CHAPTER – VII

ADDITIONAL STUDIES

[RISK ASSESSMENT & DISASTER MANAGEMENT]

7.0. ADDITIONAL STUDIES

In order to support the environment impact assessment and environment management plan, following additional studies have been included in this report.

- Risk assessment
- Occupational Health
- Disaster management plan

SCOPE OF THIS STUDY

The QRA study in this report has been conducted considering the Terms of References (TORs) given by Expert Appraisal Committee of MoEF for Environment Clearance (EC).

The study has been carried out with a view to comply all TOR points

7.1 EHS POLICY

SAFETY, HEALTH AND ENVIRONMENT POLICY GUIDELINES

FMC India Private Limited is committed to protect environment,eliminate occupational hazards and ensure safety of employees & sub contractors through :

- Monitoring and control of the impact of its activities, products and service on a continual basis
- Compliance of applicable legal and other requirements
- Adopting safe operating practices with an emphasis on social accountability measures
- Facilitating employees training and their involvement
- Pollution mitigation through adoption of best practices
- Conserving materials, energy and reducing waste at source, and/encouraging usage of renewable energy sources
- Periodic review of safety, health and environment management system.

7.2 MANUFACTURING ACTIVITY

FMC have been manufacturing the following:
Lithium, Sodium and magnesium based products

Manufacturing involves handling of many chemicals and conducting of chemical reactions. The Process flow diagrams depict the manufacturing process of different products in Chapter – II

7.3 WORKING PATTERN

FACTORY WORKING HOURS

S.NO	SHIFT	WORKING HOURS
1	GENERAL	09.00 – 17.30
2	FIRST	06.00 – 14.00
3	SECOND	14.00 – 22.00
4	THIRD	22.00 – 06.00

RISK ASSESSMENT

7.4 RAW MATERIALS INVENTORY

[RAW MATERIALS - MAXIMUM INVENTORY, MODE OF STORAGE, HAZARDS, HANDLING PRECAUTIONS & HAZARD MITIGATION PLAN [EMERGENCY PREPAREDNESS]

TABLE-7.1: LIST OF RAW MATERIALS

S.NO	NAME OF THE CHEMICAL	PHYSICAL STATE	MODE OF STORAGE	MAX. INVENTORY IN TONS.	NATURE OF HAZARD	NFPA RATING
1	Lithium metal	Solid	MS Drums	3.000	Flammable	**H: 3 F: 3 R: 2 W**
2	2-Butyl chloride	Liquid	HDPE Drums	3.000	Flammable	**H: 1 F: 3 R: 0**
3	Magnesium Metal	Solid	MS Drums	3.000	Combustible	**H: 0 F: 1 R: 1**
4	N-Butyl chloride	Liquid	HDPE Drums	3.000	Flammable Corrosive	**H: 2 F: 3 R: 0**
5	3(Dimethylamino)-1-propylchloride HCl	Liquid	HDPE Drums	3.000	Corrosive	**-**
6	Sodium Hydroxide	Solid	PP Bags	3.000	Corrosive	**H: 3 F: 0 R: 1**
7	Isoprene	Liquid	HDPE Drums	5.000	Flammable	**H: 2 F: 4 R: 2**
8	HMDS	Liquid	HDPE Drums	1.500	Flammable	**H: 3 F: 3 R: 2**
9	n-Butyl chloride	Liquid	HDPE Drums	3.000	Flammable	**H: 1 F: 3 R: 0**
10	n-Octyl chloride	Liquid	HDPE Drums	3.000	Corrosive	**H: 1 F: 2 R: 0**
11	2-Butyl lithium	Liquid	HDPE Drums	3.000	Flammable	**--**
12	Styrene	Liquid	HDPE Drums	5.000	Flammable	**H: 2 F: 3 R: 2**
13	Sodium borohydride	Solid	MS Drums		Flammable	**H: 3 F: 4 R: 2**
14	Phenyl chloride	Liquid	HDPE Drums	3.000	Corrosive	**H: 3 F: 3 R: 0**
15	Lithium chloride	Solid	Fibre Drums	5.000	Corrosive	**H: 2 F: 0 R: 0**
16	Lithium aluminium hydride	Solid	MS Drums	2.000	Flammable	**H: 2 F: 3 R: 1**
17	Cumene	Liquid	HDPE Drums	4.000	Flammable	**H: 2 F: 3 R: 1**
18	Methyl chloride	Gas	Cylinders	10 No.s	Flammable	**H: 2 F: 4 R: 0**

SOLVENTS

TABLE-7.2: LIST OF SOLVENTS

S.NO	NAME OF THE SOLVENT	PHYSICAL STATE	MODE OF STORAGE	MAX. INVENTORY IN TONS.	NATURE OF HAZARD	NFPA RATING
1	Dibutylether	Liquid	MS Drums/ HDPE Drums	5.000	Flammable	**H: 2 F: 3 R: 1**
2	n-Hexane	Liquid	MS Tank	20.000	Flammable	**H: 2 F: 3 R: 0**
3	Cyclo hexane	Liquid	MS Tank	20.000	Flammable	**H: 1 F: 3 R: 0**
4	Tert-Butanol	Liquid	HDPE Drums	5.000	Flammable	**H: 1 F: 3 R: 0**
5	THF	Liquid	MS Tank	20.000	Flammable	**H: 2 F: 3 R: 1**
6	n-Heptane	Liquid	GI Drums	5.000	Flammable	**H: 1 F: 3 R: 0**

HANDLING PRECAUTIONS

- Use in a closed system under argon or nitrogen.
- Do not get in eyes, on skin or clothing.
- Do not breathe vapors or mist.
- Store in a cool place. Keep container closed.
- Keep away from sources of ignition, water, air, acids and oxidizing agents
- In case of fire, do not use water or carbon dioxide

EMERGENCY PREPAREDNESS

- OSEP
- Training & Awareness

7.5. FINISHED PRODUCTS - PACKING, HAZARDS & RATINGS

TABLE-7.3: LIST OF FINISHED PRODUCTS

S.NO	PRODUCT NAME	PHYSICAL STATE	MODE OF PACKING	NATURE OF HAZARD
1	N-Butyl lithium	Liquid	Cylinders	Flammable
2	Lithium hexamethyldisilazide[LHS]	Liquid	HDPE Drums	Flammable
3	Hexyl Lithium(HexLi)	Liquid	Cylinders	Flammable
4	Lithium tri-tert-butoxyaluminium hydride (TBLAH	Liquid	Cylinders	Flammable
5	Lithium tetrahydridoborate	Liquid	Cylinders	Flammable
6	Lithium diiisopropylamide(LDA	Liquid	HDPE Drums	Flammable
7	Methyl Lithium(MeLi)	Liquid	Cylinders	Flammable
8	Phrnyl Lithium (PhLi)	Liquid	HDPE Drums	Flammable
9	Di-Butyl Magnesium	Liquid	HDPE Drums	Flammable
10	AI-200-2CE	Liquid	Cylinders	Flammable
11	Lithium hexamethyldisilazide[LHS]	Liquid	HDPE Drums	Flammable

Toxicity/Safety Data

- Flammable liquid. Water reactive.
- In case of fire do not use water or carbon dioxide.
- Corrosive to eyes, skin, mucous membranes, upper respiratory tract.
- Inhalation of vapors may cause dizziness, nausea, anesthesia, numbness, motor weakness in fingers and toes, in coordination, and headache.
- If ingested, may produce a lung aspiration hazard.

COMPLETE INFORMATION ON TOXICITY AND SAFETY IS CONTAINED IN THE FMC MATERIAL SAFETY DATA SHEET (MSDS) AVAILABLE FOR THIS PRODUCT.

Handling/Storage/Disposal

- Use in a closed system under argon or nitrogen.
- Do not get in eyes, on skin or clothing.
- Do not breathe vapors or mist.
- Store in a cool place. Keep container closed.
- Keep away from sources of ignition, water, air, acids and oxidizing agents.

Shipping Containers

- Bulk containers 2000 – 20000 L
- Cylinders #20, #100, #420
- Drums 55 gallon
- Glass bottles 125 mL, 500 mL, and 1 L

7.6 RISK ASSESSMENT

The above chemicals are stored in stores and have access control to permit entry of authorized personnel only. Chemicals limited to one day requirement on the shop floor are issued only to personnel trained and authorized for chemical handling.

IDENTIFICATION OF HAZARDS

- Hazard identification is carried out to ascertain the controls required and available in order to mitigate the risk of exposure to the hazards. This would substantially help in overcoming costly errors and prolonged delays that may be caused due to the design changes that may be required on a later date.

- Hazard assessment is carried out at the equipment design stage and the control / mitigation measures are put in place overcome them to avoid costly errors at a later stage.

- Hazard assessment in our plant is carried out examining the, material storage, type of operations, locations to find out the facilities in place to overcome the risks of exposure to the hazards.

- Hazard Analysis and Risk Assessment study is carried out where consequences, risks associated are estimated, based on that the anticipated emergencies at this plant are identified. Such emergencies could be

1. Fire and Explosion Emergency may occur when Lithium metal / Magnesium come in contact with water in storage/process or while handling,

2. Hydrogen, Tert. Butanol and Hexane are flammable substance. Fire/ explosion emergency maybe caused due to leakage of Hydrogen or spillage of Butanol/ / hexane while unloading from road tanker to the storage tanks, from storage tank to measuring tank, hitting the road tanker with any other objects may occur containment failure etc

3. Vessel / Pipeline Rupture related consequences

After a critical analysis of the chemicals used, stored, defined safe operating procedures and the different manufacturing processes, the following table lists the safety measures / installations in place and mitigation measures to overcome the hazards.

