled.
- The dog's lips may be drawn back to reveal its teeth.
- The hair along the back of its neck may be sticking up along its spine.
- You can see that the dog's ears may lay back, pinned against its head, or be pushed up forward.
- Its body may appear tense and cocked.
- The dog is making noises such as growls or snarls.

Ways to Avoid Dog Bites and Dog Attacks

- Don't horse play with Dog during duty hours
- After getting any signs from above, immediately change your pathway and avoid the dog.
- Don't do any act which can encourage aggressive behaviour of dog.

First Aid Measures:

- Immediately call to ambulance ¯ Phone no. 5333 for chemical plant & 5908 for cement plant, Mithapur Hospital casualty No. 5461
- The dog bite victim needs to be taken to a safe place away from the assailant dog to prevent further attack and injury. Since dog bites can cause significant

damage beneath the skin, a type of injury that cannot always easily be appreciated, medical care should be accessed by a health care practitioner.
- Wounds should be kept elevated and, if possible, washing the wound with tap water may be attempted.
- Necessary medical treatment will be given at Mithapur hospital

2.5.3 EMERGENCY DUE TO RADIATION SOURCE

- Actions to be initiated in Consultation with Radiological Safety Officer (RSO)

2.6Hazardous Area Classification

The following areas have been identified as per Hazardous Area Classification.

Zone-1

CELL HOUSE-

1) Flame proof light fittings provided.
2) Lightning spike provided on top of cell house for lightning protection.
3) Bonding &Earthling of Hydrogen lines done.
4) Flameproof telephones have been received & and will be installed shortly.

HYDROGREN BLOWER AREA

1) Flame proof light fittings provided
2) Flame proof motor being procured.

HCL PLANT

1) Flame proof light fittings provided
2) Lightning spike provided on top of HCL plant for lightning protection
3) Flameproof telephones have been received and will be installed shortly.

NEW OIL STORAGE AREA

1) Flame proof light fittings provided

Zone-2

AMMONIA STORAGE AREA

1) Flame proof light fittings provided

Zone 3

COAL HANDLING SYSTEM FOR POWER PLANT

1) Flame proof light fittings provided
2) Fire detection system is commissioned.

COAL HANDLING SYSTEM FOR CEMENT PLANT

1) Flame proof light fittings provided
2) Fire detection system is commissioned

2.7 DEVELOPMENT OF A TASK FORCE:

A properly trained force will be of great help to overcome the problems. (E.g. firefighting, Search, Rescue).

A group of workmen and superiors are trained and prepared to combat such situations with necessary equipment.

2.8TRADE WASTE DISPOSAL

There is only one effluent from the factory which is being discharged off into Gulf of Kutch as per consent order of Gujarat Pollution Control Board. After dilution with plenty of sea water separating out calcium chloride solids at Effluent Solid Filtration plant which are utilized as raw material for cement manufacturing.

The only toxic constituent is ammonia which is removed and recovered in the effluent treatment plant. All other constituents like salts of sodium, calcium and magnesium are compatible with sea water - the receiving media.

Stack monitoring and ambient monitoring is being carried out as per the Consent of Gujarat Pollution Control Board.

2.9 RECORDS OF PAST INCIDENTS:

Three incidents were reported two of them resulting fatal injury and other one is toxic release. Details are as under.

i). 01.05.2014 – Cement fatality:

While trying to facilitate the flow of clay from the stack to hopper Person was buried due to sliding of material and succumbed to Injuries

Action Taken:

Activity mapping for all Functions along with HIRA and Development of SOPs

ii). 25.01.2012 - Fatal incident detail:

Three contractor employees were working on the concrete roof of the turbine house-power plant. They were removing spillage material from the RCC roof of this building. Adjacent to this RCC roof there is AC sheet roofing covering the turbine floor on which they inadvertently stepped and fell through onto the turbine floor. One worker was died and two were seriously injured.

Action Taken:

1. Identify hazardous routine activities not covered under work permit system
2. Implement JSA / SOP for Hazardous Routine activities
3. To provide the physical barricading between the RCC roof and fragile roof where people are likely to work.
4. Communication of Incident and learning across the workforce
5. Competency mapping of Mukadams and training of Mukadam

6 Develop & Implement recommended Procedures for the recruitment of Contract Workmen indicating minimum qualifications

iii. 24.09.2011 - Toxic Release detail:

A leak developed on a 400 mm diameter, 1800 mm long piece of cast iron pipe line carrying ammonical brine (salt solution). Leakage was due to crack developed in the pipe line.

Soda Ash - Process House Emergency action procedure for ammonical header leakage		
SN	**Event**	**Actions to be taken**
1	If PCB pump trips	1. First see, it is which pump (3.4, 11, 12 header pump or other header pump.) 2. Close the delivery valve of that tripped pump. 3.If it is PCB(3,4,11,12)header pump ,then start the spare pump where only 3,4,11,12 header Valve is in opened condition. Keep header pressure < 55 psi. 4.If it is other than PCB(3,4,11,12) pump ,then open the 1st floor header valve of PCB(1,2,5,1,13)& PCB(6,7,8,9) & close the header valve of PCB (3,4,11,12) 5.Start that spare pump, & keep header PR. < 62 psi
2	IF PCB header got leaked out near ETP area. (uncontrollable condition)	1.As only 2 PCB header(3,4,11,12 & 1,2,5,10,13) both its forward & return header is exits in that area ,so one must be keep his mind clear that any of that header is leaking. 2. Check the PCB (3, 4, 11, and 12) header pressure from CCR; normally it is around 52-54 psi. 3.If the pressure of PCB (3,4,11,12) goes below 45 psi &other PCB header pressure around 59-60 psi,one must be clear that the leaky header is PCB(3,4,11,12)header. Stop PCB pump & its delivery cock which is running on that header ,Also close the product & recycle cock of PCB(3,4,11,12) 4.If still leakage exits ,then reduce the brine rate to around 40 pts., as per Absorber level ,reduce Feed rate .Stop another PCB pump working on PCB header(1,2,5,10,13 & 6,7,8,9).Close the 1st floor header valve of 1,2,5,10,13 of running one pump. Also close the recycle cock of PCB (1,2,5,10) 5. If no leakage exits & leakage of the header 1, 2,5,10 identified .Start the PCB pump connected to PCB (3, 4, 11, and 12) .Increase the feed rate up to 1850 gpm as per temp. profile of the absorber,
3	If PCB header got leaked out towards Carbonating side above filtrate/RGS tank.	1. As only one PCB (6, 7, 8, and 9) header exits in that area. Stop the PCB pump related to other than PCB(3,4,11,12) 2.Always 2 PCB Pumps always working in PCB (6,7,8,9 & 1,2,5,10,13) Stop one PCB pump other than PCB pump related to PCB(3,4,11,12) 3.In Working one pump other than PCB(3,4,11,12),CLOSE the header valve of PCB(6.7,8,9) from 1st floor. Also close its recycle & product cock valve of PCB (6.7, 8, and 9) from 1st floor. Also close its recycle & product cock from 3rd floor. 4. When leakage stops, Close the inlet & outlet cock of any three PCB coolers on PCB (6, 7, 8, 9). 5. If forward header is leaking, keep open the i/l valve of 4th PCB coolers in PCB (6, 7, 8, and 9) close its O/L valve & drain the forward header by opening its drain cock.

4	IF PCB header got leaked out other than ETP area.	1. As lot of identification board has been put all around the plant, can be easily identified. 2.Also if PCB (3,4,11,12) forwards header got leaked out ,pressure indication at CCR will speak for that. 3. Stop the PCB pump related to 3, 4, 11, and 12&closes its delivery valve. 4. Close its product & recycle cock. 5.Close the PCB coolers (3,4,11,12)
5	How to change the PCB pump	1.If the PCB pump which is to be stopped is connected to PCB(3,4,11,12) ,then start the spare pump which is already connected to that header 2.If the PCB pump other the PCB(3,4,11,12) to be stopped ,Firstly open the 1st floor header valve of PCB(1,2,5,10 & 6,7,8,9)in that spare pump & close its PCB(3,4,11,12)header valve of spare pump. Care must be taken that its header pressure should not be > 54 psi 3. Change over the PCB by adjusting the PCB pump del. Valve .Care must be taken that the Common PCB header pressure should not be > 62 psi.
6	If PCB header got leaked out	1. First Identify the location & pump. 2.From PCB header pressure indication ,one can judge which pump delivery line got leaked ,As we have pr. Transmitter tapping in PCB pump no.3 - 3&4 .Also PCB header (3,4,11,12) related to other pump i.e., PCB Pno.1/5 2.Stop the PCB pump which is related to that leaky point from CCR itself 3. Wear SCBA & close its delivery valve of that PCB pump.
7	If PCB forward header 1,2,5,10,13 passes from 1st floor towards AS-6 through ETP area just below 3rd floor (road side) to CT-3 area & return (kiln side) on the same route but at lower elevation than forward header.	1. Watch PCB header pressure for all PCB headers. Watch which header pressure has reduced first. 2. See which PCB pump is working with respective PCB header. Chart for the same is available in CCR. 3. Absorber level to be checked at field through level tube. 4. Close product cock of the header for which leakage is identified. 5. If the leakage is near PCB pump area & the area is not accessible then only Stop the respective pump from emergency push button in CCR. Otherwise person should go to site & stop the pump & close the delivery valve. 6. Close recycle valve of the header at 3rd floor. 7. Correspondingly feed & brine to be adjusted.

		8. Identify whether forward or return header is leaking. 9. Drain the header through pump suction strainer (Fwd header) & through drain cock for return header. Also individual PCB coolers can be drained.
8	CBR header leakage-D Group-Old D group Old header passes through GF near to Wet Calciner, Filterate pump-1, Filterate tank-1, 2 & climbs up to 2nd floor from opposite to CL-11. Isolation cocks are located opposite to CL-2. AT 2nd floor interconnecting line between C & D group is isolated by slip blank. Old CBR D group header is Filtrate pump side at GF.	1. Normally two CBR pumps are running. One CBR pump delivery to be reduced to Half before isolating any header. Then Isolate D group old header from GF (Opp to CL-2). Close CBR on-off & CV of CL-11 to 15 2. If the leakage is still continued, Close D group new header isolation valve from GF. 3. Change over D group towers (CL-11 to CL-15) from CBR to PCBR feed. 4. Isolate CBR D group New header at 2nd floor by closing the valve near CL-15. Note: After isolation only CL-15 will work on CBR feed through new CBR header. Now open 30% valve of CBR new D group header so that CL-15 can work on CBR feed.
9	CBR header leakage-D Group-New	As per CBR header leakage ¯ D group ¯ old (As above)
10	CBR A group header leakage CBR A grp header caters to CL-1, 2, 3. A group header passes through vertically from GF bottom header to 1st floor near CBR MS-1 to 2nd floor. (tower side)	1. Normally two CBR pumps are running. One CBR pump delivery to be reduced to Half before isolating any header. Then Isolate A group header from GF by closing 3 valves. Close CBR on-off valve & feed CV for CL-1, 2, 3. CBR header pressure tapping will be isolated by closing these 3 valves. 2. Change over A group towers (CL-1, 2, 3) from CBR to PCBR feed.
11	CBR B group header leakage CBR B group header caters to CL-4, 5, 6. B	1. Normally two CBR pumps are running. One CBR pump delivery to be reduced to Half before isolating any header. Then Isolate B group header from GF by closing 2 valves. Valve on GF bottom header is butterfly type. Below D group branch one audco cock to be closed.

	group header passes through horizontally towards Okha side on GF at extreme end near inside pit pump & then vertically from GF to 2nd floor near CBR MS-3	Close CBR on-off & feed CV for CL-4, 5, 6. 2. Change over B group towers (CL-4, 5, 6) from CBR to PCBR feed.
12	CBR C group header leakage CBR C group header caters to CL-7, 8,9,10. C group header passes through vertically (near CBR Pump-1) from GF to 2nd floor behind CBR MS-2. At 2nd floor the header passes through near SC cond tank, towards CL-7.	1. Normally two CBR pumps are running. To isolate the CBR C group header stop CBR Pump-1. One CBR pump delivery to be reduced to Half before isolating any header (Either CBR pump-2 or 3). Then Isolate C group header from GF by closing 2 valves (Bottom header & top header near CBR Pump-1). Close CBR on-off valve & feed CV of CL-7, 8, 9, 10. 2. Change over C group towers (CL-7, 8, 9, 10) from CBR to PCBR feed.

Emergency action procedure for ISO Tanker (For Bromine Transportation)

1	*Leaking valve from bonnet or body gasket*	3. Dismantle the blind flange from the red vent (for pressure relief). Relieve any pressure in the vessel by opening the red vent valve, slowly and cautiously. 4. Open the leaking valve turning the hand wheel counter clockwise, and then tighten the four nuts connecting the bonnet to the valve body. 5. Close the leaking valve and the red vent valve. Check for leakage. 6. If the leak has not stopped, repeat step `a_. Then replace the faulty valve with the gasket and blind flange, which had been above the faulty valve. Ensure tight connection.
2	*Leaking from under the manhole cover flange*	7. Tighten the nuts of the manhole cover. If necessary, use two meter long pipe on the spanner arm to increase the torque.
3	*If tanker catches fire*	8. If vehicle carrying bromine catches fire and no bromine leak is detectable, the driver should move the vehicle to an open area; remove shipping and other emergency response documents (MSDS) from the vehicle and make

		reasonable efforts to extinguish any small fires. He Should then : 9. Notify the local police and the fire department. 10. Warn other drivers and pedestrians of the danger. 11. Notify the nearest bromine handling facility. 12. Stay at a safe distance until the incident has been declared resolved by the responder in charge on the scene.
4	*If bromine spills or leaks*	13. The driver of a vehicle leaking bromine should try to get the vehicle to an unpopulated area, put on his escape gas mask, take with him all the shipping documents and get to a safe spot upwind and higher than the vehicle. 14. From this safe spot, he should warn oncoming traffic and pedestrians and call for help. People not properly equipped should be kept out of the area. 15. In any bromine road transport emergency, call the EMERGENCY CONTACT that should be clearly marked on the shipping papers and labels. 16. Properly protected and trained responders should attempt to stop leak, using emergency repair materials (i.e. Tanker leak sealing kit, wooden cones, lead wool, etc.) or by freezing the bromine at the escape opening. 17. If the bromine is leaking out from between flanges, the responders should follow the troubleshooting recommendations to contain a bromine spill on the ground, earth or sandbag dams should built around the spill and the contained bromine neutralized with dry soda ash or a slaked lime Ca(OH)2 water slurry
5	*If bromine leaks form the tanker body during transportation*	▪ *The driver of a vehicle leaking bromine should try to get the vehicle to an unpopulated area, put on his escape gas mask, take with him all the shipping documents and get to a safe spot upwind and higher than the vehicle.* ▪ *From this safe spot, he should warn oncoming traffic and pedestrians and call for help. People not properly equipped should be kept out of the area.* ▪ *In any bromine road transport emergency, call the EMERGENCY CONTACT that should be clearly marked on the shipping papers and labels.* ▪ *Properly protected and trained responders should attempt to stop leak, using emergency repair materials (i.e. Tanker leak sealing kit, wooden cones, lead wool, etc.) or by freezing the bromine at the escape opening.* • *If the bromine is leaking out from between flanges, the responders should follow the troubleshooting recommendations to contain a bromine spill on the ground,*

		earth or sandbag dams should built around the spill and the contained bromine neutralized with dry soda ash or a slaked lime $Ca(OH)_2$ water slurry. • *A wooden cone can be used to stop the leak. In this common leak sealing technique, a wooden cone is hammered into the leak opening to plug the container. This can only be done in situation where the size of the leak opening makes this possible.* • *Use a leak sealing cushion or pillow to cover the leak. The cushions strap around the outside of the container. The cushion is either inflated to apply pressure across the leak opening or clamps are tightened to apply pressure. Other variations of this device include those which adhere to the container using heavy magnets or suction cups.* • *Chemically resistant leak sealing putties have been found to be effective in some situations.* • *If equipment or expertise is available and the leak has been isolated to vapour only, a steel patch can be welded over the leak opening.* • *Another possibility for consideration, though never practiced, is chill the leak area in order to freeze the bromine to stop the leak. Because bromine freezes at -7 °C this should be considered as a possibility if other means of sealing the leak are not available.*

2.10. HAZOP FOR DIFFERENT PLANTS

HAZOP Study is done for all the plants and report is available for reference. Jobs which were identified are at the implementation stage.

2.11 ENVIRONMENT IMPACT ASSESSMENT

The assessment is carried out by a third party. The report is available for reference with Environment Management Section

2.12 QUANTITATIVE RISK ASSESSMENT

2.12.1 Types of Outcome Events

In this section we describe the probabilities associated with the sequence of occurrences which must take place for the incident scenarios to produce hazardous effects and the modelling of their effects.

Considering the present case the outcomes expected are

- Jet fires
- Late Pool Fire
- Flash Fire
- Toxic dispersion

Jet fires:

Jet fire occurs when a pressurized release (of a flammable gas or vapour) is ignited by any source. They tend to be localized in effect and are mainly of concern in establishing the potential for domino effects and employee safety zones rather than for community risks.

The jet fire model is based on the radiant fraction of total combustion energy, which is assumed to arise from a point slowly along the jet flame path. The jet dispersion model gives the jet flame length. The Jet fire scenarios are envisaged mainly for the HSD & FO storages.

Pool fires:

This represents a situation when flammable liquid spillage forms a pool over a liquid or solid surface and gets ignited. Flammable liquids can be involved in pool fires where they are stored and transported in bulk quantities.

Early pool fire is caused when the steady state is reached between the outflow of flammable material from the container and complete combustion of the flammable material when the ignition source is available. Late pool fires are associated with the difference between the release of material and the complete combustion of the material simultaneously. Late pool fires are common when large quantity of flammable material is released within short time. The pool fire scenarios are envisaged mainly for the HSD & FO storages.

Flash Fire:

These arise from delayed ignition of a well-mixed flammable gas/vapour cloud in the absence of significant confinement or obstruction. There are minimal overpressure effects and primarily local impacts. DNV UDM II model is used to model flammable gas dispersion, end points to LFL will be considered as flash fire zone. The flash fire scenarios are envisaged mainly for the HSD, FO & Ammonia storages.

Toxic Dispersion:

Release of toxic material can travel significant distance based on the process parameter and source term modelling (i.e. release size, orientation, etc.). Exposure to high dose can be lethal. The Toxic dispersion scenarios are envisaged mainly for the Ammonia, Chlorine & Bromine storages.

2.12.2 Consequence Analysis

Scenario Selection

This section documents the consequence-distance calculations, which have been computed for the accident release scenarios considered. For this study, LOC scenarios are the maximum credible scenarios which are selected for modelling.

Following are the potential maximum credible scenarios (Loss of Containment) envisaged for Installation: The consequence results for the outcome events are presented in subsequent tables. (Table 2 to 8)

Table No 1: Maximum Credible (Loss of Containment) scenarios

S.No	Scenarios Description
1	Leak of HSD tank
2	Catastrophic rupture of HSD tank
3	Leak of 50MT Ammonia Storage Tank T-01/T-02
4	Catastrophic rupture of 50MT Ammonia Storage Tank T-01/T-02
5	Leak of Furnace Oil tank
6	Catastrophic rupture of Furnace Oil tank
7	Leak of 76 MT liquid Chlorine tank
8	Catastrophic rupture 76MT of liquid Chlorine tank
9	Leak of 18 MT Bromine Storage tank
10	Catastrophic rupture of 18 MT of Bromine Storage tank
11	Leak of 17MT Ammonia tanker
12	Catastrophic rupture of 17MT Ammonia tanker
13	Leak of Bromine tanker
14	Catastrophic rupture of Bromine tanker

S.No	Scenarios Description
15	Leak of 900kg Chlorine Tonner
16	Catastrophic rupture of 900kg Chlorine Tonner
17	Leak of HSD tanker
18	Catastrophic rupture of HSD tanker
19	Leak of FO tanker
20	Catastrophic rupture of FO tanker
21	Leak of equal line from liquefier to chlorine storage tank
22	Catastrophic rupture of equal line from liquefier to chlorine storage tank
23	Leak from main equal header to each chlorine storage tank
24	Catastrophic rupture from main equal header to each chlorine storage tank
25	Leak from Main chlorine supply header
26	Catastrophic rupture from Main chlorine supply header
27	Leak in supply line from chlorine storage tank to chlorine tonner
28	Catastrophic rupture in supply line from chlorine storage tank to chlorine tonner
29	Leak of HSD unloading hose in HSD Tanker
30	Catastrophic rupture of HSD unloading hose in HSD tanker
31	Leak of pipeline from HSD tanker to Tank through unloading pump
32	Catastrophic rupture of pipeline from HSD tanker to Tank through unloading pump
33	Leak of supply pipeline from HSD tank to users through transfer pump
34	Catastrophic rupture of supply pipeline from HSD tank to users through transfer pump
35	Leak of FO unloading hose in FO Tanker
36	Catastrophic rupture of FO unloading hose in FO tanker
37	Leak of line from FO tanker to Tank through unloading pump
38	Catastrophic rupture of line from FO tanker to Tank through unloading pump
39	Leak of supply pipeline from FO tank to power plant through transfer pump
40	Catastrophic rupture of supply pipeline from FO tank to power plant through transfer pump

S.No	Scenarios Description
41	Leak of return pipeline from power plant to FO tank
42	Catastrophic rupture of return pipeline from power plant to FO tank
43	Leak of Ammonia unloading hose in ammonia Tanker
44	Catastrophic rupture of ammonia unloading hose in ammonia tanker
45	Leak of line from Ammonia tanker to Tank
46	Catastrophic rupture of line from Ammonia tanker to Tank
47	Leak of supply pipeline from Ammonia tank to absorber through pressure transfer
48	Catastrophic rupture of supply pipeline from Ammonia tank to absorber through pressure transfer
49	Leak of Bromine loading hose in bromine Tanker
50	Catastrophic rupture of Bromine loading hose in bromine Tanker
51	Leak of line from reboiler to intermediate storage to storage tank
52	Catastrophic rupture of line from reboiler to intermediate storage to storage tank
53	Leak of line from Bromine storage tank to ISO tanker
54	Catastrophic rupture of line from Bromine storage tank to ISO tanker

(A) Oil Installation Storage Area

Table No 2: Summary Jet Fire & Pool Fire

S. No	Maximum Credible Scenarios	Damage Downwind Distances in meter			Damage Downwind Distances in meter		
		JET FIRE 5D			POOL FIRE 5D		
		4	12.5	37.5	4	12.5	37.5
		Kw/m^2			Kw/m^2		
1	Leak of HSD tank	49	46	43	47	23.9	16.3
2	Catastrophic rupture of HSD tank	--	--	--	140	52	--
5	Leak of Furnace Oil tank	47	44	42	56	34	--
6	Catastrophic rupture of Furnace Oil tank	--	--	--	194	82	--
17	Leak of HSD tanker	49	45.8	41.9	45.9	29.9	16
18	Catastrophic rupture of HSD tanker	--	--	--	89	31	--
19	Leak of FO tanker	36	34	32.8	46.7	29.7	17.9
20	Catastrophic rupture of FO tanker	--	--	--	100	37	--
29	Leak of HSD unloading hose in HSD Tanker	--	--	--	13.1	11.3	10.9
30	Catastrophic rupture of HSD unloading hose in HSD tanker	--	--	--	27.2	18.2	6.2
31	Leak of pipeline from HSD tanker to Tank through unloading pump	212	188	174	51.1	45.1	39
32	Catastrophic rupture of pipeline from HSD tanker to Tank through unloading pump	--	--	--	27.2	18.2	6.2
33	Leak of supply pipeline from HSD tank to users through transfer pump	22.4	21.2	--	24.3	22.4	21.2
34	Catastrophic rupture of supply pipeline from HSD tank to users through transfer pump	--	--	--	31	19.9	6.8
35	Leak of FO unloading hose in FO	30.2	28.2	27.2	44.9	43.2	42.2

S. No	Maximum Credible Scenarios	Damage Downwind Distances in meter			Damage Downwind Distances in meter		
		JET FIRE 5D			POOL FIRE 5D		
		4	12.5	37.5	4	12.5	37.5
		Kw/m^2			Kw/m^2		
	Tanker						
36	Catastrophic rupture of FO unloading hose in FO tanker	--	--	--	91	38	--
37	Leak of line from FO tanker to Tank through unloading pump	--	--	--	13.8	11.9	10.7
38	Catastrophic rupture of line from FO tanker to Tank through unloading pump	--	--	--	40	29.2	15
39	Leak of supply pipeline from FO tank to power plant through transfer pump	30.8	28.8	27.8	48.4	44.8	42.2
40	Catastrophic rupture of supply pipeline from FO tank to power plant through transfer pump	--	--	--	186	90	--
41	Leak of return pipeline from power plant to FO tank	31	29.2	28	38.5	33.9	28.5
42	Catastrophic rupture of return pipeline from power plant to FO tank	--	--	--	100	39	--

Analysis – Jet Fire:

As per the analysis of Jet fire results, Leak of HSD pipeline during unloading operation will cause the maximum distance in terms of criticality and other storages in the dyke area. The equipment within a distance of 212 m may be subjected to exposure of the radiation of 4Kw/m2 has the tendency to cause first degree burns. The equipment within a distance of 188 m may be subjected to exposure of radiation at 12.5Kw/m2 and have major damage or piloted ignition of wood, melting of plastics tubing's etc. is possible within this distance. The equipment within a distance of 174 m may be subjected to exposure of the radiation of 37.5Kw/m2 will cause heavy damage to process equipment's and leads to fatality. The contours for scenarios are attached in QRA Report, Annexure A.

Analysis – Pool Fire:

As per the analysis of Pool fire results, Catastrophic Rupture of Furnace oil Tank will cause the maximum distance in terms of criticality and other storages in the dyke area resulting on formation of pool. The equipment within a distance of 194 m may be subjected to exposure of the radiation of 4Kw/m2 has the tendency to cause first degree burns. The equipment within a distance of 82 m may be subjected to exposure of radiation at 12.5Kw/m2 and have major damage or piloted ignition of wood, melting of plastics tubing s etc. is possible within this distance. The contours for scenarios are attached in QRA Report, Annexure A.

Table No 3: Summary Flash Fire

S. No	Maximum Credible Scenarios	Damage Downward Distances in m
		5D
		PPM
1	Leak of HSD tank	37
2	Catastrophic rupture of HSD tank	60
5	Leak of Furnace Oil tank	38
6	Catastrophic rupture of Furnace Oil tank	70
17	Leak of HSD tanker	36
18	Catastrophic rupture of HSD tanker	43
19	Leak of FO tanker	26.5
20	Catastrophic rupture of FO tanker	33
29	Leak of HSD unloading hose in HSD Tanker	5.1
30	Catastrophic rupture of HSD unloading hose in HSD tanker	15.9
31	Leak of pipeline from HSD tanker to Tank through unloading pump	134
32	Catastrophic rupture of pipeline from HSD tanker to Tank through	16

S. No	Maximum Credible Scenarios	Damage Downward Distances in m 5D PPM
	unloading pump	
33	Leak of supply pipeline from HSD tank to users through transfer pump	13.8
34	Catastrophic rupture of supply pipeline from HSD tank to users through transfer pump	35
35	Leak of FO unloading hose in FO Tanker	22.5
36	Catastrophic rupture of FO unloading hose in FO tanker	128
37	Leak of line from FO tanker to Tank through unloading pump	5.4
38	Catastrophic rupture of line from FO tanker to Tank through unloading pump	5.4
39	Leak of supply pipeline from FO tank to power plant through transfer pump	25.5
40	Catastrophic rupture of supply pipeline from FO tank to power plant through transfer pump	280
41	Leak of return pipeline from power plant to FO tank	22.8
42	Catastrophic rupture of return pipeline from power plant to FO tank	105

Analysis:

As per the analysis of Flash fire, The maximum damage can be felt in case of a Catastrophic rupture of supply pipeline from FO tank to power plant through transfer pump felt up to a distance of 280m.

(B) Ammonia Section

Table No 4: Summary Jet Fire & Pool Fire

S. No	Maximum Credible Scenarios	Damage Downwind Distances in meter			Damage Downwind Distances in meter		
		JET FIRE 5D			POOL FIRE 5D		
		4	12.5	37.5	4	12.5	37.5
		Kw/m^2			Kw/m^2		
3	Leak of 50MT Ammonia Storage Tank T-01/T-02	111	87	71	--	--	--
4	Catastrophic rupture of 50MT Ammonia Storage Tank T-01/T-02	--	--	--	--	--	--
11	Leak of 17MT Ammonia tanker	--	--	--	--	--	--
12	Catastrophic rupture of 17MT Ammonia tanker	--	--	--	--	--	--
43	Leak of Ammonia unloading hose in ammonia Tanker	38	27	--	--	--	--
44	Catastrophic rupture of ammonia unloading hose in ammonia tanker	--	--	--	--	--	--
45	Leak of line from Ammonia tanker to Tank	--	--	--	--	--	--
46	Catastrophic rupture of line from Ammonia tanker to Tank	--	--	--	--	--	--
47	Leak of supply pipeline from Ammonia tank to absorber through pressure transfer	--	--	--	--	--	--
48	Catastrophic rupture of supply pipeline from Ammonia tank to absorber through pressure transfer	--	--	--	--	--	--

Analysis – Jet Fire:

As per the analysis of Jet fire results, Leak of 50MT Ammonia Storage Tank T-01/T-02 will cause the maximum distance in terms of criticality and other storages in the dyke area. The equipment within a distance of 111 m may be subjected to exposure of the radiation of 4Kw/m2 has the tendency to cause first degree burns. The equipment within a distance of 87 m may be subjected to exposure of radiation at

12.5Kw/m2 and have major damage or piloted ignition of wood, melting of plastics tubing's etc. is possible within this distance. The equipment within a distance of 71 m may be subjected to exposure of the radiation of 37.5Kw/m2 will cause heavy damage to process equipment's and leads to fatality. For all other scenarios no possibility of Jet & pool fire is envisaged. The contours for scenarios are attached in QRA Report, Annexure A.

Table No 5: Summary Flash Fire

S. No	Maximum Credible Scenarios	Damage Downward Distances in m
		5D
		PPM
3	Leak of 50MT Ammonia Storage Tank T-01/T-02	29
4	Catastrophic rupture of 50MT Ammonia Storage Tank T-01/T-02	41
11	Leak of 17MT Ammonia tanker	2
12	Catastrophic rupture of 17MT Ammonia tanker	27
43	Leak of Ammonia unloading hose in ammonia Tanker	7.5
44	Catastrophic rupture of ammonia unloading hose in ammonia tanker	4
45	Leak of line from Ammonia tanker to Tank	2.4
46	Catastrophic rupture of line from Ammonia tanker to Tank	11
47	Leak of supply pipeline from Ammonia tank to absorber through pressure transfer	2.65
48	Catastrophic rupture of supply pipeline from Ammonia tank to absorber through pressure transfer	13

Analysis:

As per the analysis of Flash fire, the maximum damage can be felt in case of a catastrophic rupture of catastrophic rupture of 50MT Ammonia Storage Tank T-01/T-

02 felt up to a distance of 41m. The contours for scenarios are attached in QRA Report, Annexure A.

Table No 5.6: Summary Toxic Dispersion

S. No	Maximum Credible Scenarios	Damage Downward Distances in m
		1.5F
		IDLH (PPM)
3	Leak of 50MT Ammonia Storage Tank T-01/T-02	1150
4	Catastrophic rupture of 50MT Ammonia Storage Tank T-01/T-02	2250
11	Leak of 17MT Ammonia tanker	143
12	Catastrophic rupture of 17MT Ammonia tanker	245
43	Leak of Ammonia unloading hose in ammonia Tanker	598
44	Catastrophic rupture of ammonia unloading hose in ammonia tanker	245
45	Leak of line from Ammonia tanker to Tank	277
46	Catastrophic rupture of line from Ammonia tanker to Tank	680
47	Leak of supply pipeline from Ammonia tank to absorber through pressure transfer	314
48	Catastrophic rupture of supply pipeline from Ammonia tank to absorber through pressure transfer	800

Analysis:

As per the analysis of Toxic dispersion, the maximum damage distances are calculated based on IDLH (Immediate dangerous to life or health) values of a chemical. In case of Ammonia, The maximum damage can be felt in case of a catastrophic rupture of 50MT Ammonia Storage Tank T-01/T-02 up to a distance of 2250m. The contours for scenarios are attached in QRA Report, Annexure A.

(C) Chlorine Section:

Table No 7: Summary Toxic Dispersion

S. No	Scenarios	Damage Downward Distances in m
		1.5F
		IDLH (PPM)
7	Leak of 76 MT liquid Chlorine tank	1400
8	Catastrophic rupture of 76MT liquid Chlorine tank	7450
15	Leak of 900kg Chlorine Tonner	1405
16	Catastrophic rupture of 900kg Chlorine Tonner	1940
21	Leak of equal line from liquefier to chlorine storage tank	181
22	Catastrophic rupture of equal line from liquefier to chlorine storage tank	191
23	Leak from main equal header to each chlorine storage tank	1000
24	Catastrophic rupture from main equal header to each chlorine storage tank	2060
25	Leak from Main chlorine supply header	2040
26	Catastrophic rupture from Main chlorine supply header	2792
27	Leak in supply line from chlorine storage tank to chlorine tonner	160
28	Catastrophic rupture in supply line from chlorine storage tank to chlorine tonner	1800

Analysis:

As per the analysis of Toxic dispersion, the maximum damage distances are calculated based on IDLH (Immediate dangerous to life or health) values of a chemical. In case of Chlorine, The maximum damage can be felt in case of a catastrophic rupture of 76MT liquid Chlorine tank up to a distance of 7450m. The contours for scenarios are attached in QRA Report, Annexure A.

(D) Bromine Section:

Table No 8: Summary Toxic Dispersion

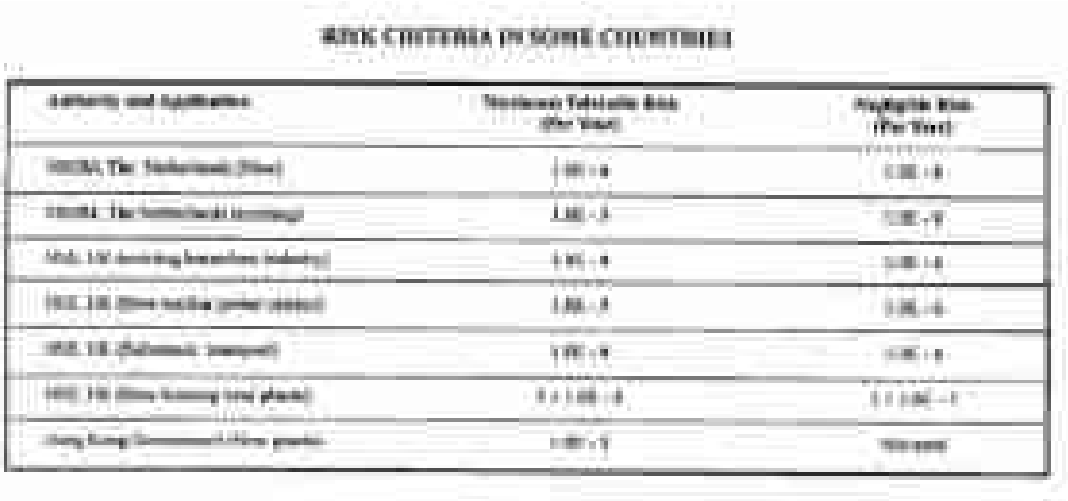
S. No	Scenarios	Damage Downward Distances in m
		1.5F
		IDLH (PPM)
9	Leak of 18 MT Bromine Storage tank	3060
10	Catastrophic rupture of 18 MT of Bromine Storage tank	5200
13	Leak of Bromine tanker	4600
14	Catastrophic rupture of Bromine tanker	3060
49	Leak of Bromine loading hose in bromine Tanker	1020
50	Catastrophic rupture of Bromine loading hose in bromine Tanker	799
51	Leak of line from reboiler to intermediate storage to bromine storage tank	1200
52	Catastrophic rupture of line from reboiler to intermediate storage to bromine storage tank	1295
53	Leak of line from Bromine storage tank to ISO tanker	1020
54	Catastrophic rupture of line from Bromine storage tank to ISO tanker	889

Analysis:

As per the analysis of Toxic dispersion, the maximum damage distances are calculated based on IDLH (Immediate dangerous to life or health) values of a chemical. In case of Bromine, The maximum damage can be felt in case of a catastrophic rupture of 18 MT of Bromine Storage tank up to a distance of 5200m. The contours for scenarios are attached in QRA Report, Annexure A.

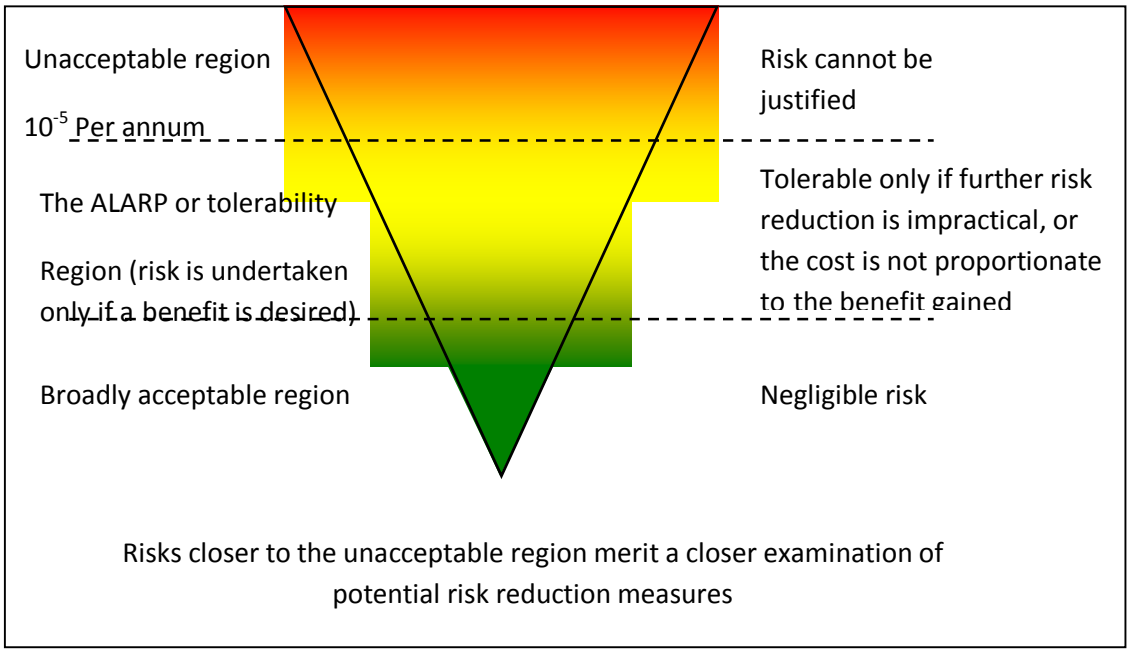
2.12.3 Risk Acceptance

In India, there are no defined criteria for risk acceptance. However, in IS 15656 ¯ Code of Practice for Hazard Identification and Risk Analysis, Annexure E summarizes the risk criteria adopted in some countries. Extracts for the same is presented below:



RISK CRITERIA IN SOME COUNTRIES

To achieve the above risk acceptance criteria, ALARP principle was followed while suggesting risk reduction recommendations.


Unacceptable region
Risk cannot be justified
10^{-5} Per annum
The ALARP or tolerability
Region (risk is undertaken only if a benefit is desired)
Tolerable only if further risk reduction is impractical, or the cost is not proportionate to the benefit gained
Broadly acceptable region
Negligible risk
Risks closer to the unacceptable region merit a closer examination of potential risk reduction measures

In the case of chemical Installation, Based on the scenarios described in Table 1 Risk Level Summary shows the category and the risk which are majorly in **acceptable limits**. The scenarios pertaining to Leak & catastrophic rupture of hoses while loading / unloading operations of HSD, Furnace oil, Ammonia & Bromine contribute to have high risk levels greater than 1.0E-07 but are well within the ALARP levels.

As can be seen from the consequence models worked out for Jet fire, Pool fire & Flash fire the consequences are confined to plant premises only. The provision of effective controls for minimizing such a risk and the firefighting measures to be adopted, are considered adequate for meeting the contingencies.

It can also be seen from the result of the consequence analysis that the consequences resulting from a Flash fire & Toxic dispersion are far more severe as compared to jet fires from spillage & release of same magnitude.

It is, therefore necessary to take all precautions and ensure that the spills, if any, are properly contained and diverted to safer places with smaller containment area to reduce rate of vaporisation and take effective steps to prevent dispersing beyond the plant boundary limits. It is particularly necessary to break the continuity by providing water deluge / sprinklers and / or water wall / curtain systems, to prevent consequential damage to plant and personnel due to sources of ignition beyond the plant limits.

Typically, Storages are not normally manned facilities. It is expected that occupancy level on all storages will be less than 5%. It is evident from the above results that no contour for risk level of 1E-4 is present.

Therefore calculated risk for each worker group is lower than 1E-05 which lies in acceptable region as per QRA Criteria and hence deemed acceptable.

CHAPTER 3 - EMERGENCY ORGANIZATION

This chapter is devised and explains the organization for emergency preparedness. Key personnel to combat emergency are nominated with specific responsibilities according to set procedures and making best use of the resources available and to avoid confusion. Such key personnel include incident controller. Main incident controller, other key personnel and essential workers.

Assembly points for non-essential workers, emergency control canters, ambulance room and van, fire and toxicity control arrangements, medical arrangements, transport, evacuation arrangements, pollution control arrangements are the important parts of the emergency organization.

All such key personnel shall be available in all shifts and call on off duty employees Or holiday.

3.1 ROLE OF KEY PERSONNEL

3.1.1 MAIN INCIDENT CONTROLLER

He has overall responsibility for direction operation and calling outside help for emergency control centre. As he is required to take decisions by collaboration between the Plant Heads at the site and the Senior Officers of the outside services, the Vice President - Manufacturing shall act as the Main Incident Controller.

The duties and responsibilities of Main Incident Controller are.

- Being aware of the emergency immediately he will go to the emergency control room/Shadow Emergency Control as the case may be.
- Relieve the Incident Controller of responsibility of L3 or Offsite overall main control).
- Decide whether a major emergency exist and on declaration of a major emergency in consultation with the Incident Controller. Ensure that the outside emergency services and mutual help are called, the off-site plan gets activated and if necessary, nearby factories and population are informed. Inform Head Office.
- Ensure that the key personnel are called in.
- Exercise direct operational control of those parts of the works outside the affected area. Continually review and assess possible developments to determine the most probable course of events.
- Direct the safe close down and evacuation of plants in consultation with the incident controller and key personnel. If necessary, direct for evacuation of neighboring population.
- Ensure that casualties are receiving adequate attention. Arrange for hospitalization of victims and additional help if required. Ensure that the relatives are communicated.

- Inform and liaise with the Chief Officers of the Fire and Police Services, District Emergency Authority and with the Factory Inspectorate and experts on health and safety. Provide advice on possible effects on areas outside the factory.
- In the case of prolonged emergencies involving risk to outside areas by windblown materials, contact the local Meteorological Office to receive early notification of impending changes in weather conditions.
- Review the authorized statements prepared for the news media.
- Direct for the preservation of evidence.
- Control rehabilitation of affected areas and victims on cessation of the emergency. Do not restart the plant unless it is ensured safe to start and cleared by the authorities.

3.1.2 INICIDENT CONTROLLER

His primary duty is to take charge at the site of the incident. In the initial stages he will take decisions involving the operation of the other plants or to stop or continue any process and take decisions to control the incident.

The AVP - Operations has been appointed as Incident Controller for all the 24 hours of working and holidays.

DGM - Soda Ash and AGM - Salt, CCG and Marine Chemicals are appointed as Deputy Incident Controllers and would take the charge in the absence of the incident controller for Ammonia and Chlorine gases respectively. All the persons are quite competent to face any kind of emergency. In case the emergency occurs at more places the deputy incident controllers would take charge as Incident Controller in their respective places to prevent the danger of a disaster. All the above mentioned Responsible Persons stay in township within half a kilometre distance from the factory premises and as they are provided with adequate communication system they can take care of the emergencies.

- He will proceed to the scene immediately on being aware of the emergency and its location.
- Assess the scale of emergency and decide whether a major emergency exists or is likely. On his decision, he will activate the on-site plan. In case conditions relate to off-site emergency, he shall consult the Main Incident Controller to activate the off-site emergency plan.
- Assume the duties of the Main Incident Controller till his arrival. For this purpose he will depute his deputy incident controller at the site of scene and he will go to the control center.
- His main duty is to bring the emergency situation under control, at the source.
- Direct the shutting down and evacuation of plant and areas likely to be affected by the emergency.
- Search for casualties.
- Evacuate non-essential workers to the assembly points.

- Ensure that the outside emergency services, including mutual aid, have been called in if necessary.
- Ensure that key personnel have been called in.
- Direct all operations within the affected areas with the following priorities.
- Secure the safety of personnel.
- Minimize damage to plant, property and the environment.
- Minimize loss of material.
- Direct rescue and firefighting operations until the arrival of the outside Fire Brigade, when he will relinquish control to the Head of the Fire Brigade.
- Set up a communications point and establish telephone / messenger contact as appropriate with the emergency control center.
- Give advice and information as requested to the Head of Safety &Fire and other emergency services.
- Brief the Main Incident Controller and keep him informed of developments.
- Preserve evidences that will be necessary for subsequent inquiry into the cause of the emergency and concluding preventive measures.

3.1.3 DEPUTY INCIDENT CONTROLLER

(AGM - Soda Ash / GM - Salt, CCG & Marine / DGM -Cement / GM -Power Plant)

a)	He may be required to act as Incident Controller (IC) in the beginning, if IC is acting as Main Incident Controller.
b)	In consultation with Incident Controller inform the Fire Station In charge (Phone No 5555/5802) to start the emergency siren.
c)	He shall work under the direction of Incident Controller.
d)	Help in plant shutdown and evacuation of non-essential workers.
e)	Direct the non-essential workers to take safe route to the assembly point.
f)	Arrange to call for essential workers.
g)	Give the instruction to the Area Engineer to take the attendance of the assembled workers.
h)	Call the fire brigade.
i)	Call the security people for traffic control.
j)	Inform the railway people to vacate the T C railway yard.
k)	Assist in sending victims if any, to the first aid centre or hospital Depending on the severity.

3.1.4. ROLE OF MANAGER / DEPT. HEAD (AFFECTED PLANT)

a)	Ensure that fire / safety / security have been informed & reached at site.
b)	Ensure Electrical / Instrument / Transport / Mechanical are called in.
c)	Help in controlling the incident.
d)	Direct the essential workers for effective control.
e)	Arrange to take attendance of assembled.
f)	Help in evacuation of people.
g)	Communicate to adjacent plant people about the nature of hazard.
h)	Ensure co-ordination between all services.
i)	Keep Main Incident Controller & Incident Controller inform of site conditions.

3.1.5 ROLE OF DY. /ASST. MANAGER (SHIFT) AFFECTED PLANT

a)	He shall act as Incident Controller, till his seniors arrive at site & take over.
b)	Inform fire / safety / security Dept.
c)	Inform Senior Official and key personnel.
d)	Inform Electrical / Instrument / Transport / Mechanical services.
e)	Shutting down the plant in a safe manner if required.
f)	Will try to control leakage / fire in a safe manner using required PPE.
g)	Assist in evacuation of non-essential workers.
h)	Ensure safe transfer of materials.
i)	Emergency engineering work e.g. isolating equipment, material etc.

3.1.6 ROLE OF MANAGER – SECURITY SERVICE/ASST. MANAGER-SECURITY SERVICES/SECURITY OFFICER

a)	Manager ¯ Security will arrange for effective security near the affected areas.
b)	Depute the security guards for manning gates and traffic control at scene of emergency
c)	Mobilize security force for help.
d)	Help to evacuate the persons within the factor and if required nearby villages.
e)	Control traffic movement in the factory.
f)	Will arrange to Depute one responsible person to take charge of assembly points for head counts.
g)	If required, Depute security staff at hospital gate to control mob.
h)	As per directions of Main Incident Controller, he will liaise with police Department with the help of Head HR, Personnel & Administration if necessary.

3.1.7 ROLE OF AGM – SAFETY & HEALTH / DY. / ASST. MANAGER-SAFETY & FIRE

a)	AGM - S & H will monitor overall safe handling of emergency & advice SMS / FMS as required.
b)	Arrange for up to date recording of emergency.
c)	In absence of AGM ¯ *Safety & Health*, AM - FMS ¯ he will take the responsibility & play the role of AGM ¯ Safety & Health.
d)	In-charge - FMS will mobilize & direct the firefighting crew.
e)	Ensure that people go to the assembly point.
f)	Help in providing required PPE.
g)	Brief the Main Incident Controller about developments.
h)	Keep constant touch with Main Incident Controller and direct key personnel as required.

3.1.8 ROLE OF ENVIRONMENT MANAGEMENT SYSTEMS

a)	Rush to the affected area immediately.
b)	Keep constant touch with Main Incident Controller, Sr. Manager - Safety & Health & appraise him about the situation.
c)	Carry out ambient / emergency discharge monitoring & appraise results to the concerned authorities wherever necessary.