Following are the Hazardous areas identified in the Plant

- Production blocks
- RM Stores
- Finished Products Storage area
- Cylinders Storage area
- Electrical
- Solvents storage area
- Filtration

Following are the Hazards identified in the Plant:

- Fire Hazards
- Spillage of chemicals
- Explosion Hazards
- Toxic gas release
- Noise

TABLE- 7.4: AREA WISE IDENTIFIED HAZARDS, PRECAUTION TAKEN WITH MITIGATION MEASURES

S.NO	AREA	IDENTIFIED HAZARD	SEVERITY & NO. OF PERSONS EXPOSED	PRECAUTIONS TAKEN	MITIGATION MEASURES
1	Raw materials and Finished product storage area]	Spillage of chemicals	Low to medium 10 persons	1. Approved layout as per legal requirements. 2. Flame proof electrical fittings installed 3. Chemical powders stored in safe containers with secondary containment to prevent spillages. 4. Storage quantity is limited 5. Manufacturing area is ventilated by a forced air ventilation system.	1. Area is cordoned off. 2. Emergency control center is informed. 3. Information is given to the declarer of emergency on the scale of leakage. 4. Emergency Response teams are kept on alert for swift response. 5. All hot works being carried out in the surrounding areas are stopped

S.NO	AREA	IDENTIFIED HAZARD	SEVERITY & NO. OF PERSONS EXPOSED	PRECAUTIONS TAKEN	MITIGATION MEASURES
				6. Material accessed only by authorized personnel using mechanized systems 7. Double door entry to ensure a clean atmosphere. 8. Body provided showers for decontamination.	6. Personnel working in the area are evacuated.

S.NO	AREA	IDENTIFIED HAZARD	SEVERITY & NO. OF PERSONS EXPOSED	PRECAUTIONS TAKEN	MITIGATION MEASURES
2	Solvents storage area / Production Blocks	Spillages/ Leaks / Fire	Medium to high 3 persons	1. Flame proof electrical fittings installed 2. Material stored in safe containers with secondary containment to prevent spillages. 3. Freight lift installed for movement of material. 4. Earthing and bonding carried out for all storage tanks and pipelines 5. Work permit system implemented for hazard assessment in case of any hot work / height work.	1. Area is cordoned off. 2. Power supply is cut off to the area to prevent accidental fire. 3. All hot work carried out in the vicinity is stopped. 4. Emergency control center is informed. 5. Information is given to the declarer of emergency on the scale of leakage. 6. Emergency Response teams are kept on alert for swift response. .

S.NO	AREA	IDENTIFIED HAZARD	SEVERITY & NO. OF PERSONS EXPOSED	PRECAUTIONS TAKEN	MITIGATION MEASURES
				6. All pipelines are of flame proof type and pipeline colors confirm to IS 2379 specifications. 7. Storage of Solvent quantities are limited 8. Manufacturing area is ventilated by a forced air ventilation system 9. Material accessed only by authorized personnel using mechanized systems	7. Personnel working in the area are evacuated. 8. Spilled powders are collected in vacuum cleaners.

S.NO	AREA	IDENTIFIED HAZARD	SEVERITY & NO. OF PERSONS EXPOSED	PRECAUTIONS TAKEN	MITIGATION MEASURES
	Production Blocks	Fire /Explosion	Medium to high 6 persons	10. Eye wash fountain / Body shower provided for decontamination 11. Personnel are provided with full body protection suits and nose masks to prevent exposure to chemicals. 12. Fire hydrant system with hydrant points with hose reels and nozzles installed to mitigate fire hazards 13. Fire extinguishers deployed adequately 14. Emergency exits are provided for safe escape in case of any emergencies.	

S.NO	AREA	IDENTIFIED HAZARD	SEVERITY & NO. OF PERSONS EXPOSED	PRECAUTIONS TAKEN	MITIGATION MEASURES
				15. Personnel are trained about Do's & Don'ts during emergency. 16. Emergency stair case provided for safe evacuation in case of any emergencies 17. Fully fledged medical center with medical officer and nursing staff operating round the clock	

S.NO	AREA	IDENTIFIED HAZARD	SEVERITY & NO. OF PERSONS EXPOSED	PRECAUTIONS TAKEN	MITIGATION MEASURES
3	Cylinders storage area	Fire due to gas leakage	Medium 3 - 5 persons	1. Site conditions as per legal requirements. [PESO requirements] 2. Leak detectors provided to sense leakages. 3. Power supply is cut-off in case of an emergency. 4. All electrical fittings are of flame proof and confirm to IS 2148 standards 5. Training to personnel posted at site in emergency response techniques	1.Limit the no. of cylinders stored in the facility. 2. Leakage detectors trigger audio alarm 3. Cut-off power supply to eliminate explosion risk. 4. Water spray using triple action nozzles to dilute the leakages 5. Cap of the leaking cylinder will be closed and shifted to an isolated location

S.NO	AREA	IDENTIFIED HAZARD	SEVERITY & NO. OF PERSONS EXPOSED	PRECAUTIONS TAKEN	MITIGATION MEASURES
				6. Cylinders are checked for leakage at the time of delivery and stock acceptance 7. Mock drills regularly conducted to test and improve emergency response and identify shortcomings	

S.NO	AREA	IDENTIFIED HAZARD	SEVERITY & NO. OF PERSONS EXPOSED	PRECAUTIONS TAKEN	MITIGATION MEASURES
4	Diesel Generator	Noise & Fire		1. Noise abatement thru' modular acoustic paneling of D.G sets 2. Secondary containment to prevent Diesel leakage from day tanks. 3. Adequate no. of fire extinguishers is kept to handle emergency . 4. Entry access to the area controlled	1. Information is given to Emergency control center. 2. Power supply is cut off to the storage area to prevent accidental fire. 3. All hot work around the area is stopped and the area is cordoned off . 4. The concerned maintenance personnel carry out repairs to mitigate the leakages. 5. Emergency Response Team is kept on alert for swift response. 6. Periodical occupational health checks to personnel working in the area to assess exposure to noise.

S.NO	AREA	IDENTIFIED HAZARD	SEVERITY & NO. OF PERSONS EXPOSED	PRECAUTIONS TAKEN	MITIGATION MEASURES
5	Electrical sub stations	Electric shock / fire	Low to medium 2-3 persons	1. Layout confirm to legal requirements specified under Indian Electrical Rules. 2. Entry restricted to licensed and authorized personnel only. 3. Earthing provided for leakage of stray currents. 4. Electronic mimic panels installed for fault indication at the entry of the sub-station.	1. Information is given to Emergency control center. 2. Power supply is cut off from incoming source. 3. Electricity supply company is alerted for cut off power supply in case of major risks

S.NO	AREA	IDENTIFIED HAZARD	SEVERITY & NO. OF PERSONS EXPOSED	PRECAUTIONS TAKEN	MITIGATION MEASURES
				5. Insulating rubber mats confirming to IS 15652:2006 provided in front of all electrical switchgear. 6. Periodical inspection and maintenance carried out to ensure good health of the equipment. 7. CO2 / DCP fire extinguishers deployed to handle emergency fires	4. All hot work around the area is stopped and the area is cordoned off. 5. The concerned maintenance personnel carry out repairs to restore normalcy. 6. Emergency Response Team is kept on alert for swift response

S.NO	AREA	IDENTIFIED HAZARD	SEVERITY & NO. OF PERSONS EXPOSED	PRECAUTIONS TAKEN	MITIGATION MEASURES
6	Hazardous waste storage room	Fire	One person	1. Storage shed in an isolated location. 2. Conditions specified in hazardous waste authorization issued by SPCB implemented. 3. Compatible wastes are stored in separate enclosures 4. Layout provides adequate ventilation and illumination 5. Secondary containment provided to prevent leakages / spillages	1. Information is given to Emergency control center. 2. Power supply is cut off from incoming source. 3. All hot work around the area is stopped and the area is cordoned off. 4. The concerned maintenance personnel carry out repairs to restore normalcy

S.NO	AREA	IDENTIFIED HAZARD	SEVERITY & NO. OF PERSONS EXPOSED	PRECAUTIONS TAKEN	MITIGATION MEASURES
				6. Storage quantity is limited. 7. Periodical disposal of accumulated waste to authorized landfills. 8. Flame proof electrical fittings installed to prevent fire / explosion hazards. 9. Eye wash / body shower is provided for decontamination in case of spillage on body parts. 10. PPE box is equipped with gum boots, splash proof safety goggles, aprons for use during handling of chemicals. 11. Access to the area restricted to authorize personnel only. 12. Fire hydrant point with hose reels provided for fire mitigation	personnel carry out repairs to restore normalcy. 5. Emergency Response Team is kept on alert for swift response. 6. Support of external agencies is sought in case situation poses major risks and is not controllable by in-house infrastructure

7.7. SPILL CONTROL

- For all plants spill control procedures will be displayed. Spillage shall be controlled as per concerned spill control procedure.
- Unprotected personnel up wind will be kept up wind.
- Like any spilled materials to contain. Absorb spilled liquid by dry absorbent clay or sawdust.
- Collect most of the contaminated absorbent with shovel for further disposal/incineration.
- If spill of material directly on the ground, dig up and remove saturated soil for disposal/incineration.
- Inactivate poisonous chemical with suitable method.

7.8. IDENTIFICATION OF HIGH RISK AREAS

It is observed that the storage areas pose fire/explosion hazards which may lead to major accident event. In the process areas it is observed that inventories of chemicals are very low & so there are not deemed to pose major off-site hazards. Thus, the quantitative risk assessment studies are limited to unit and some extent in vicinity.

MODES OF FAILURE

Storages system can fail in different ways depending on the materials stored, storage conditions & may involve systems in their vicinity. Conditions such as over filling, over pressure, missile, lightening or bomb attack, earthquake & resultant replier or release scenarios have been identified. Outcomes of such incidents are determined by presence of ignition either immediate or delayed. As can be seen depending upon modes of failure different scenarios are possible viz:

1. Continuous release
2. Instantaneous release

This may be of gas / liquid depending upon type of material stored/released & its characteristics. More examples, a liquid boiling at ambient conditions, will immediately be converted to gas upon exposure to atmosphere.

An instantaneous release is any release occurring for a period less than 15 seconds. Failure mode responsible for instantaneous releases may be catastrophic failure of

chemical storage tank / drum. For an instantaneous gas release important parameters are release height & quantity released whereas for instantaneous liquid release, important parameters are amount spilled, spill area & pool temperature, evaporation rate, vapour mass etc.Continuous release occurs when the material is released over a period greater than 15 seconds. For a continuous gas release, important parameters include height of leak above ground, emission rate & total time of release. For continuous liquid release important parameters are spill rates, duration, area & pool temperature, evaporation rate and vapor mass or Gas mass.

7.9. MAXIMUM CREDIBLE ACCIDENT ANALYSIS AND ITS MITIGATION MEASURES

A Maximum Credible Accident (MCA) can be characterized as the worst credible accident. In other words: an accident in an activity, resulting in the maximum consequence distance that is still believed to be possible. A MCA-analysis does not include a quantification of the probability of occurrence of the accident. Another aspect, in which the pessimistic approach of MCA studies appears, is the atmospheric condition that is used for dispersion calculations. The Maximum Credible Loss (MCL) scenarios have been developed for the Facility. The MCL cases considered, attempt to include the worst “Credible” incidents-what constitutes a credible incident is always subjective. Nevertheless, guidelines have evolved over the years and based on basic engineering judgment, the cases have been found to be credible and modeling for assessing vulnerability zones is prepared accordingly.

The objective of the study is Emergency planning, hence only holistic & conservative assumptions are used for obvious reasons. Hence, though the outcomes may look pessimistic, the planning for emergency concept should be borne in mind whilst interpreting the results.

In Consequence analysis, geographical location of the source of potential release plays an important role. Consideration of a large number of scenarios in the same geographical location serves little purpose if the dominant scenario has been identified and duly considered.

The Consequence Analysis has been done for selected scenarios by ALOHA [version 5.4.1.] of EPA.The details of software used for MCA analysis are described below.

- A computer based version ALOHA 5.4.1.2 is used to calculate toxic and explosive effect of the accidental release of liquid chemicals within the plant area.
- ALOHA (Areal Locations of Hazardous Atmosphere) is a computer program designed especially for use by people responding to chemical release as well as for emergency planning and training.
- ALOHA was jointly developed by the National Oceanic and Atmospheric Administration (NOAA) and the Environment Protection Agency [EPA]
- The mathematical model is based on the Emergency Response Planning Guidelines (ERPGs) which gives Toxic Levels of Concern (LOCs) to predict The area where a toxic liquid concentration might be high enough to harm people.
- ALOHA models key hazards-toxicity, flammability, thermal radiation (Heat), and over pressure (expansion blast force)-related to chemical releases that result in toxic gas dispersion, fire and/or explosion

7.10. CONSEQUENCES ANALYSIS

From the solvents **n-Hexane** have been taken for the consequences analysis considering their hazardous nature. Storage condition and threshold value of n - **Hexane** and other properties are given in **tables**

TABLE: 7.5. STORAGE DETAILS OF SOLVENT

S.NO	SOLVENT NAME	PHYSICAL FORM	TYPE OF STORAGE	SIZE OF STORAGE UNIT	MAXIMUM STORAGE CAPACITY	STORAGE PRESSURE KG/CM2	STORAGE TEMP 0C
1	**n-Hexane**	Liquid	Tank	25KL	20 KL	ATM	Ambient

POSSIBLE ACCIDENT SCENARIO

Different possible ways of occurrence of any accidents due to storage/usage of above solvent is prescribed here below

SCENARIO: n-Hexane

Release of chemical due to leakage and form burning puddle [Pool fire]

SITE DATA

Location: PATANCHERU.

Building Air Exchanges per Hour: 10 (user specified)

CHEMICAL DATA:

Chemical Name: **n-HEXANE**

Molecular Weight: 86.18 g/mol

AEGL-1 (60 min): N/A AEGL-2 (60 min): 2900 ppm AEGL-3 (60 min): 8600 ppm

IDLH: 1100 ppm LEL: 12000 ppm UEL: 72000 ppm

Ambient Boiling Point: 66.4° C

Vapor Pressure at Ambient Temperature: 0.45 atm

Ambient Saturation Concentration: 479,963 ppm or 48.0%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)

Wind: 1.5 meters/second from NE at 3 meters

Ground Roughness: open country

Cloud Cover: 0 tenths

Air Temperature: 45° C

Stability Class: B (user override)

No Inversion Height

Relative Humidity: 5%

SOURCE STRENGTH:

BLEVE of flammable liquid in horizontal cylindrical tank

Tank Diameter: 3 meters

Tank Length: 4.5 meters

Tank Volume: 31.8 cubic meters

Tank contains liquid

Internal Storage Temperature: 25° C

Chemical Mass in Tank: 18.4 tons Tank is 80% full

Percentage of Tank Mass in Fireball: 80%

Fireball Diameter: 138 meters Burn Duration: 10 seconds

Pool Fire Diameter: 37 meters Burn Duration: 23 seconds

Flame Length: 72 meters

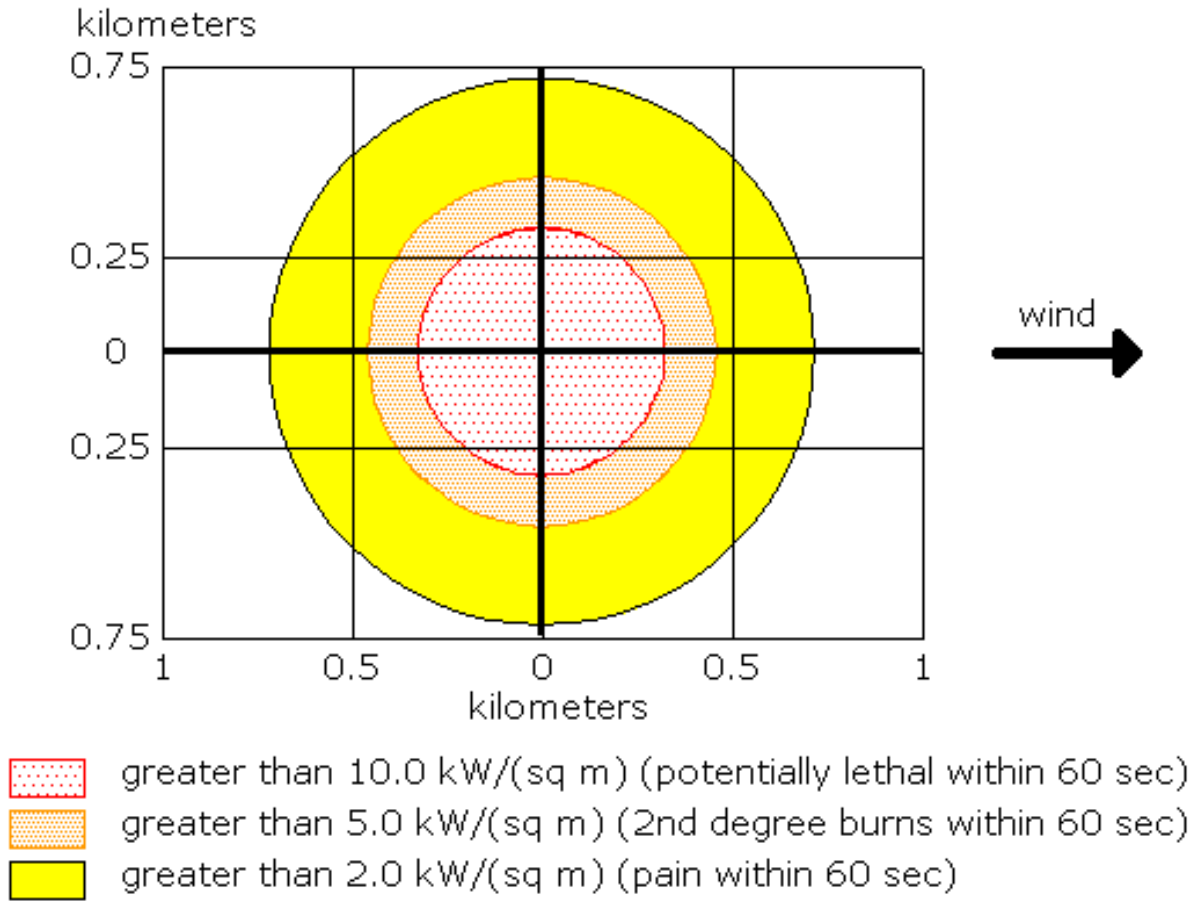
THREAT ZONE:

Threat Modeled: Thermal radiation from fireball

Red : 324 meters --- (10.0 kW/(sq m) = potentially lethal within 60 sec)

Orange: 457 meters --- (5.0 kW/(sq m) = 2nd degree burns within 60 sec)

Yellow: 714 meters --- (2.0 kW/(sq m) = pain within 60 sec)



OCCUPATIONAL HEALTH

7.11. OCCUPATIONAL HEALTH

Hazardous and toxic substances are defined as those chemicals present in the work place which are capable of causing harm.