3.1.9 ROLE OF FACTORY MEDICAL OFFICER (OHC)

a)	He will immediately contact Main Incident Controller / Incident Controller.
b)	He will render necessary treatment at first aid centre and inform Sr. Manager ¯ Safety & Health & Head - Medical Services.
c)	Seek additional assistance from Head - Medical Services as required.
d)	Mobilize trained first aiders wherever required.

3.1.10 ROLE OF HEAD - HR & PERSONNEL / HEAD -ADMINSTRATION

a)	He will contact Main Incident Controller / Incident Controller and inform &liaise Police, Asst./ Deputy / Director of Industrial Safety & health, and District Collector as per the instruction of Main Incident Controller
b)	Ensure that Press does not publish unauthentic news.
c)	Issue authorized statement to news media when necessary.
d)	Ensure that Telephone Operator keeps the board free to the extent possible for incoming calls.
e)	Ensure to convey message to the key personnel as directed by the Main Incident Controller.
f)	Will arrange for Rehabilitation / Shelters in town, if people are to be shifted.
g)	Will arrange for announcing necessary instructions for public in general.
h)	On prolonged emergency, He shall arrange for relief of personnel , provision of catering facilities, and special needs like family responsibility, counselling, personal safety & security etc.
i)	He shall arrange to inform to families/ next of kens of persons affected/injured in the incident.
j)	In absence of Head ¯ HR, Manager ¯ HR shall play the role.

3.1.11 ROLE OF – TELEPHONE OPERATOR

a)	On receiving any call regarding an emergency incident inform the incident controller and main incident controller.
b)	Record the time of first information.
c)	Record the liaison with the government officials immediately.
d)	Keep on furnishing information on the latest developments to the Main Incident Controller and government officials.
e)	Keep all the phone lines available as far as possible for receiving information.
f)	Call all the key personnel as directed by the site controller through phone.
g)	Do not waste time in hearing or conversing about the incident.

3.1.12 ROLE OF HEAD – MEDICAL SERVICES / MANAGER - MEDICAL SERVICES

a)	Appraise Main Incident Controller about the injured personnel

3.1.13 ROLE OF – EMERGENCY SUPPORT STAFF

A task force known as Emergency Support Staff, trained for emergency handling is available all the times in duty hours in adequate numbers to assist emergency preparedness team. They (except ESS at site of actual incident) shall report to Fire Station upon hearing the siren and shall be mobilized in teams as per instruction of Main Incident Controller. ESS in team may render their assistance as under-

a)	Firefighting gas leak and spill control till fire brigade takes the charge.
b)	To help to the fire brigade and mutual aid terms if it is so required.

c)	Shutting down plant and making it safe.
d)	Emergency engineering work e.g. isolating equipment, materials, process, providing temporary bypass lines, safe transfer of material, urgent repairing or replacement, electrical work etc.
e)	Provision of emergency power, water, lighting, instruments, equipments, materials etc.
f)	Movement of equipment, special vehicles and transport to or from the scene of the incident.
g)	Search, Evacuation, rescue and welfare.
h)	First aid and medical help.
i)	Moving tankers or other vehicles away from areas of risk.
j)	Carrying out atmospheric test and pollution control.
k)	Planning of assembly points to record the arrival of evacuated personnel. Planning for outside shelters and welfare of evacuated persons there
l)	Assistance of causalities reception areas to record details of causalities.
m)	Assistance at communications centres to handle outgoing and incoming calls and to act as messengers if necessary.
n)	Planning of works entrances in liaise with the police to direct emergency vehicles entering the work, to control traffic leaving the work and to turn away or make alternative safe arrangements for visitors, contractors and other traffic arriving at the works.
o)	Informing surrounding factories and the public as directed by the main incident controller.
p)	Any special help required.

3.1.14 ROLE OF RADIOLOGICAL SAFETY OFFICER

a)	Any Emergency related to Radiation source will be handled in Consultation with Certified RSO

3.2 ASSEMBLY POINTS

In affected and vulnerable plants all non-essential workers, who are not assigned any emergency duty, shall evacuate the area and report to the specified assembly points. Four assembly points are provided i.e. Nr. Administration Office (rear of car parking), Nr. Soda Ash Go-down and Nr. Salt Office & near Security Out Post (Cement Plant) All the assembly points are taken care by not keeping any unwanted material, clearly marked by a conspicuous notice and provided with identification numbers like assembly point 1, 2, 3, 4 & 5 as per Annexure no.19

All the assembly points are selected considering the distance from the hazardous plant, wind direction, capacity to accommodate the required number of people and availability of the other resources in that area.

Each assembly point is taken care by nominated security personnel to record the names and Departments of those reporting these. Means of communications are kept available to contact the main incident controller to receive further instructions concerning the development of the evacuated personnel.

Suitable PPE are also available in such areas where people require passing through the affected areas to the assembly points.

3.3 EMERGENCY CONTROL ROOM (ECR) / SHADOW EMERGENCY CONTROL ROOM (SHADOW ECR)

The centralized emergency control room is situated in Administration Office &SurakshaSanskar Kendra from which the operation to handle the emergency are directed and coordinated. The main incident controller, key personnel and senior officers of the fire, police, Director Industrial Safety & Health, District authorities and emergency services will attend it. The centre is equipped to receive and transmit information and directions from and to the incident controller and areas of the works as well as outside.

The control centre is situated in an area of minimum risk and close to the road to allow for ready access by a vehicle for if other systems fail or extra communication faculties are needed.

THE BOTH CONTAINS THE FOLLOWING FACILITIES:

i. Adequate number of external telephones
ii. Adequate number of internal telephones.
iii. E-Mail facilities
iv. Plans of the factory
v. Plans of the location
vi. Stationeries
vii. Copies of this on-site and off-site emergency plans
viii. Torches, Gas detectors, Portable monitors etc.
ix. Sufficient stock of Personal Protective Equipment s.

3.4 FIRE & TOXICITY ARRANGEMENTS

Emergency cupboards are provided at five places in the factory. They are fully equipped with all necessary PPE in readiness. The places where the emergency cupboards provided are as follows:

A. Process House (3rd floor)
B. Ammonia Storage Area.
C. CC Group (CCR / EC - 1)
D. CC Group (CCR / EC - 2)
E. Marine Chemicals (Shift Engineer's Office)

The list of PPE'S provide in the Emergency Cupboards are as under.

i. Self-contained breathing apparatus (SCBA Sets)
ii. Face shield
iii. Gum Boots
iv. Ear Muff

vi. 3 ¯ M Cartridge
vii. Goggles (Panorama Type Chemicals Proof)
viii. Rubber Hand Gloves
ix. Nitrile Hand Gloves
x. Chemical Resistance (HDPE) Suit.

List of SCBA Set available at site					
Sr. No	**Location**	**Sr. No**	**Location**	**Sr. No**	**Location**
1	New Tender	21	Bromine filling area	41	BA set store no. 02
2	New Tender	22	Power plant turbine floor	42	BA set store no. 02
3	New Tender	23	Power plant turbine floor	43	BA set store no. 02
4	New Tender	24	Soda ash - Process house ground floor	44	BA set store no. 02
5	Ambulance	25	Soda ash - Process house ground floor	45	BA set store no. 02
6	FT 01	26	Soda ash - Process house control room - 3rd floor	46	BA set store no. 02
7	FT 01	27	Soda ash - Process house control room - 3rd floor	47	BA set store no. 02
8	FT 01	28	Soda ash - Process house laboratory	48	BA set store no. 02
9	FT 01	29	Soda Ash -Process House MCC room	49	BA set store no. 02
10	CCG - CCD	30	Soda Ash -Process House MCC room	50	SCBA Trolley 01
11	Cl2 storage tank first floor	31	HCL - 2nd floor	51	SCBA Trolley 02
12	Cl2 storage tank first floor	32	Ammonia storage	52	SCBA Trolley 03
13	Cl2 tonner area	33	Ammonia storage	53	SCBA Trolley 04
14	Cell house 1st floor	34	Emergency Control room - General office	54	SCBA Trolley 05
15	Marine chemical ground floor	35	LAB	55	Bromine Tanker
16	CCG - control room	36	BA set store no. 02		
17	CCG - control room	37	BA set store no. 02		
18	CCG - control room	38	BA set store no. 02		
19	CCG - control room	39	BA set store no. 02		
20	Bromine Plant 1st floor(Glass tower)	40	BA set store no. 02		

Trained personnel are always available in these areas who can rush to the emergency point in shortest time. Warning system is always kept in working order.

Fire extinguishers of suitable types and hydrants are provided at almost all the places of the factory. A fire station is manned round the clock. Two fire tenders along with other firefighting equipment are kept & maintained in best operating condition.

3.5 MEDICAL ARRANGEMENTS:

Our company has its own ambulance room, an Occupational Health Centre for emergencies in the working hours and a fully equipped hospital situated about 700 meters from the factory premise. They are fully equipped with necessary instruments, arrangements, medicines, antidotes and staff. It has got sufficient space, capacity and sited in a safe place avoiding normal down wind direction. There is a first-aid centre named as Occupational health centre and the staffs are trained properly.

The ambulance service is available round the clock, which is fully equipped as per statutory provisions and accessible by telephone ring from anywhere in the factory.

3.6 TRANSPORT & EVACUATION ARRANGEMENTS:

In a major emergency, it will be necessary to evacuate personnel from affected areas and to further evacuate non-essential workers from areas likely to be affected should the emergency escalate.

A common siren of 10 Km range is provided for the evacuation of people. On hearing the siren, people will disperse from the factory premises. Proper instruction would be given to all the employees about the ringing of siren and the emergencies. Also an additional siren is provided at the laboratory building to warn the employees in the office area.

The employees would proceed to the Safe assembly points on hearing the siren and the security forces would be instructed to divert the people away from the affected area and towards the assembly points.

3.7 POLLUTION CONTROL ARRANGEMENTS:

A separate environment cell has been established in order to check & ensure the controlled rates of the pollutants in and around the complex. Pollution control arrangements for water, air and land are permanently put up. It is ensured by regular preventive and corrective maintenance that such arrangements and their staff work efficiently. In case of emergencies information of such arrangements are provided in Annexure-19 & 20.

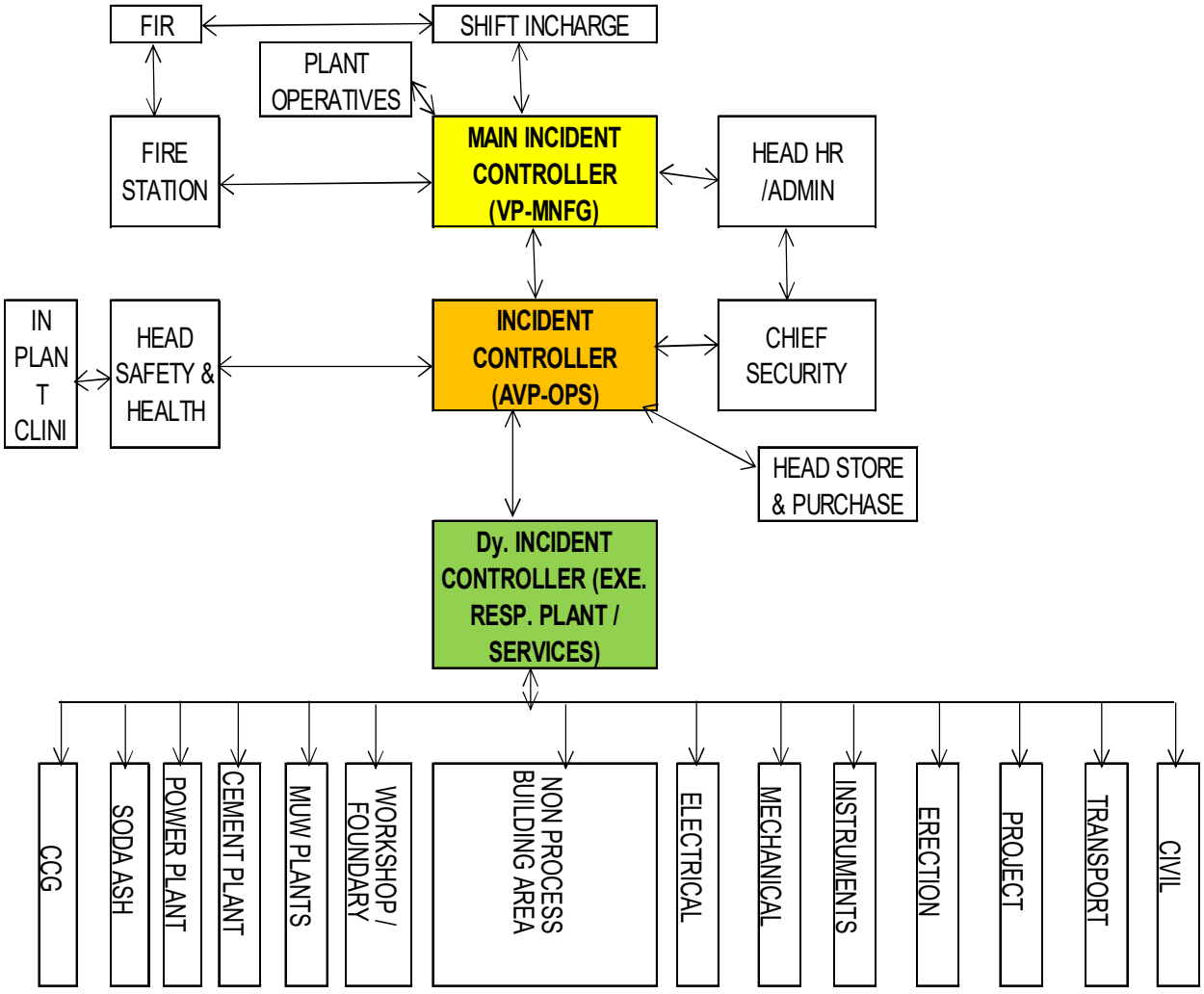
3.8 OTHER ARRENGEMNTS:

Arrangements not classified in part 1 to 10 above are included here. Particularly emergency heavy vehicles, lifts, cranes, lifting machines, transporters, alternate power and utilities supply, special equipment, instruments, materials, test facilities, specialists, special books & information, rescue team etc. are included here & given as Annexure-25.

CHAPTER 4 - COMMUNICATION SYSTEM

4.1 COMMUNICATION FLOW

Communication is an important factor in handling an emergency. When an incident occurs it is necessary immediately to raise the siren, to declare an emergency, to inform the workers for emergency services and threatened areas within the works and the outside services and threatened neighbouring areas,. Let us have a look into the communication system provided in our factory.



4.2 RAISING THE SIREN

The main siren shall be utilized as an emergency alarm with a different `beep' noise to enable employees to realize an emergency. The siren / alarm can be sounded immediately after noticing any emergency or getting to know the details by a phone call. The firemen after receiving the telephone call from main Incident controller can

raise the alarm. This will permit the earliest possible action to be taken to control the situation in time, to avoid the development of a major emergency.

The siren is audible in every part of the factory and also in the township and nearby residential areas. The siren will be more than sufficient to alert the incident controller even if other communication system gets delayed.

The siren is checked regularly (every Saturday at 11:00 a.m.) to test its efficiency.

4.3 DECLARING MAJOR EMERGENCY

The declaration of major emergency with many agencies on action and the running system may be disturbed which may be very costly at times or the consequences may be serious. Therefore such declaration is limited to Site Main Controller and through Incident Controller only. As the communication system is quite easy there will not be any delay for the Site Main Controller and his deputation to rush to the place and declare a major emergency without any problem.

4.4 TELEPHONE MESSAGES

After hearing the emergency siren and emergency declaration or even while just receiving the emergency message on phone, the telephone operator will play a vital role. He has been trained to be precise, sharp, attentive and guide in receiving and noting the message and then for immediate subsequent action of further communication.

4.5 COMMUNICATION OF EMERGENCY

There is an effective system to communicate emergency (a) inside the factory i.e. the workers including key personnel and essential workers, on duty and inside the plant during normal working hours, (b) to the key personnel and essential workers not on duty and outside during normal working hours, (c) to the outside emergency services and the government authorities and (d) to the neighbouring firms and general public in the vicinity.

4.5.1 INSIDE THE FACTORY TO THE EMPLOYEES

For prevention of emergencies, the statutory information mentioned below is made clear to the workers so that they can prepare themselves to prevent or control the emergency:

- Statutory requirements u / s 41-B, 41-C and 41-H of the Factories Act.
- A list of hazardous processes carried on in the factory.
- Location and availability of all MSDS.
- Physical and health hazards arising from the exposure to or handling of Substances.
- Measures taken by the occupier to ensure safety and control of physical and Health hazards.
- Measures to be taken by the workers to ensure safe handling, storage and Transportation of hazardous substances.

- Personal protective Equipment required to be used by the workers employed In hazardous processes or dangerous operations.
- Meaning of various labels and markings used on the containers of hazardous Substances.
- Signs and symptoms likely to be manifested on exposure to hazardous Substances and to whom to report.
- Measures to be taken by the workers in case of spillage or leakage of Hazardous substances.
- Role of workers vis-à-vis the emergency plan of the factory, in particular the Evacuation procedures.
- Any other information considered necessary by the occupier to ensure safety And health of the workers.

4.5.2 KEY PERSONNEL & ESSENTIAL STAFF

They will be available in all shifts because of the planning on call. But due to some reasons if some are outside or not on duty and if theirs help is required, updated list is kept in the emergency control room for calling them. **Annexure-17 & Annexure - 18**

The names are listed in order of priority and without wasting time information is passed on to all the key personnel.

While making contacts, the communicator will brief him about the emergency declared.

4.5.3 IN EVENT OF OFF SITE EMERGENCY -TO OUTSIDE EMERGENCY SERVICES & AUTHORITIES:

Once the declaration is made, it is essential that the outside emergency services and inside emergency services as given in **Annexure – 23 © and 28** will be called.

The emergency will be immediately communicated to the government control room and other authorities such as Fire brigade, Police, District emergency authority, Factory Inspectorate, Hospital etc. through immediate telephone message.

The statutory information to above authorities will be supplied before so that they can be well prepared to operate their off-site emergency control plan.

4.5.4 TO NEIGHBOURING FIRMS & GENERAL PUBLIC:

A major emergency may affect areas outside the works. A surrounding public will be alerted with public alarm system as mentioned before. The police will undertake any necessary action to safeguard the public visiting of the affected area.

The statutory information to the general public will be given to them for their emergency preparedness. The information, which will be conveyed, is given here:

- Name of the factory and address where situated.
- Identification, by name and position of the person giving the information.

- Confirmation that the factory has approval from the Factories Inspectorate and Pollution Control Board.
- An explanation in the simple terms of the hazardous process(s) carried on in the premises.
- The common names of the hazardous substance used which could give a rise to an accident likely to affect them, with an indication of their principal harmful characteristics.
- Brief description of the measures to be taken to minimize the risk of such an accident in compliance with its legal obligations under relevant safety status.
- Salient features of the approved disaster control measures adopted in the factory.
- Details of location form the factory's emergency warning system for the general public.
- General advice on the action, members of the public should take on hearing the warning.
- Brief description of arrangements in the factory including liaison with the emergency services to deal with foreseeable accidents of such nature and to minimize their effects.

CHAPTER 5 - ON SITE ACTION

5.1. PRE-EMERGENCY ACTIVITIES

5.1.1 INTERNAL SAFETY SURVEYS & INSPECTIONS

Internal Safety Survey is conducted with the members of Works Safety Committee / Departmental Safety Committees and Plant Officers periodically. As per the extract of the survey preventive maintenance is carried out on priority to avoid any emergency. Safety officer checks all the safety protective equipment and safety installations and controls regularly.

Fire system, fire water pump, condition of extinguishers etc. are checked by Fire department regularly.

5.1.2 THIRD PARTY INSPECTION & AUDIT

We invite third party for detailed survey of the plant as per frequency of Gujarat Factory Rules (GFR) 1963. This audit is carried out as per Indian Standard (IS14489) other focussed Audit is also carried out as and when required.

5.1.3 PRESSURE TESTING

We are maintaining list of all the pressure vessels. We are arranging its testing of the same as per the statutory rules by `Competent Person' certified by DISH, Gujarat and Records available.

5.1.4 NON DIESTRUCTIVE TESTING

NDT are carried out regularly as per the statutory requirement through consulting agents. Records are maintained along with their reports for further course of action.

5.1.5 SAFETY VALVE / RELIEF VALVE TESTING

We have prepared a list of safety relief valves for different departments of factory.

Instrument people and maintenance people of respective department are testing their functioning periodically.

Repairs or replacement of safety relief valves are being done as per requirement.

5.1.6 FIRE SYSTEM INSPECTION

We have prepared the list of fire hydrant, other fire equipment and maintaining the same to keep them in best operating condition. All the fire equipment are checked and maintained regularly.

5.1.7 MUTUAL AID SERVICES

Organisation is active member of Jamnagar and DevbhoomiDwarkaDistrict Mutual Aid Scheme. Telephone nos. & Contact people etc. are kept current as per QSW-730-GEN-25.

Other Individual departments are geared to initiate action and take care of emergencies. Full scale Mock Drill is being organised once in six months.

5.1.8 TRAINING

We are conducting regular training programmes category wise to enhance our preparedness in responding to major emergency or disaster.

5.1.9PROTECTIVE EQUIPMENTS

We have kept emergency cupboards containing all the necessary personal protective equipment at various places of the factory. We are conducting training programmes and refresher courses on the use of personal protective equipment for the workers every month.

5.1.10 COMMUNICATIONS

We are having very efficient and wide spread telephone network inside factory and town which serves as the backbone of our communication system. Apart from internal telephone we are also having sufficient numbers of external landline & mobile telephones, STD, FAX, E - MAIL, V Sat telephone WIRELESS systems are available.

We are having high fidelity siren system, which can be operated in case of any emergency, which will be easily audible in a radius of 10 km from the factory. We have wind direction indicator and our Technical Library Dept. measures anemometer records of wind direction and wind velocity.

5.1.11 EMEREGENCY LIGHTS

We have our own Thermal Power Plant which is efficient and reliable. Normally we supply surplus power to GEB grid. We can also draw power through the same synchronization system from GEB in case of emergency. We have also commissioned an emergency diesel generating sets.

All shift officers are key personnel's who are provided with pagers for immediate access to deal with the emergency and operators are provided with high intensity torch lights. Emergency lights are provided at several places of the liquid chlorine, Soda Ash and other sections.

5.1.12 EMERGENCY CONTROL ROOM / SHADOW EMERGENCY CONTROL ROOM

Emergency control room is situated inside Administration Office Building. Control room is situated in an area of minimum risk and close to the road. Shadow

Emergency Control Room is situated in SurakshaSanskar Kendra (SSK) outside plant.
Control room has the following facilities:

- Internal telephone
- Plans of the factory
- Plans of the location
- Copies of on-site off-site emergency plan
- Stationery
- P & T Telephone.
- Internet connection.
- PPE's

The following additional facilities can be extended to the Emergency Control Room as and when emergency arises.

- Fax
- Computer/Laptop

5.1. 13. ASSEMBLY POINTS

In case of emergency it will be necessary to evacuate all personnel from effective area except personnel who will be directly involved in dealing with the incident. On evacuation people will go to pre assigned assembly points, which are as under:

a.	Near Car Parking	Nearest. Tel. No.- 5403
b.	Near Salt Office	Nearest Tel. No.- 5691
c.	Near Soda Ash Go-down	Nearest Tel. No.- 5329/5330
d.	Near Security Out Post (Cement plant)	Nearest Tel. No - 5926
e	MUW 4	Nearest Tel no - 5896
f	FHTP ground	Township
g	AshapuraMataji Temple	

Asst. Manager - Security will be In-charge of the assembly points and he will handle the situation as per the directions received from Incident Controller and Main incident controller from the control room.

As per the demand of scene he will utilize the coordinated services of other Departments and crew like Safety, Fire, OHC, Transportation, Security, and Personnel Dept.

Easily readable board indicating the assembly point will make easy task for other person to be gathered.
All the emergency assembly points are having telephone facilities.

5.1.14 LIASION WITH STATE AUTHORITIES

Government authorities, local hospital, police fire services, TalukaMamlatdar, district collector and factory inspectorate will be kept informed about the occurrence and

development of any incident by incident controller, main incident controller or factory manager to procure necessary help and guidance from these authorities.

5.1.15 HOSPITAL FACILITIES

Company has own ambulance room, an Occupational health centre (First Aid Centre) for emergencies in the working hours with qualified doctor & trained staff and a fully equipped hospital situated about 700mtrs. From the factory premises. Main hospital is fully equipped with necessary instruments &equipment, Operation Theatre, modern amenities, medicines, antidotes and qualified competent, dedicated staff. It has got sufficient space, capacity and sited in a safe place avoiding normal down wind direction.

The ambulance service is available round the clock, fully equipped as per statutory provisions. Driver can be contacted on Telephone No. 5333.