[In this definition the term chemicals include dust, mixtures and common materials-solvents.]

- For handling hazardous chemicals and to take care of employee's health, and predictive maintenance looking to the nature of hazardous chemicals being handled/processed. All the equipments in the plant areas shall be inspected / tested by an outside agency.
- The various safety equipments like breathing apparatus and critical instrumentation provided on various equipments are inspected and tested frequently to ensure their operability all the time. Besides, all the first aid, fire fighting devices are also being inspected, tested and maintained by a competent third party and kept all the time in ready to use condition.
- Health of all the employees in plant area is regularly monitored by outside physician. If any abnormality is found necessary treatment is also being given time to time. Necessary history cards, records are also be maintained which is up-dated time to time.

Common Hazards

- Physical such as ventilation, poor illumination, noise, extreme temperature, humidity and radiation.
- Biological such as variety of pathogenic bacteria and parasites.
- Chemical due to hazardous gases and dusts.
- Ergonomic.

Industrial Hygiene Monitoring

- Industrial hygiene monitoring is to located and identify source of exposure in the workplace so that they can be corrected and to quantify the exposure of employees to chemicals in the air.
- Air monitoring is conducted by industrial hygienists or other person with specialized training he hygienist first record relevant data such as the process or activity sources of contamination and ventilation conditions then he or she

uses special equipment to measure the levels of substance present in the workplace employees should be informed have a right to obtain monitoring results under the regulation.

Occupational Health Monitoring System

A. Air samples

Locations of samples – air samples are generally collected in one or three locations:

- At the breathing zone of the worker [Personal sample]
- In the general room air [Area sample]
- At the operation which is generating the hazardous substance [Area sample]

Lengths of samples – Air samples are generally collected for two lengths of time.

- Grab samples [instantaneous] measure conditions at one moment in time and can be likened to a still photograph. They give only a picture of conditions at one place at one instant in time.
- Continuous Samples [range from twenty minutes to 8 – 10 Hours].These is used to evaluate all day exposure by a series of continuous samples. Continuous samples may be thought of as like a motion picture since they record activity taking place in various places over a period of time. They provide an average of conditions over a period samples.

B. Other sampling methods

Bulk samples

Bulk samples are collected from settled dust in the work place or from drums or bags of chemicals. Their purpose is to analyze and identify the substances present. For example, bulk samples are used to analyze the percent of asbestos in insulation or dust. Usually, a substance which is greater than one percent of bulk sample is considered a concern.

Wipe Samples

Wipe samples are used when skin absorption or ingestion is a suspected rote of exposure. The purpose is to show whether skin, respirators, clothing, lunch rooms, lockers, etc. are contaminated.

It can show which surfaces are clean and which are contaminated. It can also show if some surfaces are more contaminated than others.

Sampling Devices

The general principle of sampling is to collect an amount of a contaminant onto a medium from a known quantity of air.

Air samples are collected using small pumps to suck air from the workroom. The pump is attached by tubing to a sampling device which contains the sampling medium; for example a glass tube containing charcoal.

The sampling method used depends on the physical from of the substance:

- DUSTS –The sampling device is a filter of plastic or paper in s holder:
- VAPORS –The sampling device is a glass tube containing activated charcoal as a medium.
- GASES –The sampling device is a bubbler containing a fluid medium to dissolved or react with the gas

The collected sample are sent to a laboratory where the amount of the substance on the sampling medium [filter, tube, etc.] is measured.

In some cases air monitoring is conducted by using direct reading instrument such as a monitoring for carbon monoxide these instruments can measure the amount of a contaminant in the air immediately without being sent to a laboratory.

- **PEL**s [**P**ermissible **E**xposure **L**imits] – these are legal's limits which have been established by OSHA.
- Recommended **PEL**s – also reference to as **REL**s [**R**ecommended **E**xposure **L**imits] often these values are based on more recent scientific information than the legal PELs enforced by OSHA.
- **TLV**s [**T**hreshold **L**imit **V**alues] – These are exposure limits put out by a nongovernmental group, the **ACGIH** [**A**merican **C**onference of **G**overnmental **I**ndustrial **H**ygienists]. Many of these were adopted as legal requirements. Revised TLVs are often based on the most recent and accurate scientific information.
- Permissible Exposure Limits by **OSHA** [**O**ccupational **S**afety and **H**ealth **A**dministration] when it started back in 1970.

- **IDLH** [**I**mmediate **D**angerous to **L**ife or **H**ealth] limits are prescribed by **NIOSH [N**ational **I**nstitute **of O**ccupational **S**afety and **H**ealth]

7.12. CHEMICALS EXPOSURE CONTROLS / PERSONAL PROTECTION

S. No	CHEMICAL NAME	Exposure Standards			PROTECTION
		ACGIH [TLV]	OSHA [PEL]	NIOSH [IDLH]	
1	n – Butyl Chloride	-	-	-	Engineering controls, Ventilation and PPEs
2	Styrene	20	100	700	Engineering controls, Ventilation and PPEs
3	Cumene	50	50	900	Engineering controls, Ventilation and PPEs
4	Phenyl chloride	10	75	1000	Engineering controls, Ventilation and PPEs
5	Methyl chloride	50	100	2000	Engineering controls, Ventilation and PPEs

SOLVENTS EXPOSURE CONTROLS / PERSONAL PROTECTION

S. No	SOLVENT NAME	Exposure Standards			PROTECTION
		ACGIH [TLV]	OSHA [PEL]	NIOSH [IDLH]	
1	Cyclohexane	300	300	1300	Engineering controls, Ventilation and PPEs
2	Butyl ether	-	-	-	Engineering controls, Ventilation and PPEs
3	n- Heptane	400	400	750	Engineering controls, Ventilation and PPEs
4	THF	100	200	2000	Engineering controls, Ventilation and PPEs
5	Tert.Butanol	100	50	1400	Engineering controls, Ventilation and PPEs
6	n- Hexane	50	50	1100	Engineering controls, Ventilation and PPEs

Notes:

- All the above Values are in **ppm**
- Engineering Control means provision of Exhaust Fans, Fume Hoods, Fume Ducts etc.,
- Ventilation means Good Lighting, Air Circulation etc.,
- PPE Means Personal Protective Equipment like Helmets, Safety Google, Breathing apparatus, Nose Masks, Gloves, Gum Shoes etc.,

7.13. MEDICAL SURVEILLANCE

Employees are under gone for medical checkup periodically in industry.[Once in six months or depends on severity]

There are basically two types of job – related medical tests:

- Disease monitoring tests look for evidence that an employee has developed an occupation disease these include chest X-rays lung function tests blood or urine tests for kindly or liver function and ECG's to check the heart.
- Tests for toxic substances in our blood, breathe, urine. Hair or other part of our body, such tests known as biological monitoring.

Conclusion

Exposure to occupational hazardous increases the risk for morbidity and mortality.

The most prevalent occupation practices that increase the risks for morbidity and mortality are lack of training in occupation health safety lack of PPE's inadequate training in the proper use of machinery and long hours of work the situation is further compounded by overcrowding and poor sanitary conditions.

There is an urgent need to introduce safe industrial hygiene practices based on accurate knowledge of existing hazards and job exposure matrix for reducing the risks associated with occupational hazards.

NOTE: Medical testing reports of the Employees are enclosed

7.14. SAFE PRACTICES [HANDLING, STORAGE, TRANSPORTATION AND UNLOADING OF CHEMICALS]

Drums

Solvents will be transferred from the drums to the day tank situated at the production block with the help of leak proof drum pumps / Vacuum through pipe lines. From day tank to reaction vessel unloading by gravity.

Storage Tanks

Solvent will be transferred to the day tank situated at the production block with the help of mechanical seal pump through pipe lines from the tank, from day tank to reaction vessel unloading by gravity.

Tank is connected to chilled water circulated condenser with reflux system

Measures to Avoid Evaporation

Keep containers tightly closed.

Keep away from heat, sparks, and flame

Keep away from sources of ignition

Store in a cool, dry, well ventilated area away from incompatible substances

Safety Systems

- Designated areas with proper indication & safety sings
- Double earthling systems
- Flame arrestor to the vent
- Flame proof transferring pumps
- Handling precautions/sop protocol
- Pressure Gauges
- Level indicators
- Flame proof lighting to storage yard

TRANSPORTATION / UNLOADING

Highly inflammable chemicals will be transported by road. Therefore, adequate safety precautions for transportation are followed. During transportation of hazardous chemicals, MSDS & TREM card will be provided to driver. As per Motor Vehicle Rules, PESO rules and Factory Rules all safety precautions will be followed during transportation of hazardous chemicals.

The following safety precautions are suggested during transportation of toxic, inflammable and corrosive chemicals in tankers, while loading and unloading, transportation and meeting the emergencies arising out of leakages and spillages of hazardous materials:

- Park the vehicle at designated place.
- Stop the engine.
- Check-up spark arrester.
- Provide earthing to tanker securely.
- Ensure that fireman is available near the place with proper equipment‘s.
- Connect the piping properly
- Before start unloading, check that, there should not be any leakage.

- In case of leakage, immediately attend the leakages & rectify it.
- After unloading is over, close the lid properly.
- Vehicle to be started only after removal of all pipelines connected with tanker.

7.15. SAFETY INSTRUCTIONS FOR TRANSPORTATION OF HAZARDOUS MATERIALS

- The name of the chemical along with pictorial sign denoting the dangerous goods should be marked on the vehicle and the packing material.
- The name of the transporter, his address and telephone number should be clearly written on the road tanker and on the vehicle.
- The tanker or vehicle should not be used to transport any material other than what is written on it.
- Only trained drivers and cleaners should transport hazardous chemicals.
- The transporter and the manufacturer must ensure the safe transportation of the material.
- The Tanker / Vehicle should be checked for its fitness and safe condition before loading.
- During loading and unloading, the tanker/vehicle should be braked and isolated against any movement, while loading/unloading, use safety appliances.
- The tanker / vehicle should not be overloaded beyond the weight permitted by R.T.O.
- Check for leakages from the line connections / containers before starting and Stopping the filling operations.
- Drive the vehicles carefully, especially in crowded localities and on Bumpy roads.
- Do not apply sudden break.

The tanker / vehicle should not be parked for long time on the way and especially in crowded places. Park the vehicle away from residential areas

7.16. EMERGENCY SHUTDOWN PROCEDURES

Shut down of plant infrastructure and facilities are carried out by authorized personnel after receiving instructions from Central authority in case of total emergency and the concerned department head in case of local emergency.

- Boiler temperature is reduced and the load is removed to prevent any fire and explosion hazards.
- Power supply is cut off to the plant at the main incoming switchgear
- Generators are switched off by operating the Emergency off switches.
- Fuel supply lines to the generator is closed by operating the main line valves.
- All roads are kept clear to help in smooth vehicular movement.

PLANT SHUTDOWN

In the event of any emergency like major Ammonia leakage, fire or explosion or chemical spillage, plant is shut down to

- Minimize the loss of life and property
- Ensure a quick evacuation of all personnel
- Keep the area clear for smooth hazard mitigation by the Emergency Response team.

EMERGENCY TRANSPORT FACILITY

For transportation of inured personnel to hospitals vehicles available in the organization are used. In case of complex situations, ambulances from major hospitals / private service providers/ state emergency care will be used. For evacuation of personnel from the plant premises, available transport resources within the organization are mobilised. In case of bulk evacuation becomes essential, the support of the transport department is sought to avail the necessary vehicles.

EMERGENCY CONTROL CENTRE

In the event of any emergency in the factory, the mitigation activities are controlled from one location that has all the required resources for coordination. The facility is located at

security office, a safe zone free from exposure to hazard or hazardous material. The emergency control center is manned round the clock and has phone numbers and details of emergency service providers like hospitals and statutory bodies.
Following facilities are available in the emergency control center.

- Telephones – Land lines and mobile phones
- Plant layout.
- Telephone numbers of factory key personnel.
- Telephone numbers of neighboring organizations, Emergency service providers.
- List of all Emergency Response Team members.
- Copy of Master chemical list.
- Keys to unlock all entrance / exit doors and gates.
- Fire proximity suit
- CO2 & DCP fire extinguishers.
- Helmets for Emergency response team members
- PPE for Emergency Response Team members
- Self Contained Breathing apparatus
- Battery operated Megaphones.
- Tool kit including non-sparking tools to carry out repairs in LPG areas.

DISASTER MANAGEMENT PLAN

7.17. ONSITE EMERGENCY PLAN

OBJECTIVES OF OSEP AT FMC

- A Quick and effective response during emergency can have tremendous significance on whether the situation is controlled with little loss or it turns in to major emergency.

- Therefore, the objectives of this OSEP include

DURING EMERGENCIES

OSEP provides basic guidance to the personnel for effectively combating such situations to minimize loss of life, damage to property and work interruption.

- To localize the emergency and if possible eliminate it
- To minimize the consequences of an emergency
- To prevent spreading of the damage in the other areas
- To give necessary warning to plant personnel and neighborhood
- To maximize the resources utilization and combined efforts towards the emergency operations
- To mobilize the internal resources and utilized them in the most effective way
- To arrange rescue of persons, transport and treatment of causalities
- To seek necessary help from industries in the neighborhood or local authorities
- To provide information government agencies and to provide information to public

DURING NORMAL TIME

- To keep the required emergency equipment in stock at right places and ensure their working condition.

- To keep in readiness, the concerned personnel fully trained in the use of emergency equipment.

- Preserving records, evidences of situation for subsequent emergency etc and up keep of Onsite Emergency Response & Preparedness Plan, establishing protocol with mutual aid organizations and interact with them.

- Plan, organize Mock drills and arrange to evaluate such drills so as to improve preparedness.

AT THE END OF EMERGENCY

- To rehabilitate those affected
- To identify the causalities and communicate to relatives
- To provide information to media & government agencies
- Preserving records, evidence of situation for subsequent emergency
- To Review effectiveness of emergency management and adopt corrective measures.
- Arrange Investigation and correct the system

ELEMENTS OF ONSITE EMERGENCY PLAN AT FMC

Important elements considered in this plan are

- Identification of Emergencies
- Emergency Organization
- Emergency Facilities.
- Emergency Procedures
- Communications during Emergency
- Rescue Transport & Rehabilitation
- Roles and Responsibilities of Key Personnel and Essential Employees
- Mutual Aid
- Mock Drill Planning
- Revision and Updating of OSEP when there is a change in product, process, change of chemicals or management philosophy

PRIORITY OF PROTECTION

- Life and safety of personnel
- Preservation of property
- Restoration of normalcy

EMERGENCY ORGANIZATION CHART

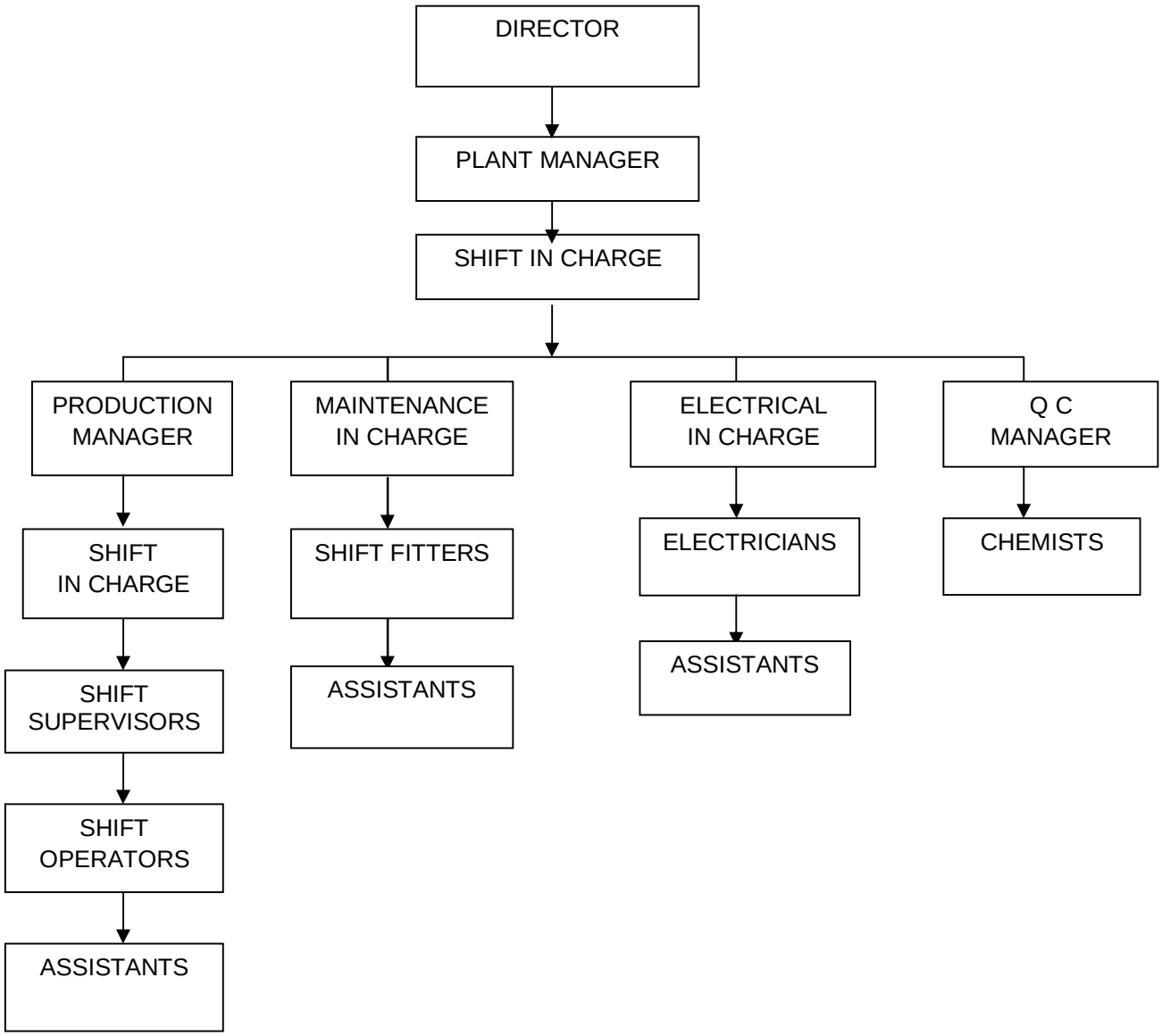
- Emergency organization has been constituted including with Director, Plant Manager, Production Manager, Maintenance manager, Electrical In-charge, Qc manager, Shift in charge, shift Supervisors', Chemists and security in - charge, Shift fitter, Electrician, Shift Operators and Assistants.

- Director of the Plant has been identified as Site Controller, Alt. / Plant Manager has been identified as Site Controller.