5.1.16OUTSIDE SHELTERS

Outside shelters will be provided with required facilities viz. medicine, food and communication system wherever necessary. List of the outside shelter is as under.

Place	Phone No.	In-charge person
Seashore - Mithapur	5281	Head - Estate Management Services
Mithapur High School	5771	Principal ¯ Mithapur High School
DAV school	5894	Principal ¯ DAV School
Mithamahal	5281	Head - Estate Management Services.
MangalKaryalaya	5281	Head - Estate Management Services

5.1.17 STATUTORY INFORMATION

Statutory information is conveyed to workers, public and government authority by Factory manager and main incident controller as per the demand of emergency

5.2 DURING EMERGNECY

Who so ever notices potential or emergency situation shall inform the Fire Station or concerned plant engineer

The information is immediately received by Incident controller, who reaches the spot of incident. He assesses the situation. He then decides on the level of emergency, gives decision of declaration. In case of potential off site emergency he consults the Site Emergency controller before declaration.

Each key person and groups get into performing duties as prescribed to them.

Plant personnel will approach systematically to combat emergency situation as per the directive received from the Incident Controller under the supervision of Dy.Incident Controller and Departmental Heads. Shift In-charge will divert the essential workers and other concerned operators and maintenance personnel to control emergency and if necessary will initiate action to safe shut down of plant as per laid down procedure.

Simultaneously, line communication will be continued from control room to link the co-ordination between internal and outsides agencies.

5.2.1 CONTROLLING THE EMERGENCY

i. **FLAMMABLE RELEASE**: Since we are not dealing with hydrocarbons this situation does not arise. However, we are having well equipped Fire Control dept., headed by fire officer with trained persons and sufficient fire protective equipment to combat this type of emergency which is rarely expected.

ii. **TOXIC RELEASE**

i. **SLOW OR INTERMITTENT RELEASE**:

Release of these types will be immediately known due to their chemical properties of irritant & varying specific order. This will be attended immediately by our standard procedure under the competent supervision of Asst. Manager level person. Considering gravity of condition if necessary, people nearest to the site of release and most closely downwind of it will be evacuated to safe place.

ii. A fire or mechanical damage that threatened an installation containing toxic material is very unlikely. Our installation of Ammonia and Chlorine are situated in isolated area away from adjacent plant and machinery. These installations are provided with secured fencing and sufficient number of fire hydrant for both installation and remote control water spray for ammonia installation.

iii. Rapid events with limited duration e.g. fracture of a component that could be isolated within a reasonable time. Incident that grow and rapidly controlled should not be met by evacuation. Any toxic cloud formed would be limited in size and would be likely to drift past particular spot relatively quickly. People are instructed to move away at right angle to the wind direction. Even in emergency such release will be of very short duration. The best places for the people in the area would be to remain indoors, upstairs or in close room as release will last for short time.

iv. A major event leading to sudden release of a large quantity of a toxic substance, which would form a large toxic cloud e.g. release to atmosphere of most of the contents of a storage vessels through the failure of a tank shell, manhole cover etc. : The probability of such occurrences is extremely low. In case of such incident the role of emergency services would be rescue, treatment of the injured, evacuation of personnel, and making the affected area safe. Approach of the emergency services will be as under:

- **ALARM RAISER**: He will immediately raise the alarm / siren on receiving the message of an emergency in predefined tone.

- **TELEPHONE OPERATOR**: Will help to communicate necessary information to relevant person and will also receive and convey the information from incident place to the concerned person in control room.

- A team of key personnel including Sr.Officer of production, Safety, Security, Fire, Gas control, Pollution control, Medical services, Transport, Engineering, Technical services, Stores, Power Plant, Personnel will contact to the incident controller and work to control emergency as per the directive received from him.
- On hearing the major emergency siren key personnel will report to the emergency control room.
- Everyone else shall report to predetermined place viz. Their normal work place, an emergency assembly point to wait for further instruction.

- To call essential worker with help of essential worker & he will try to contain and control the incident. Direct the plant people for safe shut down of the plant if necessary.
- Incident Controller shall inform the action on site to the Site Main Controller and will work under his direction and his best judgment.
- Guide Fire Fighting Team.
- Organize the help from all expert team as may be required.
- Prevent the spread and control the situation within the shortest time.
- Some standing instruction for persons assigned for specific duty is as under :

5.2.2 EVACUATION AND TRANSPORTATION

Non-essential personnel will be evacuated from the incident area and also from the adjacent areas. For the above purpose all will gather at one or more than one of the safe assembly point considering the wind direction. In charge person of safe assembly point will inform the control room about the people from the effected and adjacent area. Due care shall be taken to confirm all the person from effected area has reached to assembly point. Due care shall be taken for evacuation especially of pregnant ladies and persons with disabilities.

5.2.3 SAFE SHUT DOWN

Operation personnel have been trained for this purpose and will act immediately in case of emergency.

5.2.4 USE OF MUTUAL AID

Tata chemicals Mithapur is active member of district crisis group named mutual Aid Scheme (MAS). All MAH industries of Jamnagar District and non-industrial organization are member of this scheme. Regular meeting and mock drills are conducted under the guidance of Dist. Collector.

5.2.5 USE OF EXTERNAL AUTHORITY

Help of the outside authority will be utilised as per the requirement of the emergency. List of telephone numbers of pre-consented outside authorities will be readily available in control room prepared as per **Annexure-31.**

5.2.6 MEDICAL TREATMENT

Prompt medical treatment will be given to injured persons. As prescribed in **Annexure-17**. As mentioned earlier our in plant clinic and Town hospital is well equipped with sufficient numbers of doctors and other medical staff with the 120 beds. In addition, medical help may be procured from surrounding private and government doctors from Surajkaradi, Okha&Dwarka.

5.2.7 HEAD COUNT

List of the persons present at site will prepared by Personnel dept. on the base of ' in timings ' print on punch cards and signature of officers in musters. Shift supervisor will help to recall exact persons present under him.

- Similarly, contractors will also check their persons present at site.
- Further procedures to accounting the persons may split as under:
- Incident controller will instruct to find out if any casualty is there.
- Record of the name, area etc. will be prepared about casualties at site.
- Persons assisting to In charge of safe assembly point will record the names and departments of people reporting at assembly point
- Information collected from assembly point, plant supervisor, hospital etc. will be compared.

5.2.8 ACCESS OF RECORDS:

In case any casualties occur their relatives will be informed through HR department managers. List of the names and address of all employees & their dept. type of work, shift schedule will be kept ready all the time for this purpose.

5.2.9 PUBLIC RELATIONS

Site Main Controller will inform about emergency and its consequences to news media & government authorities. Other will not divulge information on their own since it may be inaccurate and misleading.

5.2.10 REHABILITATION

Emergency will be declared ended by incident controller only after the concrete confirmation of the controlling of even a little danger. Due care shall be taken to enter the affected areas. No work to remove salvage material, collection of evidence shall start before thoroughly examination of the area has been carried out. Other person than emergency squad will not enter in the area without pre-permission of security officer.

5.3 POST EMERGENCY ACTIVITIES

Post emergency activities will include following steps:

Collection of record: Exact information shall be collected regarding the cause of emergency so that remedial measures can be suggested to prevent such recurrence.

Detailed inquiry shall be conducted to find out cause which will be in form of fact finding committee comprising Sr. Executives. Recommendations of the committee will be complied with on priority.

Insurance claim section of the factory will work to avail the claims for damage due to consequences of an emergency.

Sufficient care will be taken to rehabilitate affected persons if any, suitably. Post medical check-up of the affected persons, necessary medical aid will be provided.

CHAPTER 6 - OFF SITE EMERGENCY PLAN

6.1 OBJECTIVESOF OFF-SITE EMERGENCY PLAN:

a. To protect persons and properties of the factories in general and the affected community as a whole.

b. To identify, assess, foresee and work out various kinds of probable hazards, their place, potential, damaging capacity and area in case of all accidents, dangerous occurrence (Rule 102, Gujarat Factories Rules). Emergencies and disasters happening in or affecting the jurisdiction at any time. In this regard it coincides with the purpose of on-site emergency plan of a factory, and will go through the on-site emergency plans of all factories in the jurisdiction and will guide or suggest the missing aspects if any. The on-site plans will be considered in advance while making and operating this disaster plan. Thus on-site and off-site plans together will be single and co-operative `package' for the common purpose of fighting the emergency. Modifications in the plants and quantity of materials may be suggested if necessary.

c. To make explicit the inter related set of actions to be undertaken in the event of an industrial accident posing hazards to the community.

d. To inform people and surrounding about emergency and disaster if it is likely to adversely affect them. Machinery will be established for this purpose to guide the people in proper way.

e. To plan for rescue and recuperation of casualties and injuries. To plan for relief and rehabilitation.

f. To plan for evacuation, safe assembly points and transportation required.

g. To plan for prevention of harms, total loss and recurrence of disaster. It will be ensured that absolute safety and security is achieved within the shortest time.

h. To contain, limit, localise and minimize the loss and damage to persons, property and environment raised from the accidents on road or industry, transport, storage or otherwise. To plan to decrease the potential levels of risk.

i. To prevent the spread and repapering of the disaster.

j. To plan for review, rectification or modification of this disaster plan on the ground of actual experience.

k. To plan for communication meeting with industries, authorities, experts, institutions, doctors, hospitals etc.

l. To prepare a site plan identifying industries, hazardous points, control points, assembly points, hospitals, dispensaries, fire station, police station, railway station, bus station, transport points, roads and all other requisite details.

m. To verify the information given by the industries to comprehend dangers and to arrange for adequate personal protective, firefighting and emergency equipment.

n. To establish command structure and to identify the respective roles of the senior personnel of various service groups, viz. police commandos, experts group, para medical group, toxicity control and de-contamination squad and various authorities of water, power, gas, health, labour, environment, revenue, explosive, pollution control, press, post, telephone wireless, railway, transport & social services etc. Necessary representatives of employers and employees shall also be incorporated. Various organisation, their duties, equipment, implementation procedure and actions on-site and off-site, warning system communication system, co-ordination system, control centres, key personnel shall be prescribed.

o. Plan to carry out training programmes in safety, health and environmental protection for the concerned parties. Necessary publication will also be useful.

p. To maintain full liaison between all parties to this plan, industries, emergency services etc.

q. To plan for the antidotes, remedial medicines and equipment in the hospitals and to carry out research for them for latest and effective measures. Sufficient stock and mutual aid scheme will be useful.

r. To provide for continuous monitoring system for essential parameters of pollution to judge malfunctioning at the initial stages and warning systems at appropriate places. Meteorological information regarding prevailing weather conditions, wind velocity and direction, rain and flood data for such data-collection.

s. To appoint a record keeper, historian and staff to collect information on the cause of disaster and to maintain the record thereof and also of the plan-proceedings.

6.2STRUCTURE OF OFF SITE EMERGENCY PLAN

Incident controller will manage the activities for off-site emergency plan under the guidance of Site Main Controller who will be contact with emergency co-ordination officer of the area, Dy. incident controller, essential workers, and production staff, key personnel will work in co-ordination with outsides available help under the instruction of Site Main Controller.

a.	*Main Incident Controller*	:	*Mr. B. B. Kathpalia*
b.	*Incident controller*	:	*Mr. M S S Rao*
c.	*Dy. Incident controllers*	:	*Mr. N Kamath*

6.3 COMMUNICATION

Telephone Operator at reception room will operate the communication system. Help of the Telephone Operator of local telephone exchange will be sought.

6.4 SPECILAISED EMERGENCY EQUIPMENTS

Heavy lifting gear, Dumpers/Tipper trucks, Bull drovers with Drivers etc. will be available with Transport department. Name of the In-charge person Mr. Sanjay M Bhayani, Phone No. 5248 (Office) and Res. 6248.

6.5 SPECILISED KNOWLEDGE:

Head of Engineering Services & Manager - Environment Management System

6.6 VOLUNTARY ORGANISATION

Benefits of the specialised knowledge of in charge persons of the following dept. will be taken:

Name of Organisation	Address
Home Guards	Opp. New Rekadi Bazar. Phone No-02892-666505,2892-223507
NCC Unit of The School	Mithapur High School Phone No - 5768

6.7 CHEMICAL INFORMATION

6.7.1 STORAGE OF HAZARDOUS CHEMICALS

- Ammonia
- Chlorine
- Bromine

6.7.2 TYPE OF RISK ASSOCIATED

Toxic release: Please see **Annexure - 2**

6.8 METEOROLOGICAL INFORMATION

Information regarding weather condition will be readily available from Technical Library Tel. No. - 5317.

6.9 HUMANITARIAN ARRANGEMENT

6.9.1 TRANSPORT

Company's vehicle will be used for transportation purpose. In case of more requirement help of the company's transport contractors, S.T. will be taken.

6.9.2 EVACUATION CENTER - Person gathered at safe assembly points and other areas will be evacuated to safe places. Please see **Annexure-15**.

6.9.3 TREATMENT OF INJURED PERSONS - Mithapur town hospital and In-plant clinic.

Ambulance etc. will be available at Hospital; Fire dept. (Phone No. 5333 / 5461) Additional transportation transport dept. shall provide jeeps / other vehicles

6.9.4 PUBLIC INFORMATION

GM ¯Admin & Personnel or Sr. Manager ¯Admin will be dealing with media - Press Office. Informing to the relatives of injured or so will be given by Head -Security and Police department.

6.9.5 ASSESSMENT

Information will be accurately collected to find out the cause of emergency.

Emergency planning will be reviewed to make it more effective and efficient. Necessary change will be made.

6.10 ROLE OF FACTORY MANAGEMENT

Site Main Controller will provide copy of the onsite emergency plan to District Authorities, Factory Inspectorate and Emergency Services so that information from the various annexures, authorities will make their emergency preparedness to formulate and execute area of off-site emergency plan.

6.11 ROLE OF EMERGENCY CO-ORDINATION OFFICER (ECO)

ECO will liaise closely with main incident controller. In case of severe incident external control may be given to senior local authority or even an administrator appointed by government. Mr. D K Thakur ¯ AGM - Safety & Health in lieu of him shall be Emergency Coordination Officer.

6.12 ROLE OF THE LOCAL AUTHORITY

Local authority will appoint **Emergency Planning Officer**. It will be responsibility of the EPO to ensure that those entire organisation which will involve off-site emergency plan in handling of emergency know their role and able to accept it by having sufficient staff. Appropriate equipment to cover their particular responsibilities will help to organize rehearsals for off-site emergency plan.

6.13 ROLE OF THE FIRE AUTHORITIES

a. On hearing the emergency proceeds immediately to the site.
b. Firefighting, help in firefighting and guiding firefighting operations by other agencies.
c. Divert the work force towards the pre decided assembly points.
d. Give instructions to all security people not to allow people other than the key personnel and essential workers.
e. If necessary, control the traffic inside the work area.
f. Keep the Incident Controller informed on the fire & rescue measures.

6.14 ROLE OF THE POLICE AND EVACUATION AUTHORITIES

Police service will work for the protecting life and property controlling the traffic movement, bystanders, identifying the dead dealing with causalities and informing to the relatives of dead or injured. Apart from above police will help to evacuate more assigned people to the safe place.

6.15 ROLE OF THE HEALTH AUTHORITIES

Health authority will be prepared to treat injured affected people with the optimum use of resources available with them. External help may be taken from surrounding private and government clinic.

6.16 ROLE OF "MUTUAL AID SCHEME" MEMBER'S

Surrounding government agencies will help to control the emergency and contribute their efforts to deal with its consequences. Following outside agencies will be contacted in case of major emergency.

6.17 ROLE OF ASST. DIRECTORATE OF INDUSTRUAL SAFETY & HEALTH

Asst. Director of Industrial Safety & Health (DISH) will observe the rehearsal of off-site. Emergency plan will suggest correction to make it fail-safe. In event of an accident, the Asst. DISH will assist the district emergency authority for information and available help from surrounding area. FI will ensure that affected areas are rehabilitated safely after the incident. They will investigate to find cause of incident and may also interview the witness. Communication will be maintained effectively between Site Main Controller and Asst. DISH.

CHAPTER 7 - NATURAL CALAMITIES MITIGATION PLAN

Natural Calamities are the occurrence that causes damage, economic disruption, loss of life and deterioration of health and health services on sufficient scale to warrant an extraordinary response from outside the affected community or area or it is a crises situation which cannot be dealt by the affected community with its own resources. Classification of Natural Calamities:
Natural Calamities can be classified as under-

Wind related: Cyclone, Tornado
Water related: Flood, Cloudburst, Excessive rains, Draught
Earth related: Earthquake, Tsunami, Landslides, Volcanic eruption, and Soil erosion
Due to natural reasons: Forest fire, Epidemic

Any of the above mentioned calamities may lead to emergency in & around the plant and community nearby area. Any of the above mentioned calamities may trigger manmade emergency cited earlier in this plan. To declare emergency same three level of emergency structure shall be followed as mentioned in chapter three.

As a matter of fact natural calamities being act of God cannot be controlled, though better awareness and preparedness play a vital role in faster restoration. Some do's and don'ts for various natural calamities are mentioned below as part of awareness.

7.1 Earthquake - Safety

- ✓ Tell the facts about earthquake to your family members
- ✓ Construct new buildings with earthquake resistant method and strengthen the old buildings
- ✓ Insure your house and family members
- ✓ Take the training for first aid and fire fighting
- ✓ Keep your important documents, some cash and necessary articles ready in a bag
- ✓ Get your house insured before the earthquake
- ✓ Identify special skills of neighbour (medical, technical) so that it can be utilized in emergency
- × Do not keep cots near the glass window
- × Do not keep heavy and fragile things in the selves
- × Do don't hang photo frames, mirrors, or glasses up your bed

7.1.1During Earthquake

- ✓ If already inside, than Stay indoors! Get under a heavy desk or table and hang on to it.
- ✓ If fire breaks out, drop on the floor and crawl towards the exist
- ✓ If you are out doors during the quake, keep away from buildings, trees and electricity lines. Walk towards open places, in a calm and composed manner.
- ✓ If you are driving, quickly but carefully move your car as far out of traffic as possible and stop.
- ✓ If you are in a school, get under a desk or table and hold on.
- ✓ Do not stop on or under a bridge or overpass or under trees, light posts, power

lines, or signs. Stay inside the car until shaking stops.
- ✓ Do not panic.

7.1.2 after the Earthquake

- ✓ Switch off electric lines.
- ✓ Listen to radio-TV and other media for Government Announcement.
- ✓ Check for injuries to yourself and those around you. Take first aid where you can.
- ✓ Extinguish fire, if any.
- ✓ Examine walls, floors, doors, staircases and windows to make sure that the building is not in danger of collapsing.
- ✓ Inspect for Gas leaks-If you smell gas or hear blowing or hissing noises, open a window and quickly leave the building. Don't light your kitchen stove if you suspect a gas leak.
- × Do not keep telephone lines busy unnecessarily.
- × Do not be panic of the aftershocks.
- × Do not enter into the unsafe or risky houses or buildings.

7.2 Flood- Safety

7.2.1 Do's and Don'ts after flood

- ✓ Where is a possibility of spread of water borne diseases after flood, and hence medical treatment should be taken immediately.
- ✓ Sprinkle medicines in the stagnant dirty water.
- ✓ Inspect your house for any cracks or other damage. Check all the walls, floor, Ceiling, doors and windows, so that any chance of house falling down can be Known and you can be aware about the immediate danger.
- ✓ If the floodwater has entered the house or has surrounded the house, then it is Advisable not to enter such house
- ✓ Keep listening to weather forecast on radio and television. Move to your residence only when instructed by the competent authority. It is not safe to believe that the problems have ended after the flood water have receded
- ✓ Inform the competent authority/officer for restoration of the necessary connections like gas, electricity, telephone, drainage, etc.
- ✓ Beware of the various insects or poisonous snakes that may have been dragged inside the house along with the floodwater.
- ✓ Destroy the food commodities that have been affected by floodwater.
- ✓ Check properly all the electric circuits, floor level furnace, boilers, gas cylinders, or electric equipment like motor pump etc. Check whether any inflammable or explosive item has not entered along with the floodwater.
- × Do not enter deep, unknown waters.
- × Do not go near the riverbank even after the floodwater has receded.

7.3 Cyclone - Safety

A cyclone is a storm accompanied by high speed whistling and howling winds. It brings torrential rains.

7.3.1 Where does a cyclone come from?

A cyclonic storm develops over tropical oceans like the Indian Ocean and Bay of Bengal and the Arabian Sea. Its strong winds blow at great speed, which can be more than 118 kilometres per hour.

7.3.2 What are the visible signs of a cyclone?

When a cyclonic storm approaches, the skies begin to darken accompanied by lightning and thunder and a continuous downpour of rain.

7.3.3 How does a cyclone affect us?

- A cyclone causes heavy floods.
- It uproots electricity supply and telecommunication lines. Power supply shuts down and telephones stop functioning.
- Road and rail movements come to halt because floods damage rail tracks and breach roads. Rail movements are also disrupted because of communication failure.
- The inclement weather conditions also disrupt Air services. Seaports stop work due to high winds, heavy rains and poor visibility. Sometimes ships overturn or are washed ashore. The high speed winds bends and plucks out trees and plants.
- A cyclone tears away wall sidings and blows off roofs of houses.
- Houses collapse and people are rendered homeless. In villages kachha houses get blown away. The speeding winds cause loose metal and wooden sheets to fly turning them to potential killers. Broken glass pieces can cause serious injuries.
- The floodwaters can take time to recede.
- The floodwaters can turn the fields salty.
- Bridges, dams and embankments suffer serious damages.
- Floods wash away human beings and animals and make water unfit for drinking.

There can be outbreak of diseases like Cholera, Jaundice or Viral fever due to intake of impure water. Water gets contaminated because of floating corpses of animals and human beings and mixing of sewage stored food supplies, gets damaged.

7.3.4 Some Facts about Cyclone

In Gujarat, the Saurashtra-Kachchh region experiences a cyclone. The port towns of Veraval, Porbandar, Jamnagar, Dwarka, Okha, Kandla and Bhavnagar and other minor port towns suffer most.

It is often difficult to predict where a cyclone will strike. When it starts moving from oceans (in Gujarat it is Arabian Sea) towards the land area, a cyclone can change track and hit areas other than those anticipated earlier.

Indian Meteorological Department has developed a four-stage warning system for a cyclone.

How does the system operate?

This warning is about the possibility of a cyclone when a low pressure depression develops in oceans. For Gujarat, the development of such a depression in the Arabian Sea is indicative of a cyclone attack.

The Alert stage
This warning is given 48 hours prior to the time when a cyclone is expected to hit the land.

The Warning stage
This is the stage when a cyclone gets formed. The warning is given 24 hours before the anticipated time of arrival of a cyclone.

Cyclone arrival
This warning is issued 12 hours before a cyclone is due to hit the land. The warning gives information about cyclone and will continue until the winds subside. In sea ports, danger signal are hoisted about the impending cyclone.
From where can people access cyclone storm warnings?

Warnings about storms,
Their intensity and the likely path they may take are regularly broadcasted by radio and television network continuously until the storm passes over.

7.3.5 What to do before and during a cyclone.

- ✓ Have your dwellings checked before a cyclone season starts and carry out whatever repairs that are needed.
- ✓ Talk to children and explain about cyclones without scaring them.
- ✓ Create storm awareness by discussing effects of a cyclonic storm with family members so that everyone knows what one can and should do in an emergency. This helps to remove fear and anxiety and prepares everyone to respond to emergencies quickly.
- ✓ Keep your valuables and documents in containers, which cannot be damaged by water.
- ✓ Keep information about your blood group.
- ✓ Keep lanterns filled with kerosene, torches and spare batteries. These must be kept in secure places and handy.
- ✓ Make plans for people who are either sick, suffer from disabilities, aged and children.
- ✓ Store up at least seven-day stock of essential food articles, medicines and water supply.
- ✓ Keep blankets & clothes ready for making beds. Also keep cotton bandages and several copies of photographs of family members in case they are needed for identification purposes after the storm.
- ✓ Store some wooden boards so that they can be used to cover windows.
- ✓ Keep trees and shrubs trimmed. Remove damaged and decayed parts of trees to make them resist wind and reduce the potential for damage. Cut weak branches and make winds blow through.
- ✓ All doors, windows and openings should be secured.
- ✓ Continue to listen to warning bulletins and keep in touch with local officials. Keep radio sets in working condition. Battery powered radio sets are desirable.
- ✓ Evacuate people to places of safety when advised.

- ✓ Take steps to protect your assets.
- ✓ Store extra drinking water in covered vessels.
- ✓ Remain calm.
- ✓ During the storm do not venture out unless advised to evacuate.
- ✓ If you have a vehicle and wish to move out of your house, leave early before the onset of a cyclone. It is often best to stay at home
- × Avoid remaining on the top floor of dwellings. Stay close to the ground.
- × Fishermen are advised not to venture out into the sea. They should keep boats and rafts tied up in a safe place.
- × Avoid taking shelters near old and damaged buildings or near trees.
- × Do not touch power lines. One may get electrocuted.