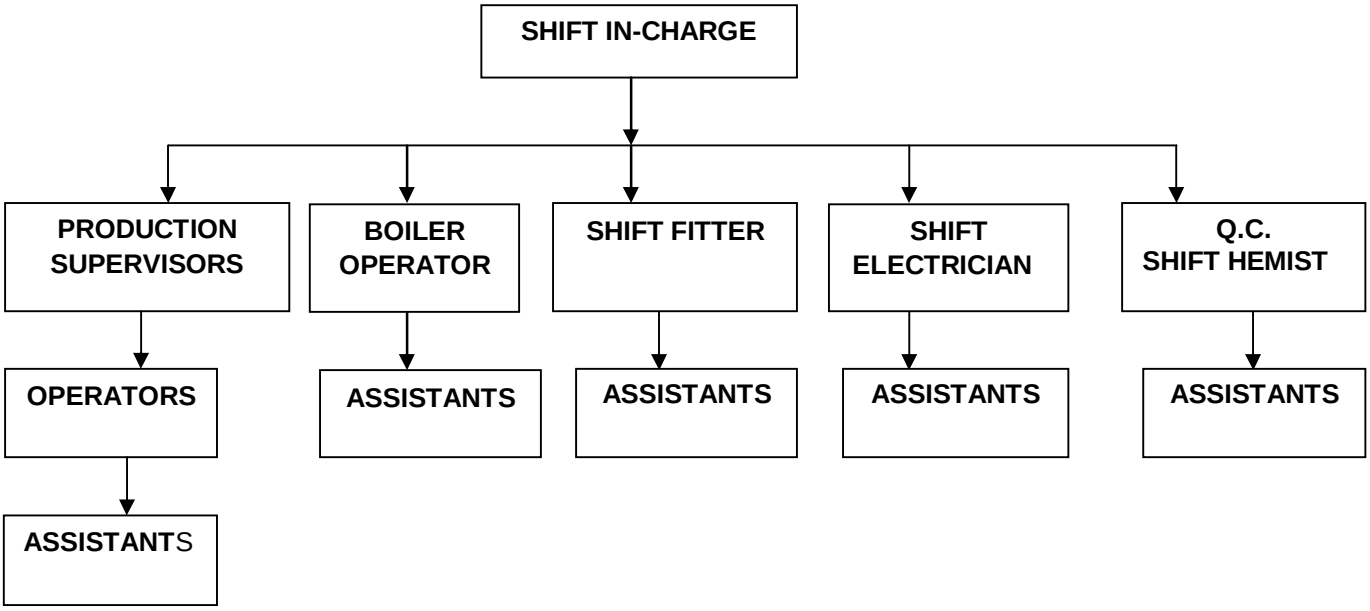
- The production Manager, Maintenance manager, Electrical In- charge, Qc manager, and security in - charge are generally available in the day shift and they are identified as emergency Co-coordinators and assists the Site Controller in Emergency Management system.

- Shift in-charge of Operational Controls has been identified as Incident Controller, Alt/Shift Supervisor/ Chemist has been identified as Incident Controller. Electrician, Fitter, Assistants are identified as Essential Employees.

ORGANISATION STRUCTURE



SHIFT ORGANIZATION CHART



EMERGENCY FACILITIES

EMERGENCY CONTROL CENTRE [ECC]

- It is a location, where all key personnel like Site Controller; Incident Controller etc. can assemble in the event of on site of emergency and carry on various duties assigned to them. All necessary facilities are to be available in the ECC. Security Office in the factory is designated as Emergency Control Centre.
- It is away from the plant. It will be marked as ECC.

FACILITIES AT EMERGENCY CONTROL CENTER (ECC)

- Since Security Office is designated as ECC, this Emergency Control Centre [ECC] can be used to conduct emergency proceedings of plants as it has P & T Telephone for communication including external communication facilities.
- The following information and Equipment would be provided at the ECC.

    1. Fire suit / gas tight goggles/gloves/helmets.
    2. Self contained Breathing apparatus
    3. Public address megaphone, hand bell,

The following are made available at ECC

- Inter com. telephone.
- P & T Telephone.
- Telephone directories
- (internal, P&T) factory layout;
- Site plan.
- Emergency lamp / torch light/batteries.
- Plan indicating locations of hazard inventories, plant control room, sources of safety equipment, work road plan, assembly points, rescue location vulnerable zones, escape.
- Hazard chart
- Emergency shut- down procedures the plant.
- Nominal roll of employees.

- List of key personnel, list of Emergency coordinators, list of first aiders, list of first aid fire fighting employees, list of qualified trained persons.
- Duties of key personnel.
- Address with telephone numbers and key personnel, emergency coordinator, essential employees.
- Important address and telephone numbers including Government agencies, neighboring industries and sources of help, outside experts, chemical fact sheets, population details around the factory.

ASSEMBLY POINTS

Assembly points are those locations where the persons who are not connected with emergency operations can await either for further instructions or of rescue transport and rehabilitation. Presently open space near Security office and factory main gate are considered as such assembly points. For any reason this assembly point becomes vulnerable for consequences of fire/ Toxic, the persons can go out of the factory gate and assemble outside

EMERGENCY PROCEDURES

ON NOTICING EMERGENCY SITUTATION

Whoever notices any of emergencies identified above or a grave situation which has potential to develop into an emergency should forthwith raise an alarm by shouting or approach his .Shift in charge/ Shift Supervisor where emergency arises or Operator or Security

EMERGENCY MEASURES

Emergency Measures include the following:

- Protection of persons engaged in emergency operations and Rescue and evacuation of others trapped in emergency situation and transporting them to medical aid if necessary or to safer location.
- Safeguarding of property
- Safe Shutdown of Plant and equipment
- Evacuation of vulnerable blocks
- Control of cause of emergency such as fire
- Taking measures to avoid spreading of effects of emergency to other areas.

EVACUATION

- In the event evacuation is decided, persons gathered at Assembly Point, and those who are in the plant are evacuated by using the available transport and also the transport drawn through Mutual Aid arrangement.
- Emergency Escapes from the Production Blocks to Assembly Point, i.e. outside the plant is marked on the site plan of the plant.
- Security in charge arranges evacuation from Assembly Point to further safe location towards main road if required.
- Escape should be across the wind direction in the event of toxic release and always, it shall be the endeavor to move away from the toxic cloud.

BEYOND NORMAL WORKING HOURS & HOLIDAYS

Incident Controller is authorized to initiate all actions necessary for overcoming emergency or controlling emergency. He would function as Site Controller, Till Site Controller, till Site Controller takes over charge of situation, till the designated Site Controller arrives to the scene and takes charge of situation.

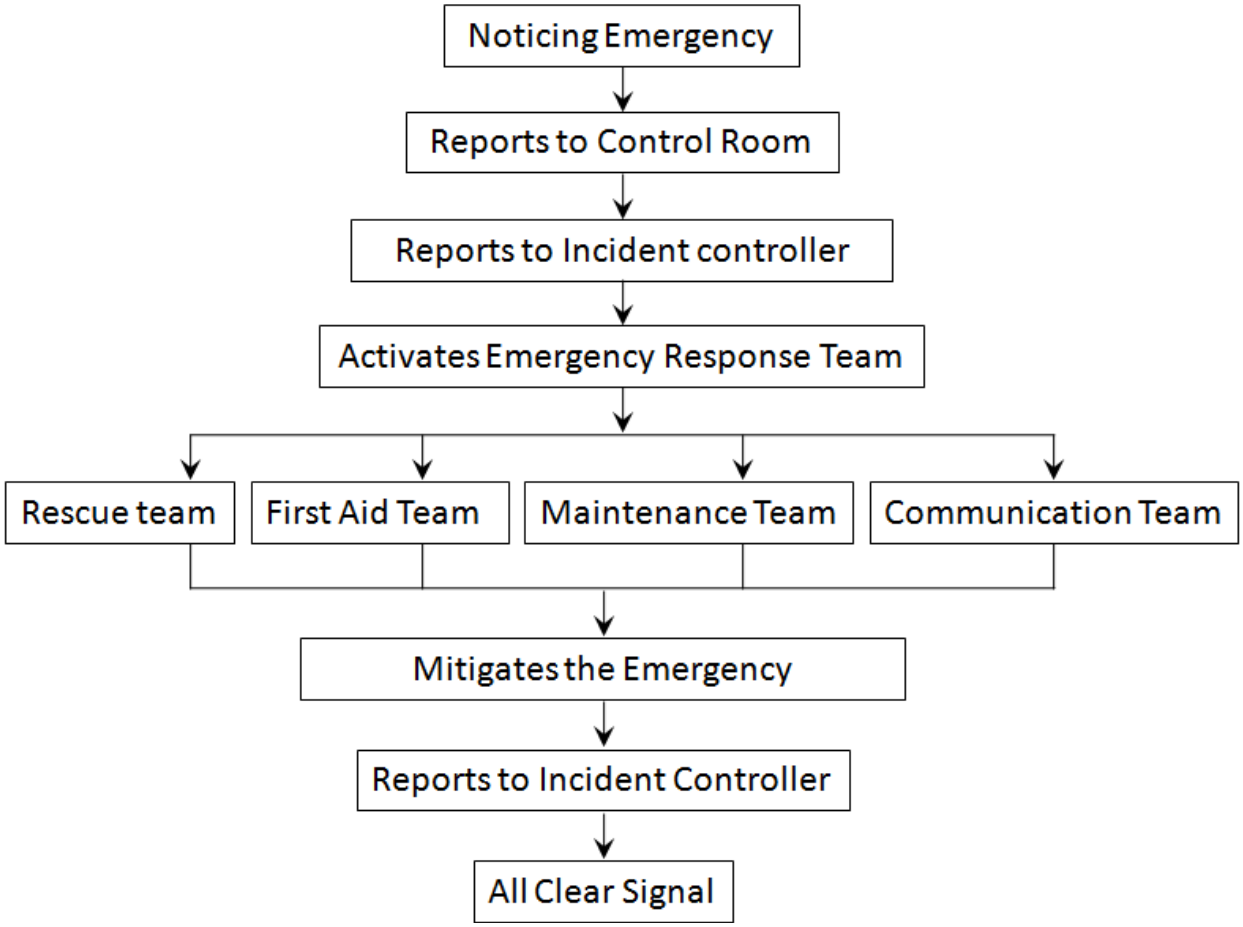
RESCUE TRANSPORT & REHABILITAION

Whatever vehicle that is available would be used for transporting injured. However, help of neighboring industry would be drawn.