7.4Storm - Safety

- ✓ Watch out for broken glass and other sharp items in debris.
- ✓ Watch out for snakes and insects. Try to call for help.
- ✓ Listen to the advice of local officials and emergency workers.
- ✓ Be sure that the storm has subsided before venturing out.
- ✓ It is advisable to wait for the "all clear message" on radio and TV networks.
- ✓ Wait for emergency relief teams to arrive. It may take a little time before relief becomes effective.
- ✓ Stay away from flooded areas.
- ✓ Fishermen should wait for at least 24 hours before resuming fishing.
- ✓ Volunteer to help people who may need assistance like:
- Bringing evacuated people back home and in recording damages suffered
- Rendering first aid to the wounded
- Donating blood
- ✓ Locating places where dead bodies can be kept until they are disposed of.
- ✓ Organizing clearing-up so that normalcy returns as soon as possible.

7.5 Tsunami - Safety

The phenomenon Tsunami is a series of traveling ocean waves of extremely long Length generated primarily by earthquakes occurring below or near the ocean floor: Following safety measures needs to be learnt before, during and after the occurrence of tsunami:

7.5.1 Before

- ✓ Be familiar with the tsunami warning signals. People living along the coast should consider an earthquake or a sizable ground rumbling as a warning signal. A noticeable rapid rise or fall in coastal waters is also a sign that a tsunami is approaching.
- ✓ Make sure all family members know how to respond to a tsunami. Make evacuation plans. Pick an inland location that is elevated.
- ✓ After an earthquake or other natural disaster, roads in and out of the vicinity may be blocked, so pick more than one evacuation route.
- ✓ Teach family members how and when to turn off gas, electricity, and water
- ✓ Children should be taught in advance about the evacuation plans
- ✓ Prepare emergency kit beforehand. The emergency kit should contain Flashlight and extra batteries, battery-operated radio and extra batteries, First aid kit,

Emergency food and water, Essential medicines, etc.

7.5.2 During

- ✓ Listen to a radio or television to get the latest emergency information, and be ready to evacuate if asked to do so.
- ✓ If you hear a tsunami warning, move at once to higher ground and stay there until local authorities say it is safe to return home.
- ✓ Move in an orderly, calm and safe manner to the evacuation site
- ✓ Stay away from the beach. Never go down to the beach to watch a tsunami come in.
- ✓ If you can see the wave you are too close to escape it.
- ✓ Return home only after authorities advise it is safe to do so.

7.5.3 After

- ✓ Stay tuned to a battery-operated radio for the latest emergency information.
- ✓ Help injured or trapped persons.
- ✓ Stay out of damaged buildings. Return home only when authorities say it is safe.
- ✓ Enter your home with caution. Use a flashlight/torch when entering damaged buildings. Check for electrical shorts and live wires.
- ✓ Open windows and doors to help dry the building.
- ✓ Shovel mud while it is still moist to give walls and floors an opportunity to dry.
- ✓ Check food supplies and test drinking water.
- ✓ Fresh food that has come in contact with flood waters may be contaminated and should be thrown out.
- × Do not use appliances or lights until an electrician has checked the electrical system.

7.6 Thunderstorm & Lightning Strikes – Safety

Thunderstorm is invariably accompanied by lightning A single stroke of lightning has 125,000,000 volts of electricity. That's enough power to light a 100-watt light bulb for more than 3 months, or enough to seriously hurt or to kill someone. Knowing what steps to take in the event of an oncoming thunderstorm & lightning can save lives. Lightning is something you should not be careless about, so Seek a safe shelter immediately. Be warned, lightning can and does strike just about any object in its path. *HCL plant and cell house will be shut down during Thunderstorm & Lightning*. When you see lightning, follow these safety rules.

7.6.1 Indoors

- ✓ **Stay or go indoors** if you hear thunder, don't go outside unless absolutely necessary. Stand clear from windows, doors and electrical appliances.
- ✓ **Stay away from anything that could conduct electricity.** This includes fireplaces, radiators, stoves, metal pipes, sinks and phones. Unplug appliances well before a storms nears ¯ never during.

- × **Don't use any plug-in electrical appliances** like TV, music systems, mixers/blenders, iron press, hair dryers, or electric razors. If lightning strikes your house they can conduct the charge to you.
- × **Don't use the telephone during the storm.** Lightning may strike telephone

lines outside. Use the telephone only for emergencies quickly. Avoid contact with piping including sinks, baths and faucets.

7.6.2 Outdoors

- ✓ **When outdoors, seek shelter from lightning** Building are best for shelter, but if no buildings are available, you can find protection in a cave, ditch, or a canyon. Tress is not good cover! Tall trees attract lightning. Never use a tree as a shelter.
- ✓ **Stay in your vehicle if you are traveling**. Vehicles give you excellent lightning protection. Get in a hard topped car.
- ✓ **Get out of the water.** This includes getting off small boats on the water. Immediately get out and away from pools, lakes, and other bodies of water.
- ✓ Victims of lightning shock should be administered CPM (cardio pulmonary resuscitation) i.e. artificial respiration, if necessary. Seek medical attention immediately.

- ✓ **When you feel the electrical charge** ¯ if your hair stands on end or your skin tingles ¯ lightning may be about to strike near you. Immediately crouch down and cover your ears.

- × **Do not lie down or place your hands on the ground.**
- × **If you can't find shelter, avoid the tallest object in the area.** If only isolated trees are nearby, your best protection is to crouch in the open, keeping twice as far away from isolated trees as the trees are high. Avoid areas that are higher than the surrounding landscape. Spread out ¯ don't stand in a crowd of people.
- × **Don't use metal objects outside.** Keep away from metal objects including bikes, electric or telephone poles, fencing, machinery, etc.

CHAPTER 8 - TRAINING, REHEARSAL AND RECORDS:

8.1 NEED OF TRAINING AND REHEARSAL

It is important for all employees to be thoroughly trained on emergency procedures. This includes the recognition of alarm signals, (initial alarm, emergency, evacuation); conduct of specific functions and use of specific equipment such as:

a. Plant control / shut down
b. Leak control
c. Fire fighting
d. Hazard reduction
e. Movement of equipment
f. Chemical analysis
g. Use of PPEs
h. Preventive maintenance etc.
i. Latest training aids such as audio-visual aids, slide projectors, OHP are used for training purpose.

8.2 TRAINING & AWARENESS

Every month training program is arranged for different category of people regarding The above mentioned points.

Firefighting demonstrations are carried out very often whenever there is a need. Also refresher courses and need based training programs are being carried out. Rehearsals would be conducted as soon as the plan is approved.

Community safety training programs and awareness sessions are organized for different groups of communities including school children.

Community volunteers have been trained for handling emergency with the help of United Nations Development program coordinator under the directives of Gujarat State Disaster Management Authority.

8.2.1 EMERGENCY INSTRUCTION BOOKLET: Booklets have been published and distributed to all residents of Mithapur Township & community volunteers

1. Guideline for Natural Calamities & First Aid (In Gujarati language)
2. Gas Leakage thiBachaav (In Gujarati & Hindi Language)

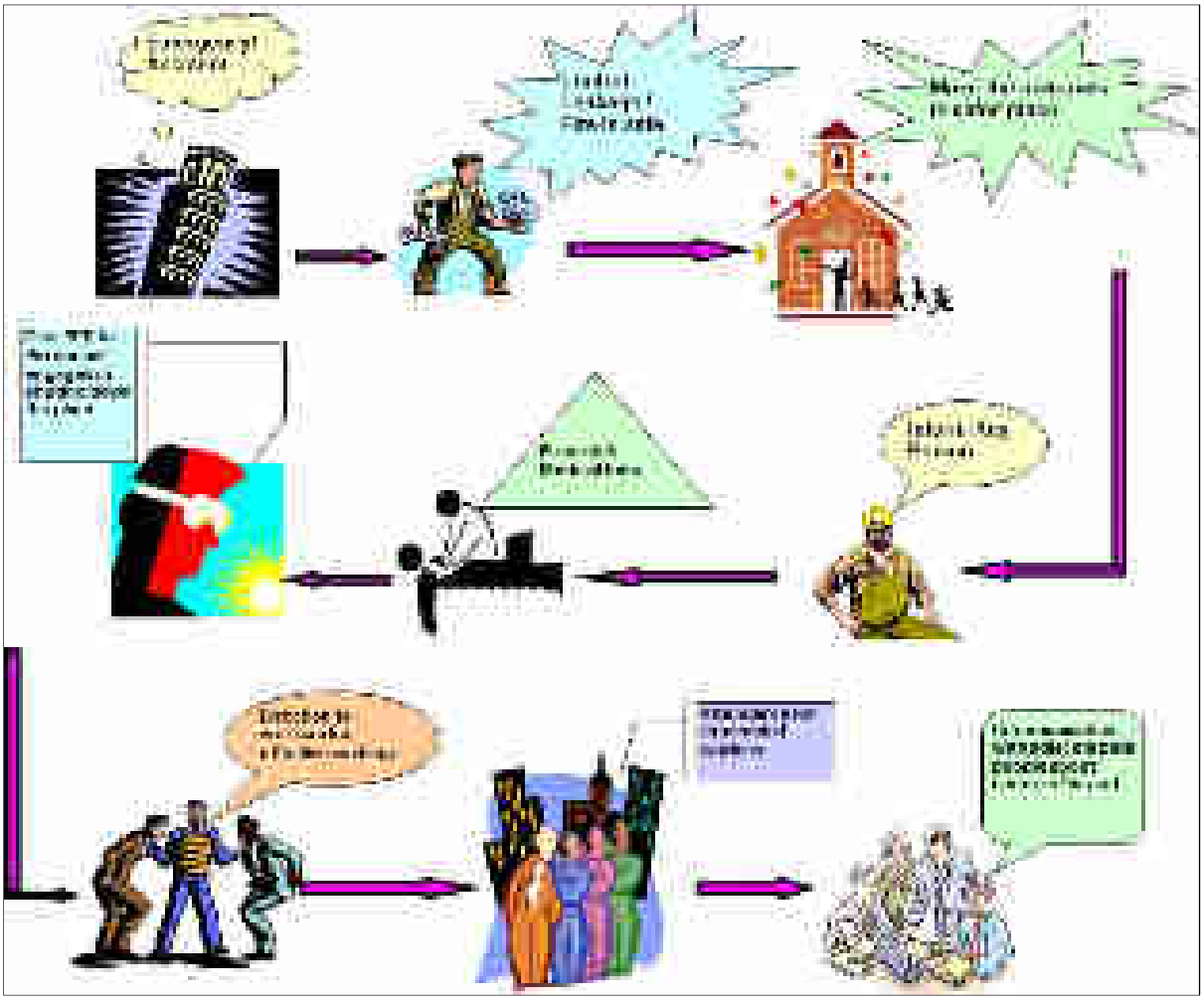
8.3 MOCK DRILL

Drills are conducted in Plants, hospital, schools etc. with our own staff and Off Site drill is conducted with the help of Mutual Aid Scheme members under the guidance of District Collector.

8.4 RECORDS

Records of such drills are maintained in standard format and compliance is taken up on priority.

WORK INSTRUCTION FOR ON SITE EMERGENCY PLAN



Business Continuity Plan

As a part of Crisis and Emergency Management System (CEMS) at TCL Mithapur, Emergency Management Team (EMT) is designated to manage any emergency arising from our business.

EMT Charter

The role of this team is to ensure the continuity of critical Business Functions at Mithapur site within the stipulated timeframes in the event of a major incident or outage which renders those functions inaccessible or unusable.

The key responsibilities of the team are;

- To ensure safety of operating assets and personnel while working out recovery of critical business processes
- To ensure alternate working measures are implemented to recover and maintain critical operating processes.
- To activate relevant support arrangements with 3rd parties to continue operating critical processes.
- To communicate with internal stakeholders and senior management about the status of disruption & recovery measures undertaken

EMT Team Composition

Sr.No.	Designation	Role
1	Vice President - Manufacturing	Leader
2	AVP ‾ Operation	Member & Alternate team leader
3	AVP ‾ Engineering Services	Planner
4	Dy. GM - HR & Administration	Member
5	GM-Civil & Mechanical Construction	Member
6	Dy. GM ‾ Cement	Member
7	General Manager - Electrical & Instrument	Member
8	Dy. GM - Supply Chain Management	Member
9	Dy. GM-Soda Ash	Member
10	Dy. GM -IBL & Mechanical Maintenance	Member
11	Asst. GM - Safety & Health	Member
12	Asst. GM - Production (CCG)	Member
13	Asst. GM - Power Plant	Member
14	Asst. GM - Production (Vacuum Salt)	Member
15	Sr. Official from Sales & marketing	Member

LIST OF ANNEXURES

ANNEXURE - 1 : IDENTIFICATION OF THE FACTORY

Full Name and Address of the Factory : TATA CHEMICALS LIMITED, MITHAPUR. 361 345 (Gujarat)

Phone No. Factory : **Office :02892- 665201**

Telex No. **Fax No. 02892 - 223361**

Full Name and Address : of the Factory Manager	**Mr. B B Kathpalia** **Tata Chemicals Limited.** **Mithapur. 361 345**	**Office :02892- 665201** **Resi.:02892-666201**

Manufacturing Process : Manufacturing of Heavy Chemicals

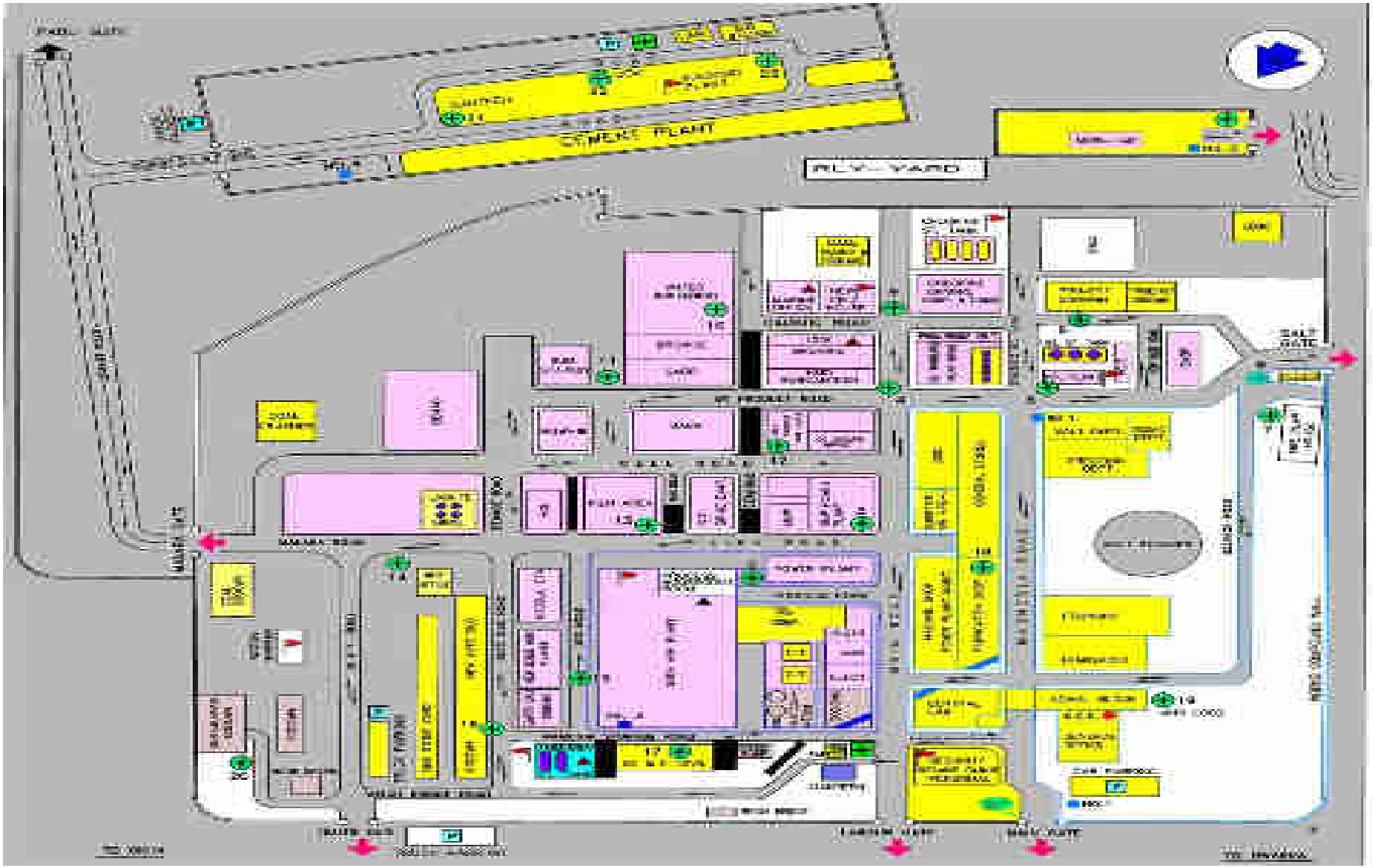
Name of the Shift	Maximum Workers at a Time as on 05 April,2017			In Workers include all employees, Contract Workers, Trainees Apprentice etc.
	Male	Female	Total	
General (G)	2696	135	2831	
First (A)	490	0	490	
Second (B)	472	0	472	
Third (C)	398	0	398	
Total Workers	4056	135	4191	

First person to be contacted in case of emergency :

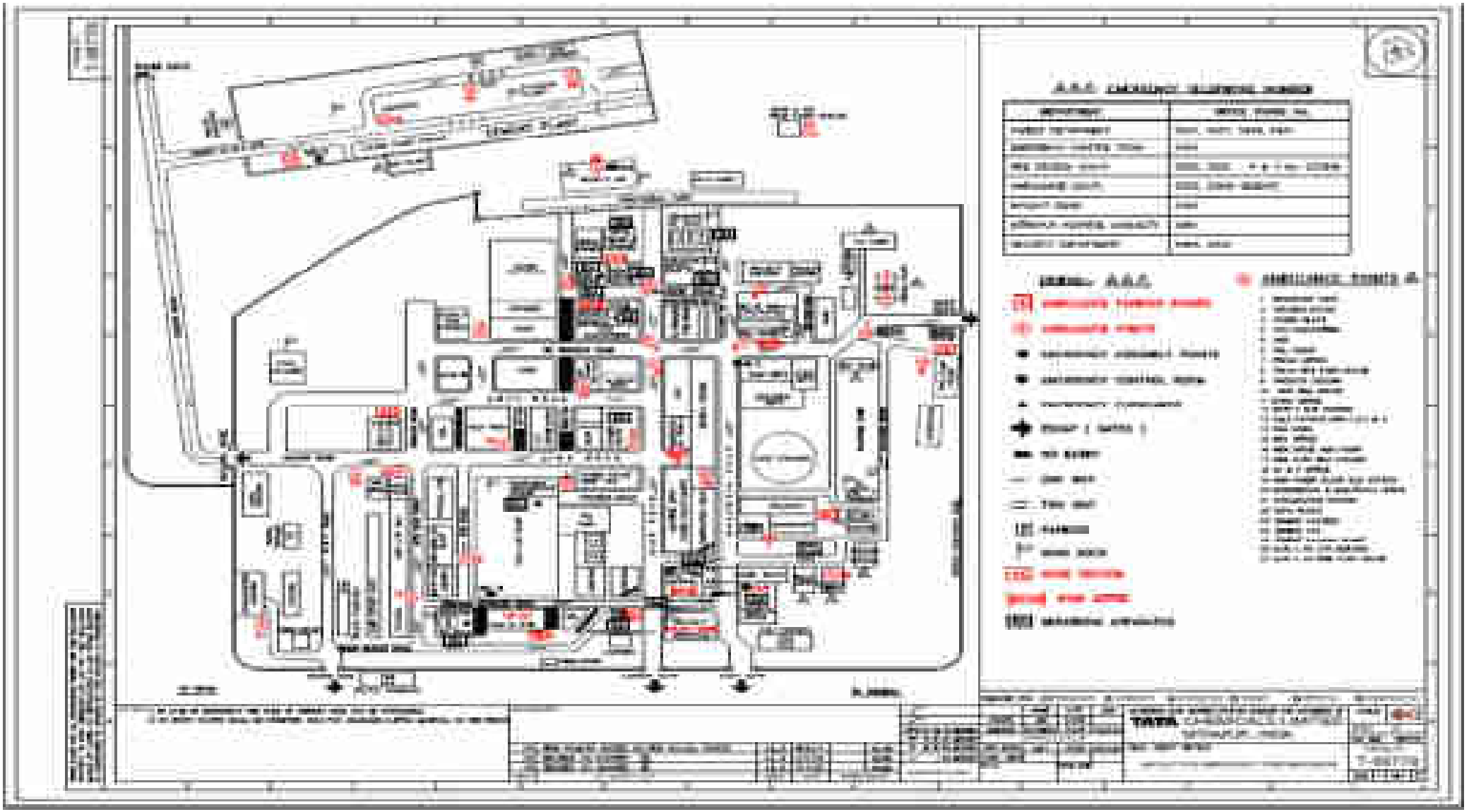
Name of the shift	Person to be contacted first in case of any emergency.			
	Name & Designation	Place of availability	Phone Nos.	
			Office	Resi.
Tata Chemicals Ltd.Mithapur.	Mr. M S S Rao			
General (G)	AVP - Operations	TCL Township, Mithapur.	5203	6203
First (A)	Mr. M S S Rao			
	AVP - Operations	TCL Township, Mithapur.	5203	6203
Second (B)	Mr. M S S Rao			
	AVP - Operations	TCL Township, Mithapur.	5203	6203
Third (C)	Mr. M S S Rao			
	AVP - Operations	TCL Township, Mithapur.	5203	6203
On Holiday	Mr. M S S Rao			
	AVP - Operations	TCL Township, Mithapur.	5203	6203

Any other information, if any

ANNEXURE – 2: SITE PLAN



ANNEXURE 3: FACTORY LAYOUT



ANNEXURE - 4 : STORAGE HAZARDS AND CONTROL

Name of the hazardous substances with concentration & group as per Annexure-A. If guideline given by Central Government.				Quantity Stored			Total of 3 & 4	Place Of Its Storage	Stage & Operating Pressure & Temp.	Type of Hazards Possible (Fire exp-lostion tox. Leakage	Control Measured Provided	Incharge person	
				Maximum that can be stored	Quantity Stored In	Quantity In Process						Name & Designa-tion	Tele. No.
1				2	3	4	5	6	7	8	9	10	11
A			Raw Materials	-	-	-	-	-	-	-	-	-	-
B			Finished Products	-	-	-	-	-	-	-	-	-	-
C			Intermediates Ammonia	100 T	50 T	100 T Absorbed in Brine Solution	150 T	Ammonia Storage Tank	130 Psi. 50 Deg.C. Temp.	Toxic release	Remote Controlled Water Spray Fire Hydrant System	DGM Soda Ash TCL Mithapur	5269
D			Bromine	02 Nos = 03 T 01 Nos = 400 Kg 02 Nos = 300 Kg 01 Nos = 270 Kg	5 T	1.5 T	6.5 T	Cold P Process Area	Amb. temp. Pr.	Leakage & Spillage	Sodium Thiosulphate Sol. PPE's	AGM - CC & Marine TCL Mithapur	5238
E			Chlorine	228 T Including Dump Tank	125 T	2 T	127 T	-	180 PSI & ambient Temp.	Toxic release	Chlorine detection system provided vent Scrubber & Fire Hydrant System	AGM - CC & Marine TCL Mithapur	5238

ANNEXURE : 5 - MSDS (Material Safety Data sheet) available at site	
Sr No	**Title of the MSDS**
1	MSDS Ammonia TCL
2	MSDS Chlorine TCL
3	MSDS Sulfuric Acid ($H2SO_4$) TCL
4	MSDS Sodium Hypochlorite Sollution (NaOCL) TCL
5	MSDS Sodium Hydroxide (NaOH) TCL
6	MSDS Sodium Chloride (NaCl) TCL
7	MSDS Sodium Bicarbonate ($NaHCO_3$) TCL
8	MSDS Soda Ash (Na_2CO_3) TCL
9	MSDS Hydrochloric Acid (HCL) TCL
10	MSDS CEMENT TCL
11	MSDS CO_2 TCL
12	MSDS HYDROGEN GAS (H_2) TCL
13	MSDS CARBON MONOXIDE (CO)
14	MSDS Carbon Dioxide (CO_2) TCL
15	MSDS CALCIUM OXIDE (CaO)
16	MSDS Bromine (Br_2) TCL
17	MSDS Sodium Sulphide (Na_2S) TCL

ANNEXURE - 6 : PROCESS AND VESSEL HAZARDS AND CONTROL

Sr. No.	Name of the Plant Depts. or Place	Name of the hazardous process & operation	Materials in the process/ operation with their quantity	Name of the vessel & its location and type of storage (i.e. Sphere, Horizontal, Vertical Tank Silo Drum Bulk etc.)	Operating Parameter Pressure Temp.etc.	Type of hazards possible (exothermic run away pressure, toxic release, fire, explosion etc.	Control Measures Provided	Responsibility	
								Desig-nation	Telephone No.
	1	2	3	4	5	6	7	8	9
1	Soda Ash	Solvay Ammonia Process	Aq.NH_3 Liquor 100 T MOL 85.6 KL Brine 2000-Gellons	Horizontal Tank-2 100 Tonnes	130 PSI & ambient temp.	Toxic release	Remote controlled water supply fire hydrant system.	DGM - Production Soda Ash TCL Mithapur	5269
2	Cell House	HCl, Cl2, Production	As Given Below	Horizontal Tank-4 228 Tonnes	180 PSI & ambient temp.	Toxic release	Cl_2 continuous monitoring system, vent scrubber & fire hydrant system	AGM - Production CC & Mrine TCL Mithapur.	5238

CHLORINE
Chlorine is produced through Membrance electrolysis technology of brine allows a production of highly pure Chlorine on the anode and it is liquified by compression and refrigeration

BROMINE
Produced from bittern by displacement of Bromine by Chlorine molecules.

ANNEXURE - 7 : EMERGENCY SCENARIO AND ITS REMEDIAL PROCESS						
Sr. No.	**Identified emergency scenario**	**Level of emergency**	**Fault Tree Analysis done = Yes/No**	**Factors that can cause this emergency**	**What can be done to improve for each of factor**	**Recommendations for implementation**
1	Ammonical-brine leakage from PCB and PCBR header lines	Level-2	Yes	Internal as well as external corrosion of header line	preventive maintenance, Hydro testing schedule and schedule	1) Followed preventive maintenance and hydro testing schedule 2) Select metallurgy as per expert advice
2	Minor Ammonia leakage from tanker˘s valve	Level-1	---	Supplier not doing inspection and maintenance thoroughly	1) Inspection of tanker at supplier end. 2) Inspection carried at our side.	1) Insist to follow complete inspection of tanker by supplier end 2) Follow Tanker inspection checklist Thoroughly
3	Chlorine release from sodium hypo chloride tower.	Level-2	Yes	Due to power failure and emergency drive would not start.	Emergency power supply equipments needs to be in health condition and maintain inspection schedule	Weekly inspection checklist followed
4	Liquid Chlorine leakage from supply line	Level-1	Yes	Preventive maintenance not followed properly	Preventive maintenance and painting schedule	Pipe line replacement and painting schedule followed
5	Fire at coal mill area	Leve-1	Yes	Leakage and spillage of hot coal	1) Avoid coal & oil spillage 2) CO2 flooding system needs to be in healthy condition	Weekly inspection of CO2 flooding system
6	Fire in Acetylene cylinder˘s hose	Level-1	Yes	Damaged/ leaky hoses, flash back arrestor wrongly work , hot cutting sparks not restricted to fall on the cylinders, cylinders not covered with fire retardant cloth and bad housekeeping nearby	1) Needs inspection complete accessories of cutting set before use 2) Restrict hot cutting sparks to fall on the cylinders. 3) maintain good housekeeping	Followed safe work permit system thoroughly
7	Fire at HR and Admin building	Level-1	Yes	Electrical short circuit	Cut off and eliminate excess electrical accessories and Maintain electrical system healthy	Internal as well as external electrical /safety audits

ANNEXURE - 8 : TRADE WASTE DISPOSALS

Sr. No.	Type and Name of the Trade Waste	Its Gener-ation	Place of its Generation	Place of its Disposal	Treatment method of Safe disposal treatme-nt plant,vent gas scru bber, flare incinerator water balnketing etc.	Alarm indication accidental release or release in excessive proportion	Monitoring & Control measures provided	Responsibility	
								Desig-nation	Telephone No.
1	2	3	4	5	6	7	8	9	10
	SOLID								
1 3	Lime Stone Fines Grit from lime	1085 TPD 141 TPD	Northern Yard Lime Slaker	Cement Plant	All lime stone fines and grit of lime are utilise in to the cement production	-	SPM through ambient air monitoring	Sr. Manager - Inbound Logistics	Off. - 5240 Resi. - 6240
	LIQUID								
1	Still effluent from Soda Ash Plant	9.04 KL per ton of Ash	Ammonia distillers	Cement Plant	Solids of effluent have been filtered at ESF plant and that solids are utilise in to the cement production	-	Monitoring Temp. PH, Ammonia, SS , Bio Assembly etc.conducted every week.	Asst. GM - Production Soda Ash	Off. - 5272 Resi. - 6272
2	Cold Process effluent	0.848 KL per ton	Brine purification system	Into the Gulf of Kutch	Effluents are settled together in settling ponds	-	Monitoring Temp. PH, Ammonia, SS , Bio Assembly etc. Conducted every week.	Asst. GM - Production Soda Ash	Off. - 5272 Resi. - 6272
	GASEOUS								
1	Waste Chlorine	-	Chlorine liquification	To vent	Chlorine scrubber is caustic solution	-	Stack / vent gas & Ambient air monitoring	Asst. GM - Production CC & Marine	Office 5238 Resi. 6238
2	Bromine from Bromine Plant	-	Bromine Conde-nsors	For reuse	Bromine vapour ab-sorber in Caustic Soda Ash solution	-	Vent gas & Ambient air monitoring	Asst. GM - Production CC & Marine	Office 5238 Resi. 6238
3	Boiler Stack	580000 Cu.m/hr.	Boiler	To vent	To minimise particulate by installed ESP multiclone / Lime stone dosing to remove S02 content	-	Stack monitoring PM, SO2, NOx, etc. Every Week.	Asst. GM - Production Power Plant	Office 5249 Resi. 6249

ANNEXURE - 9 : RECORDS OF PAST INCIDENTS

Sr. No.	Type of Incident (major - accident, emergency or disaster	Date and Time of	Its Place	Duration	Time required in controlling it	No. of workers working at that time	Persons affected		Persons died		Effects on the Survivors		Subsequent Safety measures provided	Other Details if any antidoes used etc.)
							Inside the factory	Outside the factory	Inside the factory	Outside the factory	Immediate	Delayed		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1.	Major Accident	25.01.2012 8:30 am	Power Plant	Nil	Nil	3	3	Nil	3	Nil	1	1	1. Identify all the routine activities not covered under work permit system. 2. Do the hazard analysis and FMEA for all routine activities.	Nil
2	Emergency	18.11.2011 at 7:30 pm	Soda Ash	Nil	Immediate	6	2	Nil	Nil	Nil	Nil	Nil	1. Covered PCB header lines with FRP canopy. 2. Maintain replacement schedule	Nil
3	Major Accident	01.05.2014 at 12.45 PM	Cement plant	Nil	Nil	2	2	Nil	1	Nil	1	Nil	1. Carrying out such types of activity by mechanical means only 2.Restricting entry of people by providing barrication / access control 3. Providing proper platform to perform activities to feed the plant 4. Complete SOP with DO's & Don'ts to implemented based on principles of stacking and storage.	Nil

ANNEXURE - 10 : GAS DISPERSION CONCENTRATION

Assuming leak rate (0)=3 Kg./Sec. i.e. 3x10 mg/sec. and velocity (U) = 2 & 5 M/sec. downwind concentrations of some gases at various distances are calculated and tabulated as follows

Products	Maximum concentration (PPM) is downwind direction at distance, X, Wind Velocity = 2 M/sec. for most unstable afternoon weather condition (A).											
	100 M	200 M	300 M	400 M	500 M	700 M	1 KM	2 KM	3 KM	4 KM	5 KM	
Chlorine	439	110	41	27	21	12	4.11	1.03	0.45	0.26	0.16	
Ammonia	1832	458	171	115	89	51	17.18	4.29	1.91	1.07	0.69	

Note : For other weather condition, respective curve should be chosen.

Product : Maximum concentration (PPM) in downwind direction at distance, X, Wind Velocity = 5 M/Sec. for most unstable weather condition (A)

Chlorine	175	44	16	11	9	5	1.64	0.41	0.18	0.18	0.06	
Ammonia	732	183	69	46	36	20	6.87	1.72	0.76	0.43	0.28	

** For more details refer QRA Report

Note : For other weather condition, respective curve should be chosen.

ANNEXURE - 11 : EVACUATION TABLE EVACUATION TABLE BASED ON PREVAILING WIND OF 6 TO 12 M.P.H. (2.7 to 5.4 m/s)			
Material	**Radius of immediate danger area in Meter**	**Dimension of Evacuation Area**	
		Down wind (Meter)	**Cross Wind (Meter)**
1	2	3	4
Ammonia	180	640	480
Chlorine	310	3220	2410
Source : Emergency action guide for selected hazardous material, U.S. Department of Transport, 1978.			

ANNEXURE - 12 : ENVIRONMENT IMPACT ASSESSMENT

Sr. No.	Distance (Radius from the factory)	Environment (Employees,'hutment, neighbouring factory residential colony,village,'hospital, public place, public-place, vegetable/Food market Crops,Tall Structure, Flora Fauna etc.)	Population with composition						Possible Consequence & Assessment					Types of Measures	Control Necessary
			Day Time			Night Time			Time of risk and effect possible	Duration of risk	Risk Assessment				
			Healthy	Vulnerable	Total	Healthy	Vulnerable	Total			No.of people Name & Amt. Rs. of property & other environment that may be affected	Frequency of the hazard (i.e. one such incident in what time)	Acceptable Criteria	Available in the factory	Required from out side
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	50 mt.	Own premises	-	-	-	-	-	-	-	-	-	-	-	-	-
2	100 mt.		-	-	-	-	-	-	-	-	-	-	-	-	-
3	200 mt.		-	-	-	-	-	-	-	-	-	-	-	-	-
4	300 mt.		-	-	-	-	-	-	-		-	-	-	-	-
5	400 mt.		-	-	-	-	-	-	-	-	-	-	-	-	-
6	500 mt.		Failure of Tank	Popping	-	-	-	-	Toxic acute	-	-	-	Mechnical Pipeline Storage of Safety Valves	-	-
7	600 mt.		-	-	-	-	-	-	„	-	-	-	-	-	-
8	700 mt.		-	-	-	-	-	-	„	-	-	-	-	-	-
9	800 mt.		-	-	-	-	-	-	„	-	-	-	-	-	-
10	900 mt.		-	-	-	-	-	-	„	-	-	-	-	-	-
11	1 km.		14500	-	14500	14500	-	14500	„	-	-	-	-	-	-
12	2 km.		-	-	-	-	-	-	„	-	-	-	-	-	-
13	3 km.		25300	-	25300	25300	-	25300	„	-	-	-	-	-	-
14	4 km.		-	-	-	-	-	-	„	-	-	-	-	-	-
15	5 km.		29000	-	29000	29000	-	29000	„	-	-	-	-	-	-
16	Further if necessary		-	-	-	-	-	-	„	-	-	-	-	-	-

* Vent of Safety valves is connected to scrubber.
* Pipeline are regularly painted to prevent corrosion.
* Chlorine pipes are replaced every two years irrespective of condition as a preventive measures.
* Continuous monitoring system and fire hydrant system provided.
* Water spray provided on ammonia storage.
* Storage tanks are inspected periodically as per SMPV Rules, 1981
* Dryness of chlorine is maintained absolutely.
* Gas detector are provided at storage and processing areas.
* Self contained breathing apparatus set and other safety equipments to deal with all kind of emergency are provided.

ANNEXURE - 13 : WEATHER CONDITIONS				
Sr. No.	Month & Year	Wind Velocity (Km / h)	Wind Direction (Deg.)	Humidity
1	2	3	4	5
1	Apr-2015	11.09	255.14	89.35
2	May-2015	15.05	260.71	91.72
3	Jun-2015	12.49	242.84	85.88
4	Jul-2015	13.32	241.76	94.87
5	Aug-2015	10.44	247.64	96
6	Sep-2015	8.71	252.49	92.6
7	Oct-2015	9.79	259.94	87.24
8	Nov-2015	10.11	141.3	74.87
9	Dec-2015	9.58	161.61	59.32
10	Jan-2016	10.04	169.28	63.98
11	Feb-2016	10.08	230.79	77.66
12	Mar-2016	10.44	257.99	83.19
13	Apr-2016	11.99	284.23	88.83
14	May-2016	13.07	235.94	94.48
15	Jun-2016	10.1	233.07	94.43
16	Jul-2016	11.99	239.26	97.11
17	Aug-2016	13.32	239.5	97.16
18	Sep-2016	11.7	330.48	95.16
19	Oct-2016	9.65	346.23	86.05
20	Nov-2016	8.93	235.88	80.84
21	Dec-2016	10.51	146.95	64.18
22	Jan-2017	10.37	169.1	64.66
23	Feb-2017	11.34	202.56	68.95
24	Mar-2017	10.55	272.91	88.05
25	Apr-2017	9.83	305.31	94.67
26	May-2017	11.38	327.22	97.54
27	Jun-2017	10.1	233.07	94.43
28	Jul-2017	11.99	239.26	97.11

ANNEXURE - 14 SITE MAIN CONTROLLER / INCIDENT CONTROLLER / RUNNERS UP

Sr. No.	MAIN INCIDENT CONTROLLER	Place Of availability		Phone No.	
	Designation	In the Factory	Residence	In the Factory	Residence
1	2	3	4	5	6
1	Vice President - Manufacturing Tata Chemicals Limited	TCL Mithapur	Executives Bunglow	5201 External Office : 02892-223285/665201	6201 External Resi: 02892-223209/666201

Sr. No.	Sr. No. (Any one shall be available in each Shift & on Holiday on Call	I N C I D E N T CONTROLLER	Place of availability		Phone No.		R U N N E R' S - DEPUTY INCIDENT CONTROLLER		
		Designation	In the Factory	Residence	In the Factory	Residence	Designation	Place of ava-ilability	Phone No.
1	2	3	4	5	6	7	8	9	10
First & Gen	1	AVP -Operations	TCL Mithapur.	Mithapur	5203	6203	**For Ammonia** DGM - Soda Ash	Soda Ash	O. 5269 R. 6269
Second	2	AVP -Operations	TCL Mithapur.	Mithapur	5203	6203	**For Chlorine** AGM - CCG,Salt & Marine	C.C. Group	O. 5238 R.6238
Third	3	AVP -Operations	TCL Mithapur.	Mithapur	5203	6203	**For Ammonia** DGM - Soda Ash **For Chlorine** AGM - CCG, Salt & Marine	Soda Ash C.C. Group	O. 5269 R. 6269 O. 5238 R.6238
Holiday	4	AVP -Operations	TCL Mithapur.	Mithapur	5203	6203	**For Ammonia** DGM - Soda Ash **For Chlorine** AGM - CCG, Salt & Marine	Soda Ash C.C. Group	O. 5269 R. 6269 O. 5238 R.6238

NOTE : 1. If IC is not available, for Deputy IC shall take the charge

ANNEXURE - 15 DEPUTY INCIDENT CONTROLLER / RUNNERS UP

Sr. No.	Shift (Any one shall be available in each shift & Holiday on call)	DEPUTY I N C I D E N T CONTROLLER	Place of availability		Phone No.		R U N N E R' S - DEPUTY INCIDENT CONTROLLER		
		Designation	In the Factory	Residence	In the Factory	Residence	Designation	Place of ava-ilability	Phone No.
1	2	3	4	5	6	7	8	9	10
1	First & Genera	AVP -Operations	TCL Mithapur.	Mithapur	5203	6203	**For Ammonia** DGM - Soda Ash	Soda Ash	O. 5269 R. 6269
2	Second	AVP -Operations	TCL Mithapur.	Mithapur	5203	6203	**For Chlorine** AGM - CCG,Salt & Marine	C.C. Group	O. 5238 R.6238
3	Third	AVP -Operations	TCL Mithapur.	Mithapur	5203	6203	**For Ammonia** DGM - Soda Ash	Soda Ash	O. 5269 R. 6269
							For Chlorine AGM - CCG, Salt & Marine	C.C. Group	O. 5238 R.6238
4	Holiday	AVP -Operations	TCL Mithapur.	Mithapur	5203	6203	**For Ammonia** DGM - Soda Ash	Soda Ash	O. 5269 R. 6269
							For Chlorine AGM - CCG, Salt & Marine	C.C. Group	O. 5238 R.6238

NOTE : 1. If Deputy IC is not available, for Runners shall take the charge

ANNEXURE - 16 SITE MAIN CONTROLLER / RUNNERS UP

Sr. No.	INCIDENT CONTROLLER	Place of availability		Phone No.		RUNNER' S - DEPUTY INCIDENT CONTROLLER				
	Designation	In the Factory	Residence	In the Factory	Residence	Designation	Place of Availabil;ity In the Factory	Residance	Phone No. In the Factory	
1	2	3	4	5	6	7	8			9
1	Vice President -Manufacturing Tata Chemicals Limited	TCL Mithapur	Executive Bunglow	5201 External Office : 02892-/665201	6201 External Resi: 02892-666201	AVP - Operations	TCL, Mithapur	Executives Bunglow	5203	6203

ANNEXURE - 17 KEY PERSONNEL

Sr. No.	KEY PERSON'S Department	(He may be called any time for this plan) Designation	Place of Availability In the Factory	Place of Availability Residence Address	Phone No. In the Factory	Phone No. Residence Address	Designation	NEXT PERSON'S Place of availability In the Factory	Place of availability Residence Address	Phone No. In the Factory	Phone No. Resi-dence
1	2	3	4	5	6	7	8	9	10	11	12
1	Safety	AGM - Safety & Health	Safety Deptt.	TCL township	5247	6247	Manager - Safety	Safety dept	TCL township	5421	6341
2	Health	Factory Medical Officer	Inplant clinic	TCL township	5409	--			TCL township		
3	Security	Head - Security Services	Security Deptt.	TCL township	5257	6257	Dy. Manager - Security	Security dept	TCL township	5257	6257
4	Polluction Control	VP - Manufacturing	TCL Office	TCL township	5201	6201	Sr. Manager - EMS	EMS Dept.	TCL township	5270	6270
5	Medical	Head - Medical Services	Tata Hospital	TCL township	5283	6283	Manager - Medical Services	Hospital campus	TCL township	5441	6457
6	Transport	AGM-Mech. Const.(Loco & Transport)	Transport Deptt.	TCL township	5248	6248	AM - Transport	Transport dept	TCL township	5487	6387
7	Production	AVP-Operations	TCL Office	TCL township	5203	6236	DGM - Soda Ash	Soda Ash Office	TCL township	5269	6269
8	Production	AVP-Operations	TCL Office	TCL township	5203	6236	AGM- CCG	CCG Office	TCL township	5238	6238
9	Stores	Sr. Manager - ISMS	TCL G.Stores	TCL township	5295	6295	Manager - Inventory Management	General Stores	TCL township	5755	6339
10	HR	DGM - HR & PERSONNEL	TCL Mithapur.	TCL township	5223	6223	Sr. Manager- HR	HR office	TCL township	5222	6222
11	Admin & Personnel	DGM - HR & PERSONNEL	TCL Mithapur.	TCL township	5223	6223	Head - ER & Administration	Administration office	TCL township	5359	6391
12	Instrument	Radiological Safety Officer	Instrument Dept.	TCL township	5790	92275 67062	Radiological Safety Officer	Instrument Dept.	TCL township	5315	6376
13	Power Plant	AGM - Power Plant	TCL Mithapur.	TCL township	5249	6249	Sr. Manager - Power Plant	Power Plant	TCL township	5219	6219

ANNEXURE - 18 ESSENTIAL WORKERS

ESSENTIAL WORKERS DETAILS

Emergency support staff are the volunteers from the plant employees. They undergo fire, rescue and emergency preparedness training time to time and they are identified in the plant with green radium band on their safety helmets. List of emergency support staff with complete detail of contact no and address etc is available with Safety dept and is kept current. Total nos of emergency support staff is approx *100* with an approximation that *20-25* will be available in the plant at any point of time round the clock.

Upadated list of Emergency Support staff is available at Fire Station.

As par of their role upon hearing of Emergency Siren they shall report *to Fire Station and they shall be mobilised in team for various Emergency related activities as per instruction of Main Incident Control. Emergency Support staff on duty and having incident in their own department need not to come to Fire Control Room instead they shall help their department head in combating emergency.*

ANNEXURE - 19 SAFE ASSEMBLY POINTS

Sr. No.	Identification No.of the Assembly Point	Location	Accomodation Capacity	AT THE TIME EMERGENCY						
				Person Incharge						
				Name & Designation	Place of availibility		Phone No.		Nearest Phone	PPE that may be required
					In the Factory	Residence Address	In the Factory	Residence		
1	2	3	4	5	6	7	8	9	10	11
1	Assembly Point No - 1	Behind Car Parking	About 1000 persons	Security Office, TCL-Mithapur	Security	Town Qtrs, Mithapur	5401 / 5402		5403	Available all types of PPEs in emergency cupboard
2	Assembly Point No - 2	Near Salt Office	About 1000 persons	Security Office, TCL-Mithapur	Security	Town Qtrs, Mithapur	5401 / 5402		5691	Available all types of PPEs in emergency cupboard
3	Assembly Point No - 3	Near SCM Office	About 1000 persons	Security Office, TCL-Mithapur	Security	Town Qtrs, Mithapur	5401 / 5402		5330	Available all types of PPEs in emergency cupboard
4	Assembly Point No - 4	Security Out post (Cement Plant)	About 1000 persons	Security Office, TCL-Mithapur	Security	Town Qtrs, Mithapur	5401 / 5402		5926	Available all types of PPEs in emergency cupboard
5	Assembly Point No - 5	Security Out post (MUW AR-2)	About 1000 persons	Security Office, TCL-Mithapur	Security	Town Qtrs, Mithapur	5401 / 5402		5872	Available all types of PPEs in emergency cupboard at plant

ANNEXURE - 20 EMERGENCY CONTROL ROOM/SHADOW ECR -SSK

Location of the Centre	**General Office**
Telephone Nos. of the Centre	**Internal : 5420 / 5421** **External : 665991/665992**
Safety Dept.	**External : 223439**

Sr. No.	Items kept in the Centre (See (1) to (10) Page No. 32 - 33)	Number of Quantity	Persons who will handle/operate this item	Its period of operation		Notes
				Last	Present	
1	2	3	4	5	6	7
1	External Telephones	External - 2	Receptionist (General Office)	-	-	-
2	Internal Telephones	Internal - 2	Asst. Mgr - Safety shall precide,till President arrived at centre	-	-	-
3	Walkie-Talkie	Being arranged	Dy.Incident Controller & other key personnel			
4	Plans of the factory	1 Nos.				
5	Plans of the location	1 Nos.				
6	Stationery	Pad, Pencils, Papers				
7	Copies of on-site, Off-site emergency plan	One				
8	B A Set	Two				
9	Critical personal protective equipments	Adequate Quantity				

ANNEXURE - 21(A) : FIRE AND TOXICITY CONTROL ARRANGEMENTS

For Flammable and toxic substances storage see Annexure-4 and for their process see Annexure-6

For Key Personnel and essential workers see Annexure-17 & 18

Fire Water : No. of Reservoirs - One **No. of Tanks : Not Applicable** **Total Quantity : Unlimited (Open Pond)**

Other Sources and capacity	No of hydrant points	No.of fire pumps, Type and capacity	No. of hose reals and total length	No.of fire tendors and capacity	No. of Sprinkler / Monitors				Alternative Power	No. of 6.8 CO2 Exting-uishers
					Monitors		Sprinklers			
					Fixed	Portable				
1	2	3	4	5	6	7	8	9	10	11
-	290 Chemical Plant	**JOCKEY PUMPS**-2 Nos. - Capacity 24.6 M3/hour at 8.8 Kg/cm2 pressure, **Electrical Driven**-2 Nos & **Diesel Driven**-2 Nos. - capacity 410 M3 / hour at 9.2Kg/cm2 Pressure Type: all are Vertical Turbine pumps	50' - 100 Nos.	Multi purpose tendor - 2 Nos One tender - water tank-5000L, Foam tank-800L DCP-500 KG CO2-90 KG Pump-2250 LPM at 7.0 KG/CM2 Another tender - water tank-5000L, Foam tank-800L Pump-2250 LPM at 7.0 KG/CM2	5	2	Adequate automatic sprinklers provided on all 11 coal conveyor belts		Electricity, DG Sets & GEB power	20
-	50 Cement Plant	**JOCKEY PUMP - 1** no. - Capacity 10 M3/hour at 7 Kg/cm2 pressure	-		-	-			power	-
-		**Electrical Driven - 1 No & Diesel Driven - 1 no** - capacity 137 M3 / hour at 7 Kg/cm2 Pressure	-		-	-		-	-	-
	55 MUW-4	**Jockey pumps, 2 no.** Capacity 24.6 M3/hour at 7 kg/cm2 pressure **Electrical Driven - 1 No & Diesel Driven - 1 no** - Capacity 171 M3/hour								
-	-	2 trailor pump capacity 1800 ltr./mts. At 7.0 kg/cm2 One portable pump - capacity 275 lpm at 4.5 kg/cm2			-	-	-	-	-	-

** Bromine Leak seal kit is available at fire station.

ANNEXURE - 21(B) : FIRE AND TOXICITY CONTROL ARRANGEMENTS

For Flammable and toxic substances storage see Annexure-4 and for their process see Annexure-6

For Key Personnel and essential workers see Annexure-17 & 18

No. of portable Extinguisher & Type.				No. & size of blankets	Other jel products, quantity	D.C.P Powder storage	AFF Foam quantity	Respiratory		Non-Respiratory	
Water(CO2)	D. C. P	C02	Foam					Type	Nos.	Type	Nos.
12	13	14	15	16	17	18	19	20	21	22	23
61	801	444	59	Nil	Nil	4200 kg	1320 lits	SCBA & Air line BA trolly	60 SCBA and 5 trolly	Nil	

MUTUAL AID ARRANGEMENTS

Name and address of the factories	Approx. Distance	Contact		FFE available		PPE available		No.of experts & trained persons available	Decontamination substance available	Gas detectors available	Other equipments available
		Person	Telephone	Type	Quantify	Type	Quantity				
24	25	26	27	28	29	30	31	32	33	34	35
Okha Nagarpalika Fire station	10 kms	Emergency control room operator	02892 - 262539/262438	Mini tender Water bowser (12000 L)	1 1	-	-	4	-	-	Aska tower light - 2 nos. Fire Fighting motorbike for rapid response with high pressureextinguisher
Dwarka Nagarpalika Fire station	18 kms	Emergency control room operator	02892-234057	Mini Fire Tender Water Bowser (12000L & 10000L)	2 2	SCBA set	3	8	-	-	Fire Fighting motorbike for rapid response with high pressureextinguisher rescue bot Ambulance - 3 nos.