EMERGENCY COMMUNICATION

- In view of size of the Plant Electrical Siren would be provided to alert the people.
- However, for outside contact, telephone facility is available. Moreover the factory being in the Industrial cluster, there is no difficulty in sending communication to outside.

ALERT ACTION PLAN DURING WORKING / NON WORKING HOURS



CODE OF SIREN TO INDICATES THE EMERGENCY SITUATION AND NORMALCY

- Siren to declare significant emergency in the plant - 5 minutes siren with 5 wailings.
- Siren to communicate Fire Emergency -3 minutes siren with 3 wailings.
- Continuous operation of siren for 3 minutes is indication of **ALL CLEAR.**

PARTICULARS TO BE INFORMED ON TELEPHONE

- Identify each other
- Inform incident/location/any precise further information he can give about incident.
- Get the message repeated if not understood clearly.

WHEN COMMUNICAITON SYSTEM FAILS

During such communication system failure, helpers or security personnel act as runners or passing on information to the concerned within the plant or outside, including sending information to fire services.

FIRST ANID FIRE FIGHTING EQUIPMENT

First Aid Fire fighting system is being implemented. First Aid Fire Extinguishers are installed wherever fire hazard is identified

TABLE: 7.6.LIST OF FIRE EXTINGUISERS

S.NO.	TYPE	CAPACITY	NUMBERS
1.	D.C.P.	50KG	5 No's
2.	D.C.P.	10 KG	17 No's
3.	D.C.P.	5kg	3 No's
4.	Dry Sand fire buckets		22No's
5.	Lime power buckets		13 No's

7.18. KEY PERSONNEL RESPONSIBILITIES

SITE CONTROLLER - DIRECTOR / ALT. / PLANT MANAGER

On hearing the emergency alarm he will rush to the emergency control centre and will take overall control of the situation.

He will

- Assess the magnitude of the situation on the advice of incident controller and decide if staff needs to be evacuated from their assembly units.
- Exercise direct operational control over the emergency.
- Maintain a continuous review of possible development and aspects the situation in consultation with in incident controller and other key personnel as to whether shutting down the plant or any section of the plant is required and if evacuation of persons is required.
- Liaison with officials of police, fire services, medical and factories Inspectorate. Provide advice on possible effects on areas outside the factory premises.

In consultation with the Incident Controller call for external help as required.

Decides upon

- Whether the affected area needs to be evacuated. Whether personnel who are at assembly points need to be evacuated.
- In consultation with Incident Controller, declare conclusion of emergency and orders for all clear information or bell
- Informs Inspector of Factories, APPCB and other statutory authorities.
- Keeps record of chronological events and prepare as an investigation report and preserve evidence.

INCIDENT CONTOLLER - SHIFT IN CHARGE / SIFT SUPERVISOR / ALT. / SHIFT CHEMIST / ALT. / OPERATOR.

- On hearing of emergency and its location he will rush to the scene and take overall charge and report to site controller. In the absence of site controller assumes the role of Site Controller also.

He will

- Assess the gravity of the emergency and decide if a major emergency exists or is likely to develop. Accordingly he will advise Site Controller and takes steps in controlling the effects of emergency.

- Direct all operation within the affected areas with the priorities of Safety of personnel, minimize damage to the Plant. Property and environment and minimize loss off material.
- Pending arrival of the Site Controller assume the duties of site controller and in particulars.
- Directs the shutting down and evacuation of people in the plant and areas which are likely to be affected by the emergency.
- Ensures that all key personnel and outside help are called in.
- Keeps in continuous touch with Site Controller and feeds him correct information of situations to enable him to take appropriate action.
- Ensures that all non-essential workers/staff of the areas affected are evacuated to the appropriate assembly points and the areas are searched for causalities.
- Co-ordinate with emergency services at site.
- Arranges for safety equipments for the members of this team.
- Assembles the incident control team.
- Provides tools and safety equipments to the team members.

EMERGENCY CO ORDINATORS

PRODUCTION MANAGER, MAINTENANCE MANAGER, Q.C. MANAGER, ELECTRICAL IN CHARGE OTHER OPERATIONALPERSONNEL

- Try to identify block under emergency and type of emergency.
- Suspend all hot work/vessel entry jobs. Persons inside the vessel are to be brought out side immediately.
- Instruct contract workers to stop work and safely proceed to assembly points.
- Extend all necessary help like men, material and fire extinguishers on demand from the affected area in-charge.
- Ensures rumors are not spread and employees should not become panic.
- Be prepared to render help to the production block /section/department, where an emergency took place.
- Co-ordinate with the neighboring industries and arrange mutual aid.
- Co-ordinate with the medical officer and arrange best available treatment to the injured.
- Receives instruction from Site Controller and orders the security to declare emergency and all clear by blowing the siren.

ESSENTIAL EMPLOYEES

ELECTRICIAN

- On knowing about emergency, he would inform site Controller/Incident Controller and puts off power supply to the Particular section where emergency situation arouse or surrounding areas affected by fire. He ensures that light from street lighting is available and is focused on the affected area. He operates water pump to augment water supply from OH tanks.

SECURITY

- Security person at gate will not allow any unauthorized person into the plant.

GENERAL

MUTUAL AID

- While necessary facilities are available and are updated from time to time sometimes, it may be necessary to seek external assistance; it may be from the neighboring factories or from the State Government as the case may be.
- The factory is located in the Industrial Area. Necessary assistance can be available.
- The help would be in the form of technical manpower, medical aid transport for rescue and rehabilitation, shelter for rehabilitation, fire fighting, additional special protective wear or any other help as the case may be. Plant Manager

is assigned with this responsibility and he would maintain liaison during non-emergency period and ensure cooperation.

- Similarly, the help required from civil administration, in respect of medical aid, transport, law and order, rehabilitation etc are identified and liaison is established with Mandal Revenue Officer and Police Officials.

TABLE: 7.7. MUTUAL AID - FACTORIES

S.NO.	NAME OF THE ORGANIZATION	TYPE OF AID
1.	Mahidhara	Man power or any other
2.	Hitesh Organics Pvt. Ltd.	Man power or any other

7.19. MOCK DRILL

- Inspire of detailed training, I t may be necessary to try out whether, the OSEP works out and will there be any difficulties in execution of such plan.

- In order to evaluate the plan and see whether the plan meets the objectives of the OSEP, occasional mock drills are contemplated. Before undertaking the drill, it would be very much necessary to give before undertaking the drill, it would be very much necessary to give adequate training to all staff members and also information about possible mock drill.

- After few pre-informed mock drill, few un-informed mock drills would be taken. All this is to familiarize the employees with the concept and procedures and to see their response.

- These scheduled and unscheduled mock drills would be conducted during shift change, public holidays, in night shift etc, to improve preparedness.

- Site Controller is responsible for this

7.20. REVIEW OF OSEP

- OSEP would be reviewed periodically about the effectiveness, any changes to be made, based on actual need or whenever, there is a change in propositions made in the OSEP or change of key Personnel or essential employees etc or at least, once a year. Site Controller is responsible for this.

- Whenever, changes are made, due notification of the changes to all concerned would be made.

7.21. TREATMENT OF WORKERS AFFECTED BY ACCIDENTAL SPILLAGE OF CHEMICALS

[Interim First Aid for General Injuries & Wounds]

Interim First Aid is essential in many injuries while injured waits for trained personnel to arrive.

BLEEDING

- Apply direct pressure on the wound with a clean dressing.
- If bleeding continues and you do not suspect a fracture, elevate the wound above the victim's heart and continue to apply direct pressure.
- If bleeding continues, apply pressure at a pressure point.
- Maintain body temperature.
- Do not use a tourniquet unless this is a serious amputation.

BREATHING PROBLEMS

- Move victim to fresh air if smoke or dangerous gases are present.
- Otherwise, do not move victim.
- If victim loses consciousness, call doctor
- Never enter into a room with toxic gases released -call without protection

UNCONSCIOUS VICTIM

- Move victim to fresh air if smoke or dangerous gases exist.
- Begin rescue breathing- is First Aid trained ahead of time! Instead.
- Never enter into a room with toxic gases released- call without protection

CHEMICAL BURNS

- Have victim remain under a safety shower or flush skin with an available water source for 15-30 minutes.

- Remove all contaminated clothing and jewellery.
- Cover burns with dry, loose dressings.
- Wash all clothing thoroughly before wearing it again.

ACID BURNS

- In case of acid burn, the operator should with all possible speed get under a safety shower and use the full flow of water - the more water the better. A small amount of water will incase severity o f the burn Water should be used until all traces of acid have been washed from the burn. Alkaline solutions are not needed; if used at all they should be used only after all acid has been washed from the burn, it may to treat in the same manner as a heat burn.