ANNEXURE - 22 : MEDICAL ARRANGEMENTS

Designation Key Doctors		Residence Phone No.	Residence Address	Name & Address of the factories/ Hospital	Approx. Distance	Equip-ments	Anti-dotes	Ambulance Van
1		2	3	4	5	6	7	8
Head - Medical Services	O R	5283 6283	TCL Township	Mithapur Hospital Mithapur	0.5 km.	Most of requirement Equipment available Including Sisters Nurses Wardboy Aya Sweeper	Available Including Sisters Nurses Wardboy Aya Sweeper	Available Including Sisters Nurses Wardboy Aya Sweeper
Manager - Medical Services	O R	5441 6457	TCL Township	Mithapur Hospital Mithapur	0.5 km.			
Factory Medical Officer-Occ Health Services	O R	5409 6444	TCL Township	Occupational Health Centre Mithapur	Inside Plant			
Pharmasist								
Pharmacist	O R	5451/52/53	TCL Township	-	-	-	-	-
Laboratory								
Pathologist	O R	5861 6312	TCL Township	-	-	-	-	-
X-Ray								
X ray- Sr. Officer	O R	5449 6314	TCL Township	-	-	-	-	-
Social Worker								
Dr. Ghaghda		227133	Surajkaradi	Surajkaradi	1 Km -	-	-	-

ANNEXURE - 23 (A) : TRANSPORT & EVACUATION ARRANGEMENTS

For key personnel and essential workers see Annexure - 11 and 12 and for Assembly points see Annexure - 13

Type of Siren, if any, for evacuation : MECHANICAL TYPE

OWN TRANSPORT CENTRE					OWN VEHICLES				
Name & Location	Phone Nos.	Incharge Person			Sr. No.	Type & No.	Capacity	No. and Type of public warning instruments (Refer page 40)	Driver's Name & Address
		Designation	Residence Phone	Residence Address					
1	2	3	4	5	6	7	8	9	10
Transport Deptt. Tata Chemicals Limite Mithapur	5487 5489	AGM - Mech. Const. (Loco & Transp.) Dept.	5248	TCL, Township Mithapur.	1. 2	Truck-1 Trippler-05	10 10	- -	Driver's Name & Address is available in Transport Dept.

ANNEXURE - 23 (B) : Out side Shelters for evacuated persons

For key personnel and essential workers see Annexure - 11 and 12 and for Assembly points see Annexure - 13
Type of Siren, if any, for evacuation : MECHANICAL TYPE

Out side Shelters for evacuated persons

Sr. No.	Name, Address & Distance	Phone Nos.	Incharge Person			Accommodation Capacity	Facilities available
			Name & Designation	Residence			
				Phone	Address		
1	2	3	4	5	6	7	8
1	Airstrip - 1.0 km.	5281	Head - Estate Management Services	6281	Town Administration Estate Officer	1000 persons	-
2	Mithapur High School, Mithapur - 0.5 kr	5771	Principal - MHS	6448	Principal, Mithapur.	200 persons	-
3	Mithamahal - 0.3 km.	5762/63	Incharge of Mithamahal	6431	Incharge of Mithamahal	500 persons	-
4	Mangal Karyalaya	5253	Manager - Town Administration	6253	Manager - Town Administration	300 persons	-
5	Between Greenbelt & Sunset - 2.0 km.	5748	Town Officer	-	Town Officer	2000 persons	-
6	Taluka Shala(School) - 0.5 km.	-	Principal, Taluka Shala	-	Principal, Taluka Shala	500 persons	-
7	Surajkaradi School - 1.0 km.	-	Principal, Surajkaradi School	-	Surajkaradi School	500 persons	-
8	Aramda School - 3.0 km.	-	Principal, aramda School	-	Aramda School	500 persons	-

ANNEXURE - 23 (C) : MUTUAL-AID SCHEME ORGANISATION'S TELEPHONE NUMBERS

Sr. No.	Name of Mutal-Aid-Scheme Member	Telephone No. Office	Residence/ Mobile Nos.	Sr. No.	Name of Mutal-Aid-Scheme Member	Telephone No. Office	Residence/ Mobile Nos.
1	Chairman - Collector	2555869 9978406210	2554059	22	Sushil Bhati -IOCL Vad Mr. Niraj Kumar	02833 - 256330	8238049555 9979593444
2	Jt. Chairman RAC Khambhaliya Shri Dhiraj K	02833-232804	9727763794	23	Asst. Commandant - CISF Vadinar	02833-256559	02833-256558
3	RAC JMN	2550284 / 2553183	2672131	24	Vinay Sharma - EOL Sachin Shah VOTL	2833- 661005	9512047100 9879105470
4	Jt.Chairman - Commissioner,JMC	2552321	2552372	25	SS Modak -VP(S&F,L) GSFC ltd.	3019297	9979853438
5	**RN Shah - Secretary MAS,GSFC**	**0288 - 3019242**	**9979862520**	26	Pramodkumar Chilli - IOCL Theba	2570712	9426911475
6	**YJ Vithlani - Treasurer-MAS, SDCC**	**3019242 2344332**	**9099038052**	27	**SR Mishra- GSECL Jt. Sec. MAS** DM Chauhan	2344116	9099959261 9925208943
7	MAS OFFICE	2542764		28	Chetansinh Jadeja - FO,	2344272 -75/ 2439322 (Fire)	9099038083
8	Office of Supdt. of Police - JMN Office of Supdt. of	2554203	2555868	29	Umesh Khandalkar Fire **AB Ghosh Jt. Sec. MAS RIL**	6611193	9998215963 9662046305
9	KK Bishnoi - JMC CFO	2550340/101 (2672208)	9879531101	30	D K Thakur TCL	02892 - 665247	9227676113
10	District Disaster C/R - JMN Yashvansih K Parmar -	2553404 / 2541485/ 1077 (Toll Free)	9426950783	31	Mr. Tripathi, Mgr.(O&M) - GSPL		9825035755
11	District Disaster C/R - KHAM VP Chudasma	02833-234736 234113	9909728920	32	Sanjay Tiwari - Digjam Ltd.	2712972/73/74	9687622397
12	ADISH D S Prajapati B S Patel	0288-2678206	9662021546 9408872078	33	Rajendra Tadhe -GAIL	4011437	9720163032
13	Police Control Room - Jamnagar	2550200	2344249(Sikka) 2846125(Padana)	34	Ramesh Thakkar, AVP BORL Digvijaysing	02833 -296675	8238069222 9274390999
14	Chief Warden - Mr. KB Pandya	2540371	9824510942	35	D.C.Boliya-Cairn Manubhai Savalia	Jamnagar	8527134477 9662539588
15	Mr. Desai -Home Guard - Jamnagar	2553862		36	Dr. Pratik Mehta Essar Power		9925240107
16	RMO - GG Hospital	2550240 /2541081	2551689 / 9824258885	37	D.C Boliya-Cairn Bhogat A.P Rathod	Radio Office	8527134477 9099994555
17	Control Room GMB -	2711805 / 2756909		38	OOD Indian Navy- Valsura	3987210	9375296545
18	Indian Coast Guard - Vadinar	02833 - 256579	1090 (Terror Helpline Toll free)	39	Indian Air Force, Jamnagar	2720007, Extn.4222(fire)	RK Singh 9426850187
19	Pollution Control Board, Jamnagar	2752366		40	Oshwal Hospital-Jam.	2566533	
20	Samarpan Hospitals	2712728/29		41	Vasai PHC	2910033	
21	HealthCentre -Sikka	2344329			For any Emergency Ambulance / Fire		108

ANNEXURE - 24 (A) POLLUTION CONTROL ARRANGEMENTS

FOR KEY PERSONNEL AND ESSENTIAL WORKERS, SEE ANNEXURE-17 & 18 : TRADE WASTE DISPOSAL, SEE ANNEXURE - 8.

	Type and Capacity of effluent treatment plant	No. of sample monitoring centres and its frequency	Other control Measures	Logbook & records	Incharge person's Name, Address & Phones	No. and place of sample monitoring centres	Type Paramet-ers & Fr-equency	Wind direction &velocity meters	Instruments available	Logbook & Records
	1	2	3	4	5	6	7	8	9	10
						INSIDE PLANT :				
a)	Hot effluent Pipeline end)	Daily, except holiday	Dilution water pumps / Settling ponds	Analysis records and data available	Manager EMS TCL-Mithapur Phone : 5270	a) Personnel Dept. b) Laboratory Terrace d) Bromine Plant	SPM SO2 NOX Cl2	Available	1) ENVIROTECH HIGH VOLUME Sampler-140 (2 Nos.)	Analysis records and data available
b)	Hot effluent ('100 mtr away from dilution point)	Daily, except holiday	Dilution water pumps / Settling ponds	Analysis records and data available	Manager EMS TCL-Mithapur Phone : 5270				1) ENVIROTECH HIGH VOLUME Sampler-140 (2 Nos.)	Yes
c)	Cold effluent (Pipeline end)	Daily, except holiday	Dilution water pumps	Analysis records and data available	Manager EMS TCL-Mithapur Phone : 5270	**EACH CENTRE ONCE A WEEK**			1) ENVIROTECH HIGH VOLUME Sampler-140 (2 Nos.)	Yes
d)	Cold effluent (at the Exit of setting ponds)	Daily, except holiday	Dilution water pumps	Analysis records and data available	Manager EMS TCL-Mithapur Phone : 5270	**OUT SIDE PLANT** Director Bunglow			1) ENVIROTECH HIGH VOLUME Sampler-140 (2 Nos.)	Yes

ANNEXURE - 24 (B) POLLUTION CONTROL ARRANGEMENTS

No.of location of sample places	Type para meters & freque-ency	Control measures provided	Instruments available	Logbook and	Key person Designation	Location	Type and Capacity	For what	Incharge person's Name, Address & Phones	No.of sample monitoring centres & frequency of moni-toring	Other measures	Log book	Incharge Person's Name Address & phones	Permi-ssion obtained	Condition ful filled
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
CEHP 1	PM.Sox & Nox	ESP, Fuel type & SOP	Stack moni-toring kit	Work book & reports	Asst. Mgr - EMS dept	EMS lab	-	-	GM- SHE Tata Chemicals Township (O) 5267 (Resi) 6267	Once in Month	-	-	-	-	Yes
CEHP 2	PM.Sox & Nox	ESP, Fuel type & SOP					-	-		Once in Month	-	-	-	-	Yes
B & W	PM.Sox & Nox	ESP, Fuel type & SOP					-	-		Once in Month	-	-	-	-	Yes
IBIL	PM.Sox & Nox	ESP, Fuel type & SOP					-	-		Once in Month	-	-	-	-	Yes
HPB 3	PM.Sox & Nox	ESP, Fuel type & SOP					-	-		Once in Month	-	-	-	-	Yes
HPB 4	PM.Sox & Nox	ESP, Fuel type & SOP					-	-		Once in Month	-	-	-	-	Yes
Raw Mill	PM	ESP					-	-		Once in month	-	-	-	-	Yes
New Coal mill		ESP					-	-		Once in month	-	-	-	-	Yes
Old coal mill		ESP					-	-		Once in month	-	-	-	-	Yes
Cooler		ESP					-	-		Once in month	-	-	-	-	Yes
Drier		ESP					-	-		Once in month	-	-	-	-	Yes
Cement mill		ESP					-	-		Once in month	-	-	-	-	Yes
Packer - 1		Bag Filter					-	-		Once in month	-	-	-	-	Yes
Packer 2		Bag Filter					-	-		Once in month	-	-	-	-	Yes

ANNEXURE - 25 OTHER ARRANGEMENTS

FOR KEY PERSONNEL AND ESSENTIAL WORKERS - SEE ANNEXURE - 14 & 15

Sr. No.	Type and Name of arrangements available	Qty.	Place of availability	Phone No.	INCHARGE PERSON'S Designation	Residence Phones	Residence Address	Place from where the samething available
1	2	3	4	5	6	7	8	9
1	**Heavy Vehicles** 1. Tippler 2. Trucks	4	Transport Dept.	5487	AM-Transport	6392	TCL, Township Mithapur.	TCL-Mithapur
2	**Lifts, Cranes etc.** 1. Cranes = 6 2. Omega = 2	6	Erection Dept.	5381	Manager - Mechanical Construction construction	6355	TCL, Township Mithapur.	TCL-Mithapur
3	**Transporters for material** 1. Karubha Karsanbha 2. Viram Asha & Co. 3. Ker & Co. *4. OTA (Okha Transport Assocication)*	12 -- --	Mithapur *Opp. MHY Gate*	- *826409 9999*	AM - Transport	6392	TCL, Township Mithapur.	TCL & Surajkaradi
4	Power Alternatives	-	-	-	-	-	-	-
5	Utilities alternatives	-	-	-	-	-	-	-
6	Sp. Equipments/ Instruments	-	-	-	-	-	-	-
7	Sp. Materials	-	-	-	-	-	-	-
8	Test Facilities	-	-	-	-	-	-	-
9	Special Information	-	-	-	-	-	-	-
10	Others	-	-	-	-	-	-	-

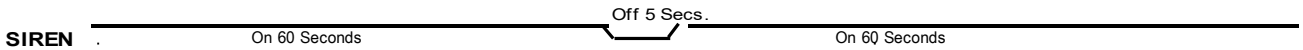
ANNEXURE - 26 : ALARMS & SIRENS

Sr.	Plantwise alarm points							The alarm	Sound difference if any			
	Plant/ Dept./ Location		Area of	Sr.No. of	Its place of	Type of the	Its period	(Signal)	Type	Type of	Duration of	Type of sound
	Name &	No.of	Each	the alarm	location(with	alarm or	of	is heard	of	alarm or	sounding	of alarm/ siren
	Location	Floor	Floor	point	floor No. if any)	siren	of checkin	(seen) at	emergency	siren		
1	2	3	4	5	6	7	8	9	10	11	12	13
1	a. CCD & Cl2 compressor b. CC Group Office c. New Liquid Plant	1 1 1			Ground floor Ground floor Ground floor	Hooter P.A System Provided Hooter	Weekly — Weekly	Heard Heard Heard	Emergency Emergency Emergency	Hooter — Hooter	1 Min. — 1 Min.	
2	New Liquid Plant	3			Ground floor	Bell		Heard	Emergency	Hooter	Push type	
3	New Liquid Plant	3			Storage Tank Ground Floor (4 Nos.)	Cl2 leakage		Heard	Cl2 leakage	Peep	Continuous	
4	Chlorine container loading area	1			Ground floor	Cl2 leakage		Heard	Cl2 leakage	Peep	Continuous	Hooter
5	New Liq. Cl2 Plant	3			Ground floor	Cl2 leakage		Heard	Cl2 leakage	Peep	Continuous	Hooter
6	Cell House	1			Ground floor	Cl2 leakage		Heard	Cl2 leakage	Peep	Continuous	Hooter
7	New Liquid Plant	3			Ground floor from Compressor	From Compressor tripping		Heard	Tripping	Peep	Reset type	Peep
8	CCD	1			Ground floor	High Temp. Alarm		Heard	High Gas Temp.	Peep	Reset type	Hooter
9	Process House CCR	1			Ground floor	NH_3 Sensors	Monthly	Heard	NH_3 Gas Leakage	Peep	Reset type	Indication on panel / Hooter
10	Process House NH_3 Strorage area	1			Ground floor	NH_3 Sensors	Monthly	Heard	NH_3 Gas Leakage	Peep	Reset type	Indication on panel / Hooter
11	HPB-3	3	HPB-3 Control Room		2nd Floor	Hooter	Yearly	Heard	Leval-2 & Leval-3	Hooter	Continuous	Hooter
12	HPB-3	3	HPB-3 MCC Room		1st Floor	Hooter	Yearly	Heard	Leval-2 & Leval-3	Hooter	Continuous	Hooter
13	Turbine Floor	1	ESP Control Room		1st Floor	Hooter	Yearly	Heard	Leval-2 & Leval-3	Hooter	Continuous	Hooter
14	Turbine Floor	1	LPT-10 MCC Room		1st Floor	Hooter	Yearly	Heard	Leval-2 & Leval-3	Hooter	Continuous	Hooter
15	Turbine Floor	1	CEHP-2 Control Room		1st Floor	Hooter	Yearly	Heard	Leval-2 & Leval-3	Hooter	Continuous	Hooter
16	Turbine Floor	1	Burnner Floor		1st Floor	Hooter	Yearly	Heard	Leval-2 & Leval-3	Hooter	Continuous	Hooter
17	Densh Ash		Densh Control Room		2nd Floor	Hooter	Yearly	Heard	Leval-2 & Leval-3	Hooter	Continuous	Hooter
18	CCG	3	CCG Control Room		2nd Floor	Hooter	Yearly	Heard	Leval-2 & Leval-3	Hooter	Continuous	Hooter
19	CCG	3	CCG Cable Galary		3rd Floor	Hooter	Yearly	Heard	Leval-2 & Leval-3	Hooter	Continuous	Hooter
20	MUW-3	3	Muw-3 Control Room		2nd Floor	Hooter	Yearly	Heard	Leval-2 & Leval-3	Hooter	Continuous	Hooter
21	MUW-3	3	Muw-3 MCC Room		3rd Floor	Hooter	Yearly	Heard	Leval-2 & Leval-3	Hooter	Continuous	Hooter
22	WorkShop Area	1	WorkShop Area		Ground Floor	Hooter	Yearly	Heard	Leval-2 & Leval-3	Hooter	Continuous	Hooter
23	Fire Station Out Side	1	Fire Station Out Side		2nd Floor	Hooter	Yearly	Heard	Leval-2 & Leval-3	Hooter	Continuous	Hooter
24	Soda Ash	3	Soda Ash Control Room		2nd Floor	Hooter	Yearly	Heard	Leval-2 & Leval-3	Hooter	Continuous	Hooter
25	Soda Ash	3	Soda Ash Rack Room		1st Floor	Hooter	Yearly	Heard	Leval-2 & Leval-3	Hooter	Continuous	Hooter
26	Soda Ash	3	Soda Ash Rack Room out side		1st Floor	Hooter	Yearly	Heard	Leval-2 & Leval-3	Hooter	Continuous	Hooter
27	Soda Ash	3	Soda Ash Office		Ground Floor	Hooter	Yearly	Heard	Leval-2 & Leval-3	Hooter	Continuous	Hooter
28	Mono hydrent	4	Mono Hydrent Control Room		1st Floor	Hooter	Yearly	Heard	Leval-2 & Leval-3	Hooter	Continuous	Hooter
29	Mono hydrent	4	Mono Hydrent MCC Room		3rd Floor	Hooter	Yearly	Heard	Leval-2 & Leval-3	Hooter	Continuous	Hooter
30	Process House	4	VAC PCB MCC Room		1st Floor	Hooter	Yearly	Heard	Leval-2 & Leval-3	Hooter	Continuous	Hooter

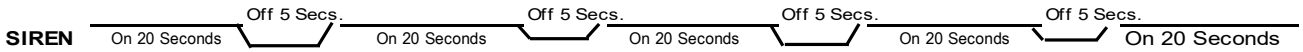
31	ESF	4	ESF 1&2 Control Room Outside		1st Floor	Hooter	Yearly	Heard	Leval-2 & Leval-3	Hooter	Continuous	Hooter
32	ESF	3	ESF 3rd Steam		2nd Floor	Hooter	Yearly	Heard	Leval-2 & Leval-3	Hooter	Continuous	Hooter
33	Cement Plant	2	Laboratory Inside GND Floor		Ground Floor	Hooter	Yearly	Heard	Leval-2 & Leval-3	Hooter	Continuous	Hooter
34	Cement Plant	2	Laboratory Inside 1st Floor		1st Floor	Hooter	Yearly	Heard	Leval-2 & Leval-3	Hooter	Continuous	Hooter
35	Cement Plant	3	Ground Floor CCR Building		Ground Floor	Hooter	Yearly	Heard	Leval-2 & Leval-3	Hooter	Continuous	Hooter
36	Cement Plant	3	1st Floor CCR Building		1st Floor	Hooter	Yearly	Heard	Leval-2 & Leval-3	Hooter	Continuous	Hooter
37	Cement Plant	2	MSS-1 1st Floor Out side		1st Floor	Hooter	Yearly	Heard	Leval-2 & Leval-3	Hooter	Continuous	Hooter
38	MuW-1 & 2	3	1st Floor Circulator MCC Room		1st Floor	Hooter	Yearly	Heard	Leval-2 & Leval-3	Hooter	Continuous	Hooter
39	MuW-1 & 2	3	2nd Floor Circulator MCC Room		2nd Floor	Hooter	Yearly	Heard	Leval-2 & Leval-3	Hooter	Continuous	Hooter
40	Water Softing	1	Control Room		Ground Floor	Hooter	Yearly	Heard	Leval-2 & Leval-3	Hooter	Continuous	Hooter
41	SAPA	4	Control Room		1st Floor	Hooter	Yearly	Heard	Leval-2 & Leval-3	Hooter	Continuous	Hooter
42	SAPA	4	Ground Floor		Ground Floor	Hooter	Yearly	Heard	Leval-2 & Leval-3	Hooter	Continuous	Hooter
43	SAPA	4	Begging Area		1st Floor	Hooter	Yearly	Heard	Leval-2 & Leval-3	Hooter	Continuous	Hooter
44	HR Building	2	Office Area		Ground Floor	Hooter	Yearly	Heard	Leval-2 & Leval-3	Hooter	Continuous	Hooter
45	HR Building	2	Office Area		Ground Floor	Hooter	Yearly	Heard	Leval-2 & Leval-3	Hooter	Continuous	Hooter
46	HR Building	2	Office Area		Ground Floor	Hooter	Yearly	Heard	Leval-2 & Leval-3	Hooter	Continuous	Hooter
47	HR Building	2	Office Area		1st Floor	Hooter	Yearly	Heard	Leval-2 & Leval-3	Hooter	Continuous	Hooter
48	HR Building	2	Office Area		1st Floor	Hooter	Yearly	Heard	Leval-2 & Leval-3	Hooter	Continuous	Hooter
49	HR Building	2	Office Area		1st Floor	Hooter	Yearly	Heard	Leval-2 & Leval-3	Hooter	Continuous	Hooter
50	General Building	2	Office Area		Ground Floor	Hooter	Yearly	Heard	Leval-2 & Leval-3	Hooter	Continuous	Hooter
51	General Building	2	Office Area		Ground Floor	Hooter	Yearly	Heard	Leval-2 & Leval-3	Hooter	Continuous	Hooter
52	General Building	2	Office Area		Ground Floor	Hooter	Yearly	Heard	Leval-2 & Leval-3	Hooter	Continuous	Hooter
53	General Building	2	Office Area		1st Floor	Hooter	Yearly	Heard	Leval-2 & Leval-3	Hooter	Continuous	Hooter
54	General Building	2	Office Area		1st Floor	Hooter	Yearly	Heard	Leval-2 & Leval-3	Hooter	Continuous	Hooter
55	Engineering Building	1	Office Area		Ground Floor	Hooter	Yearly	Heard	Leval-2 & Leval-3	Hooter	Continuous	Hooter
56	General Store	2	Inside Ground Floor		Ground Floor	Hooter	Yearly	Heard	Leval-2 & Leval-3	Hooter	Continuous	Hooter
57	General Store	2	Inside Ground Floor		Ground Floor	Hooter	Yearly	Heard	Leval-2 & Leval-3	Hooter	Continuous	Hooter
58	General Store	2	Inside Ground Floor		Ground Floor	Hooter	Yearly	Heard	Leval-2 & Leval-3	Hooter	Continuous	Hooter
59	General Store	2	Inside 1st Floor		1st Floor	Hooter	Yearly	Heard	Leval-2 & Leval-3	Hooter	Continuous	Hooter
60	General Store	2	Inside 1st Floor		1st Floor	Hooter	Yearly	Heard	Leval-2 & Leval-3	Hooter	Continuous	Hooter

EMERGENCY SIREN TONE

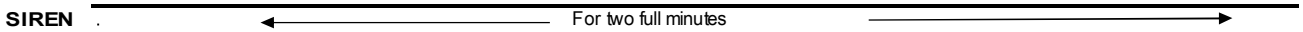
GAS LEAKAGE : 60 SEC. CYCLE WAILLING SOUND FOR TWO MINUTES



FIRE & OTHER EMERGENCY : 20 SEC. CYCLE WAILLING SOUND FOR TWO MINUTES.



ALL CLEAR & TESTING : CONTINUOUS SIREN FOR TWO MINUTES.



Siren Locations

S.No.	Plant	Location	Range
1	Power plant	HPB-3 top floor	8 Km.
2	Cement	New Coal mill Building top, canteen side corner	8 Km.
3	MHY	PCB Sub station top	8 Km.
4	Soda Ash	Process House 7th floor	16 Km.
5	CCG	CCR top	8 Km.
6	MUW-4	CCR top	8 Km.
7	Salvage Yard	New DG set building top	8 Km.

SIREN TESTING TIME : - EVERY SATURDAY AT 11.00 AM

ANNEXURE - 27 INTERNAL PHONES

Sr. No.	Name	PERSON AVAILABLE ON THIS PHONE				
		Name	On-site / Off-site emergency plan, if any	Phone Office (02892)	Phone Residence (02892)	Address
1	Vice President - Manufacturing	Mr. B. B. Kathpalia	Main Incident Controller	665201	666201	Tata Chem. Ltd. Township
2	AVP - Operations	Mr. M S S Rao	Runner / Incident Controller	665203	666203	Tata Chem. Ltd. Township
3	AVP - Engg. Services	Mr. N Kamath	Runner / Incident Controller	665205	666221	Tata Chem. Ltd. Township
4	DGM-Soda ash	Mr. S Roy	Runner / Deputy Incident Controller	665269	666269	Tata Chem. Ltd. Township
5	AGM - CCG,Salt & Marine Chemicals	Mr.R A Vadgama	Runner / Deputy Incident Controller	665221	666238	Tata Chem. Ltd. Township
6	AGM - Safety & Health	Mr.D K Thakur	Key personnel - Rescue & other help	665247	666247	Tata Chem. Ltd. Township
7	Asst. Manager- Fire	Mr.Varun Raolji	Key personnel - Rescue & other help	665420	666388	Tata Chem. Ltd. Township
8	DGM HR & Admin	Mr. D.B. Shukla	Key personnel - Overall arrangements	665223	666223	Tata Chem. Ltd. Township
9	Head - Security	Major Nol Godwin Fernandez	Key personnel - Evacuation	665257	666257	Tata Chem. Ltd. Township
10	Head - Medical Services	Dr. Sanjeev Bhatnagar	Key personnel -First Aid	665283	666283	Tata Chem. Ltd. Township
11	AGM - Mech. Construction & Transport	Mr. Sanjay Bhayani	Key personnel - Transportation	665248	666248	Tata Chem. Ltd. Township
12	Sr. Manager-ISMS	Mr. K Satish	Key personnel - Supply PPE's & other equipments	665295	666295	Tata Chem. Ltd. Township
13	AGM- Power Plant	Mr. H.N Padh	Key personnel - Control Emergency	665249	666249	Tata Chem. Ltd. Township
14	DGM- Cement	Mr. S. Chakraborty	Key personnel - Control Emergency	665224	666224	Tata Chem. Ltd. Township
15	AGM - Electrical	Mr. D K Chanpa	Key personnel - Control Emergency	665290	666290	Tata Chem. Ltd. Township
16	Sr. Manager - Soda Ash Maint. Group	Mr. Ketan Thanki	Key personnel - Control Emergency	665229	666360	Tata Chem. Ltd. Township
17	AGM - Chlor Caustic Maint. Group	Mr. Anil Dani	Key personnel - Control Emergency	665296	666451	Tata Chem. Ltd. Township
18	AGM - Civil	Mr. Nirav Amritlal Shah	Key personnel - Control Emergency	665287	666287	Tata Chem. Ltd. Township
19	Manager - Safety	Mr. Prathmesh Bhatt	Key personnel - Control Emergency	665421	666341	Tata Chem. Ltd. Township
20	Manager - Safety	Mr. Paresh Patel	Key personnel - Control Emergency	665408	666329	Tata Chem. Ltd. Township
21	Asst. Manager - Safety	Mr. Labhesh Modha	Key personnel - Control Emergency	665786	666342	Tata Chem. Ltd. Township
22	Sr. Officer - Safety	Mr. Kiran Valand	Key personnel - Control Emergency	665407	666404	Tata Chem. Ltd. Township
23	Fire Officer	Mr. Dennis Swami	Key personnel - Control Emergency	665624	666340	Tata Chem. Ltd. Township
24	Asst. Engg. - Safety	Mr. Kaushik Pandya	Key personnel - Control Emergency	665408	666324	Tata Chem. Ltd. Township
Out Side Important Telephone Numbers						
1	Police Station	Head Constable	Helping in Controlling Emergency	5778		
2	Post Office	Post Master	Helping in Controlling Emergency	5779		
4	Railway Yard	Yard Supervisor	Helping in Controlling Emergency	5784		
5	District Collector, Jamnagar.	District Collector	Government communication & Co-ordination.	2555869		Quarter - Jamnagar.
6	Mamlatdar - Dwarka	Mamlatdar	Government communication & Co-ordination.	234541		Mamlatdar's Quarter - Dwarka
7	Police Deptt. Okha	P.S.I.	Maintenance of Law & Order, Traffic	262038		P.S.I. Quarter Okha
8	INS - Dwarka	Commandant - Navy		262161		INS - Dwarka
9	Government Hospital, Dwarka	Government Medical Officer	Help in medical treatment to the affected	234262		Aditya Road, Dwarka.
10	S.T. Depot. Manager, Dwarka		Transportation	234204		S.T.Bus Station, Dwarka.
11	IOC Depo. Manager.	IOL, Okha	Help in case of fire	262028		IOL, Okha.

ANNEXURE : 28 - External Phones							
Sr No.	Name & Address of the dept. service person	Ph. Nos.	Person available on this Phone				
			Name	Designation	Services expected under emergency plan	Ph. Nos.	Address
1	2	3	4	5	6	7	8
1	District Collector & Magistrate	2555869, 9978406210	-----	----	Coordination	2555869, 9978406210	Jamnagar
2	District Collector & Magistrate	02833-232152, 232805	----	----	Coordination	02833-232152, 232805	Khambhaliya
3	Addl. Collector	2550284, 99784 05182	-----	----	Coordination	2550284, 99784 05182	Jamnagar
4	Office of Supdt. of Police	2554203	-----	----	Coordination	2554203	Jamnagar
5	Dy. Director Health & Safety	2678206	-----	----	Coordination	2678206	Jamnagar
6	Police Control Room -Jamnagar	2550200	-----	----	Coordination	2550200	Jamnagar
7	Jt.Chairman -Commissioner,JMC	2552321	-----	----	Coordination	2552321	Jamnagar
8	MAS OFFICE	2542764	----	----	Coordination	2542764	Jamnagar
9	Yashwantsinh Parmar - Disaster Management cell	9426950783	----	----	Coordination	9426950783	Jamnagar
10	RMO - GG Hospital	2550240 /2541081	-----	----	Coordination	2550240 /2541081	Jamnagar
11	KK Bisnoi - JMC CFO	2550340/101 (2662691)	-----	----	Coordination	2550340/101 (2662691)	Jamnagar
12	Indian Coast Guard - Vadinar	02833 - 256579	-----	----	Coordination	02833 - 256579	Vadinar
13	Indian Air Force, Jamnagar	2720007, Extn.4222(fire)	----	----	Coordination	2720007, Extn.4222(fire)	Jamnagar
14	Okha Nagarpalika Fire station	02892 - 262539/262438	----	----	Coordination	02892 - 262539/262438	Okha
15	Dwarka Nagarpalika Fire station	02892-234057	----	----	Coordination	02892-234057	Dwarka

ANNEXURE - 29 NOMINATED PERSONS TO DECLARE MAJOR EMERGENCY

Sr. No.	Name of the plant, Department or Location	Duty or designation on given, if any under the On-site/Off-site emergency plant	Phone No.	Residence	
				Phone No.	Address
1	2	4	5	6	7
1	Vice President - Manufacturing	Main Incident Controller	5201	6201	Executive Bunglow
2	AVP - Operations	Runners Main Incident Controller	5203	6203	Executive Bunglow
	(In absence of VP-Manufacturing)				

ANNEXURE - 30 : A FORM TO RECORD EMERGENCY TELEPHONE CALL

PART A : ESSENTIAL INFORMATION

Details of call as reported						
Caller's Name & Designation		**Date**		**Time**		**Phone No.**
Purpose of Call : If any particular advice required immediately ?						
Name of Chemicals, to be spelt out clearly						
Brief Description of incident						
Fire/Explosion/Liquid Spill/Gas release						
Quantity involved						
Packaging/Storing/Handling/Using details						
Location of Incident						
Cause, if known, in brief,						

PART - B : INFORMATION TO BE OBTAINED IF READILY AVAILABLE

Has anyone been injured ?	YES		NO		If yes, How many ?			
Affected by Chemicals ?	YES		NO		If yes, How many ?			
What First-aid has been given ?								
Has anyone been taken to Hospital ?	YES							
If Yes, Address of the hospital.	NO							
Is the Road blocked ?	YES		Closed to traffic ?	YES				
	NO			NO				
Who owns the Chemicals ?	YES							
	NO							
If caused by vehicle, **Vehicle No.**			and Name & Address of the Owner					
Has the owner been informed ?	YES							
	NO							
To whom was the load consigned ?								

ANNEXURE - 31 : STATUTORY COMMUNICATION

	Statutory information to be given to	Periodicity of such information to be given (Statutory of Self-decided)	Date of last information given	To how many persons	Suggestions received if any	Last date of implement-tation of actual suggestions
	1	2	3	4	5	6
1	Employees	As and when required	(SHE Policy)	All Employees	-	-
2	To general public and neighbouring firms	As and when required	Safety Dept. (SHE awareness)	(Communication Meet)	-	-
3	District Emergency Authority	As and when required	As and when necessary	-	-	-
4	DISH / ADISH	Regularly	"	-	-	-
5	Legal requirements	Sr. Management staff	26.04.2017 Conducted Mock drill	3658 Persons -	-	

ANNEXURE - 32 : SEPARATION DISTANCES				
Sr. No.	Substances	Tanks		Separation Distance (M)
		Capacity	Nos.	
1	2	3	4	5
1	Ammonia	50 T	2	1.000
2	Chlorine	76 T	4	2.300

ANNEXURE - 33 : EMERGENCY INSTRUCTION BOOKLET

Sr. No.	Role to be played as . (Name emergency designation viz. Incident, Controller, Particular key person or essential worker doing the job of).	His emergency Duties / Functions (Narrate in short and clear sentences and 1, 2, 3)	Also refer (other relevant documents of the factory viz., Safety Manual etc.)	He should report at (the incident place or control room etc.)
1	2	3	4	5
1	**Incident Controller**	Will give necessary instruction to control emergency and safe shut down. Co-ordination of different agencies.	-	Control Room
2	**DGM- Soda Ash**	Will work as an Incident Controller in case of Incident controller is not available.	-	Control Room and Incident place as per the requirement.
3	**AGM- CC & Marine**	Will work as Incident controller in case of Incident controll is not available.	-	Incident place
4	**AGM - Safety & Health**	Will direct for emergency control operation and guide to combat fire with squad in case of fire.	-	Incident place
5	**Head - Medical Services**	Arrange to give medical treatment to affected people.	-	Control Room
6	**DGM - HR & Personnel**	For shifting affected people to hospital, help in evauation.. To ensure safe evacuation of plant personnels by calling attendance of employees and instruct canteen to supply Tea and Coffee in sufficient quantity to be given to effected persons as per the doctor's advise as stimulent.	-	Incident place
7	**AVP - Engg Services**	To co-ordinate all service department activities.	-	Incident place
8	**Head - Security Services**	To control traffic at incident site and give entry to essential staff and prevent unauthorised entry at all gates	-	Incident place
9	**Sr. Manager - Inventory & Stores**	To supply necessary material to control emergency.	-	Incident place

ANNEXURE : A - PRESS RELEASE NOTE

Date: Time: Press Release No:

Tata Chemicals (TCL) regret to inform that an incident (describe in broad terms) occurred on (installation and location of incident) at (date and time of incident).

The last reported situation was (give information on last confirmed situation).

TCL has mobilised its Emergency Response Team, and is working closely with the Local Emergency Services and the District authorities.

Firm details of the incident are not yet confirmed, but every action is being taken to safeguard lives.

The next press release will be made as soon as more information becomes available.

Direct enquiry lines have been established as follows:

Media (Telephone number to handle media calls)

Relatives (Telephone number to handle relatives calls)

(Details which needs to be mentioned)
What happened?
Who is involved?
When did it happen?
Where did it occur?
Why did happen?
How will it be prevented from happening again?

ANNEXURE : B INFORMATION TRANFER	
TIME	**ACTION TAKEN / COMPLETED**

ANNEXURE : C - FOCUS BOARD					
People	Environment	Assets	Business Continuity	Liability	Reputation

ANNEXURE : D - CASUALITY TRACK

Name	Status	Nominated Emergecy Contact (NEC)	NEC Contacted?	Location	Transfer To	Transfer By

ANNEXURE : E – INCIDENT REPORTING

DESCRIPTION OF INCIDENT / ACCIDENT (tick relevant boxes)							
Fire		Explosion		Bomb Threat		Toxic Gas Release	
Vehicle Accident		Serious Injury		Hazardous Spill		Threatening Weather Event	
Blow out		Structural Failure		Hydrocarbon Release		Kidnap	
Security Threat		Rioting		Missing Vehicle		Missing Person	

LOCATION OF INCIDENT / ACCIDENT	
Description of Location of Incident :	Provide details of immediate location at which incident occurred
	Provide details of status of equipment and environment in impacted area
	Provide specific details which may assist in emnergency response.

IMPACT TO PERSONNEL							
No. of Personnel Killed		No. of Personnel Injured		No. of Personnel Missing		Total Personnel on site	

IMPACT TO ENVIRONMENT (tick relevant boxes)							
Fauna affected?		Flora affected?		Local Agriculture affected?		Local waterways affected?	
Cultural or heritage sites affected?							

ANNEXURE : F - EMERGENCY THRESHOLD MATRIX						
Situational guidance	**Employees, people and community impacts**	**Company assets or business continuity impacts**	**Company earnings and revenue impacts**	**Environmental impacts**	**Reputational impacts or public concern**	**Notification and activation required**
Emergency	Minor injuries resulting in lost time.	Minor assets consequences.	Interruption extends from 01 - 30 days with production reduced by up to 10 %.	The impact or release is readily contained and cleaned - up with available resources with the possibility of prosecution for environmental damage.	Normally just isolated media coverage, mainly localized, with no real issue or effect. However regulators may need to be advised; interest groups may raise the matter; and there may be noticeable public concern	The Emergency Response Team is activated, and the Incident Management Team leader is notified. The Business Unit is notified. Emergency services maybe requested.
Major Emergency	Major injuries or a single isolated fatality.	Major asset damage	Interruption extends from 1 - 3 months with production reduced by more than 10 %. Share price impacts.	The impact or release requires outside assistance and mandatory reporting. Significant degradation occurs and there is a prolonged recovery period.	Disruption to operation. Potential for national media coverage, negative state news, and interest group protest. Regulators may take action such as permit delays, investigations, audits and monitoring. There is customer or supplier concern	One or more Incident Management Teams are activated, and the Business Unit and Crisis Management Team are notified. External affairs and HR provide direct support.
Crisis situation	Multiple fatalities, multiple serious injuries or disabilities. Kidnapped employees,	Extensive assets damage.	More than 10 % reduction in production for more than 3 months. Concern over need for stock Exchange disclosure or trading halt.	Substantial pollution with detrimental effects or residual impacts over a wide area with slow recovery or substantial outside assistance needed.	Cessation of operation and demonstrable public outrage. Demonstrations and world wide negative news with strong protests by interest groups. Major concern by customers and suppliers. Regulators take strong action.	One or more Incident Management Teams and Crisis Management Team are activated. External Affairs, Corporate HR and Business Unit provide support to all. Location - District Crisis Group maybe activated. The global Crisis Management Team is notified.

ANNEXURE: G

Cyclone Mitigation plan at Mithapur

Following activities / actions plans were developed and acted upon.

COMMUNICATION:

1. Dos & Don˘ts were circulated through internal mail to all Mithapur Users.
2. Hand-outs in Gujarati for the precautions to be taken during cyclone were printed & distributed to entire Mithapur Plant employees.
3. A vehicle was arranged that went around entire township & messages on cyclone preventions were loudly communicated.
4. A Meeting was arranged with G-1 & above staff in auditorium where entire planning was shared with them about the action already taken & planned in next few days by AVP ops, HR head. Also Ideas were sought if anything is missed out.
5. A meeting was arranged with Local contractors, their supervisors in Suraksha Sanskar Kendra. It was attended by @ 140 contractor˘s responsible person. Communication about planned action was shared with them.
6. Joint Management council (JMC) was briefed about planning & their support was sought.
7. President of Merchant association was informed to convey local merchants to take requisite precautionary measures.
8. VODAFONE, 2nd communication system simcards issued to critical functional heads for managing communication in case of one line failure. Also all G-1 & plant head personal mobile numbers listed & circulated.
9. Everyday review on progress made &generation of further mitigation ideas carried out in Dream room by sr. leaders.
10. Individual department communicated the action plan & sensitized the staff in their PD

OFF SITE PLAN:

1. List of volunteers with clearly defined Roles & responsibility were prepared & circulated thr˘o E-mail by GM ¯ HR & Administration.
2. Continuous contacts with government authorities like, Dist. Collector office, Dwarka Mamlatdar, Local Police, SP, Director District Industry Centre Jamnagar, were maintained by Sr. Manager - Admin.Manager & team.
3. Aqua Ducts were cleaned for storm water drain, Vertical pumps availability checked.
4. A diesel Generator set was hired& specially installed for water drain in Town to take care of heavy rain & Power supply failure.
5. Do˘s Don˘t pamphlets delivered door to door in Mithapur.
6. All essential commodities like Atta, Potatoes etc. kept in stock at Guest House.
7. An EMERGENCY control room opened in Town &its contact numbers were displayed in Hand-outs.
8. Volunteers kept ready.
9. Availability of Keys of school MHS/DAV/Gujarati Sala & human amenities were assured.

10. Eight Trucks were deployed with stools at strategic locations for evacuation of people if required .Additional jeeps & vehicle kept in Town civil yard.
11. Strom water drain channel was barricaded at J-1 J-5 area
12. Road closed to sea shore.
13. LPG cylinder go down was checked for proper safety.
14. Nearby community villages were informed & trucks arrangements were assured in case of evacuation by Mr. Kamani& team.
15. TCSRD ladies employees were declared leave for two days.
16. Four ladies group :Mahila Mandal˘ were kept ready to cook food for affected people by community dept.at Arambhda Village, Udhoygnagar etcǔ

WORKS PLANN:

1. Apprentice˘s students/employees were not allowed for two days inside the works.
2. Handicap employees were also stopped to come to works.
3. All four chlorine storages were kept empty.
4. Steam Power balance were prepared for variety of scenarios like, Soda ash plant stoppage or at different rates, MUW stoppages etc. Also it was worked for Minimum Soda ash rates like 1500 tpd, etc. By AVP ¯ Operations & team.
5. Ammonia storage tanks stock was reduced to @ 25 its& fresh tanker coming from suppliers were Hold at Rajkot to avoid excess stocks by DGM ¯ Soda Ash & team.
6. Acetylene cylinders stocks were reconciled & all cylinders at heights inside plants were brought down to ground by respective service dept. heads & team.
7. Plant rates were reduced to 2200 tpd SA, & @ 150 tpd steam rates for MUW on 30th.Plann were discussed for further requirement if any.
8. Cooling Towers fans were planned to stop at high wind velocity, hence wins speed monitoring also started, Few fans were tied with rope & Kiln top loose material brought down by Sr. Manager - SAMG & team
9. Canteen facility was assured for lunch/dinner during shift change & providing food to employees in shift inside during cyclone.
10. List of people were prepared who will be on duty in second & night shift inside the plant.
11. Additional torch lights were arranged by Mr. Modi & team Purchase.
12. Additional vehicles arranged inside plant at Power plat/MUW/Security/Cement.
13. Ambulance/fire tenders/additional Gum boots/safety PPEs /BA set/ 10+2 fire attendants˘ staff including safety officers were assured by AGM ¯ Safety & team.
14. Diesel pumps operation were checked & assured for water evacuation ,all vital drains inside
15. All DG Set were tested, diesel tanks were full, Tower lights lowered at non critical points, Passengers lift operations suspended by GM ¯ Electrical - Instrument & team.
16. Effluents were managed by keeping lower thickener levels at Cement/ESF plant in case of power failure in downstream by DGM - Cement & team.
17. Finished goods stocks/additional rakes for dispatches were well supported by sales team & arranged By Sr. Manager - SCM & team.
18. Minimum staff was ensured inside the work by stopping work permits & suspending working at heights, declaring non-core activities like painting, fabrication etc. Suspension for two days.
19. 38 KL of diesel & 91 Kl of furnace oil were assured, along with covering of raw material like Pet coke/Indo-coal / BlA Coke /etc.by Sr. Manager - IBL & team.
20. Team of 3-4 people were made by individual departments with specific focus on listing &mitigation unsafe conditions inside plant like hanging of ac sheets, loose pipes, etc...

21. SOP plant stopped& product covers & preserved by GM - Projects & team.
22. All hanging /loose ac sheets were tightened, spare fire hydrant line replacement, main drains cleaning, Barricading by temporary blocks the Bicarb Go down, removal of weirs at Padli in view of flooding were completed on war footing by GM ¯ Civil, Mechanical construction & Transport & team.

SALT:

23. Salt loss was protected by assuring curb wall at various stacks.
24. Crystallizers at Mithapur-Samlasar-Okhamadhi-No-13 bittern ponds were filled up to @ 6_ level to avoid dilution as those were opened for harvesting.
25. Feeding to crystallizer at Mithapur stopped to build brine stocks for MUW.
26. Charakla Operation- :O6˘, M-13, K-8 gates were closed to avoid flooding of water at charkla highway.
27. Pumping of brine controlled.

SODA ASH:

28. Kiln Top & operation on height were restricted.
29. Outside pit were cleaned & all pit pumps were tested.
30. Auto silo dump valves, both vacuum system conveyors, Bicarb top conveyors, were covered with Tarpaulins to avoid water in grace.

Electricals:

31. All non-critical flood light towers height was brought down.
32. Samlasrpower from 10 MVA & Padli from 3mva distributed to avoid power disturbance at effluent system.
33. All Substations˘panels checked for covering
34. All DG set tested.

CEMENT:

35. Margins maintained in thickeners to accommodate effluent in case of requirement& level were kept low.
36. Cement plant Vertical pump for dewatering started for 24 hrs. dewatering.
37. Clinkers & raw material covering assured.

POWERPLANT:

38. All oil drums shifted to safe locations.
39. Fly ash bins were kept emptied.
40. Loose & hanging ac sheets /Insulation sheets were tied up & all activities were reviewed.

SAFETY DEPT:

41. Assured all PPEs, 3 walky- talky sets-placed at strategic locations (safety dept., power plant& Fire Pump house).
42. Assured spare Fire tender readiness, ambulance preparedness.

MHY:

43. All raw materials covered.

TRACKING NILOFAR:

TRACKING FROM: WWW.Indianmeteorological department

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