CHEMICAL INGESTIONS

- Never enter into a room with toxic gases released without protection
- Do not give victim any food or liquids without specific advice from physician.

EYE INJURIES FROM CHEMICALS

- Get victim to a safety shower or eye wash immediately.
- Never enter into a room with toxic gases released- call without protection
- Flush eye for 15-30 minutes with both lids held open. Keep the injured eye lower than the uninjured eye.
- Keep the eyelids open hold fingers at top and bottom of the eyeball. Wrap a bandage loosely around both eyes.

7.22. EMERENCY MEASURES FOR SPECIFIED CHEMICALS

SODIUM HYDROXIDE

Inhalation: Remove to fresh air,. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

Ingestion: Do not induce vomiting1 Give large quantities of water or milk if available. Never give anything by mouth to an unconscious person. Get medical attention immediately.

. **Skin Contact:** Immediately flush skin with plenty of water of at least 15 minutes, while removing contaminated clothing and shoes. Call a physician, immediately. Wash clothing before reuse.

Eye Contact: Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately

Note to Physician: perform endoscopy in all cases of suspected sodium hydroxide ingestion. In cases of severe esophageal corrosion, the use of therapeutic doses of steroids should be considered. General supportive measures with continual monitoring of gas exchange, acid base balance, electrolytes, and fluid intake are also required.

Fire: Not considered to be a fire hazard. Hot or molten material can react violently with water. Can react with certain metals, such as aluminum, to generate flammable hydrogen gas.

Explosion: Not considered to be an explosion hazard.

Fire Extinguishing Media: Use any means suitable for extinguishing surrounding fire. Adding water to caustic solution generates large amounts of heat.

In the event of a fire, wear full protective clothing and self- contained breathing apparatus with full face piece operated in the pressure demand or other positive pressure mode.

Ventilate area of leak or spill. Keep unnecessary and unprotected people away from area of spill. Wear appropriate personal protective equipment. Spills: pick up and place in a suitable container for reclamation or disposal, using a method that does not generate dust. Do not flush caustic residues to the sewer. Residues from spills can be diluted with water, neutralized with

dilute acid such as acetic, hydrochloric or sulfuric. Absorb neutralized caustic residue on clay, vermiculite or other inert substance and package in a suitable container for disposal.

TETRAHYDROFURAN

- Extinguishers Media: WATER, WATER FOG, CO2, FOAM, DRY CHEMICAL
- .Water fog may be used for small fires. The vapor pressure of even dilute solutions in water may be high enough to support combustion. A 0.3% solution in water has a flash point of +70C.
- Fire and explosion Hazards: The tends to form peroxides when in contact with air, this process is promote by light. The peroxides are explosive when THF is being distilled. Heavy blows of shaking at room temperature caused no explosion in lab tests.

NOTE:

AS THE PLANT HANDLES WATER REACATIVE CHEMICALS, USAGE OF WATER OR OTHER MATERIAL CONTAINING WATER AS FIRE FIGHTING MEDIUM IS PROHIBITED.

DRY SAND / DRY CHEMICAL POWDER, TERNARY. UTECTIC CHLORIDE POWDER [TEC] CAN BE USED ON METAL FIRES.

7.23. IMPORTANT INFORMATION

Name and address of Plant executives with telephone numbers.

NAME	DESIGNATION	RESIDENTIAL ADDRESS	TEL. / MOBILE NO.
	Director		
Mr.Murgesh	Plant Manager		

7.24. EMERGENCY SERVICES

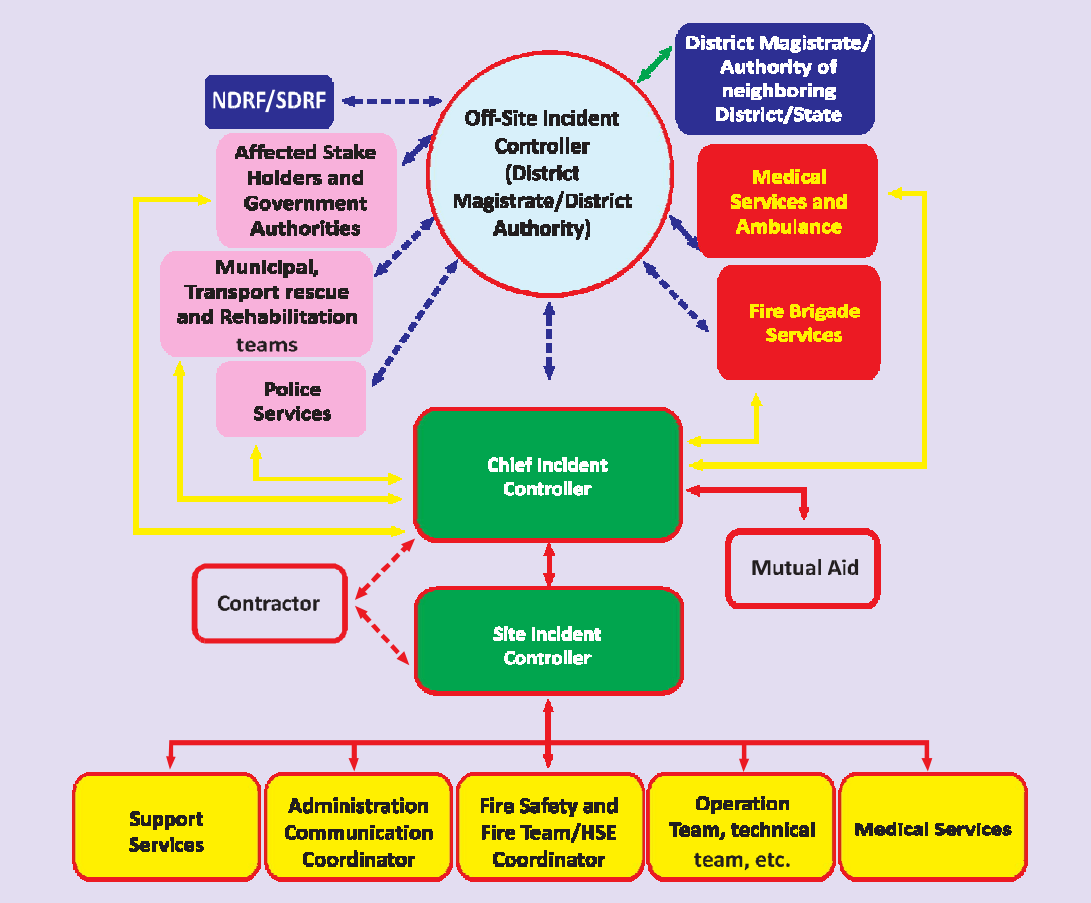
- Lingam ally Police Station 040-23182268.
- S.P.- Sanaga Reddy 08455-276600/276700.
- Patancheru -Fire Brigade 08455-242099/241702.
- Sanga Reddy -Fire Brigade 08455-276299.

- Fire Brigade 101/25600102.
- Regional Fire officer 040-23223670.
- Divisional Fire Officer 040-24600009.
- Fire Station Control room. 040 - 46184041/2400009/24740101.

7.25. OFFSITE EMERGENCY PLAN

"If the accident is such that its affects inside the factory are uncontrollable and it may spread outside the factory premise, it is called "as **OFFSITE EMERGENCY**

FLOWCHART FOR OFFSITE EMERGENCYPLAN



The Offsite emergency plan is made based on events, which could affect people and Environment outside the premises. The off site plan is largely a matter of ensuring the co-ordination of proposed services and their readiness as far as possible, for the specific hazards and problems, which may arise in as incident. Briefly two main purposes of the plan are as under:

To provide the local district authorities, police, fire brigade, doctors etc. the basic Information of risk and environmental impact assessment and to appraise them of the consequences and the protection / prevention measures and control plans and to seek their help to communicate with the public in case of major emergency.

To assist the district authorities for preparing the offsite emergency plan for the district or particular area. We have made our key personnel and other fully aware about this aspect. The function of the offsite plans are as under:

Structure of the offsite emergency plan includes the following:-

- Organizational set up-Incident controller /Site main controller, Key personnel, etc
- Communication facilities - List of important telephones
- Specialized emergency equipment - Fire fighting equipment
- Specialized Knowledge - Trained people
- Voluntary Organization - Details of organization
- Chemical information - MSDS of hazardous substances
- Meteorological information - Weather condition, Wind velocity etc
- Humanitarian arrangement - Transport, First aid, Ambulance

7.25.1. ROLES AND RESPONSIBILITIES

ROLE OF THE FACTORY MANAGEMENT

The onsite and offsite plans are come together so that the emergency services are call upon at the appropriate time and are provided with accurate information and a correct assessment of situation.

ROLE OF LOCAL AUTHORITY

Generally the duty to prepare the off-site plan lies with the local authority. They may have appointed an emergency planning officer (EPO) to prepare whole range of different emergency within the local authority area.

ROLE OF FIRE AUTHORITY

The control of a fire is normally the responsibility of the senior fire brigade officer who would take over the handling of fire from the Incident Controller on arrival at the site.

ROLE OF POLICE

The overall control of an emergency is normally assumed by the police with a senior officer designated as emergency coordinating officer. Formal duties of the police during emergency include protection of life and property and controlling traffic movements.

ROLE OF HEALTH AUTHORITIES

Health authorities, including doctors, surgeons, hospitals, ambulances etc. have a vital role to play following a major accident and they should form an integral part of the emergency plan. Major off site incidents are likely to require medical equipments and facilities in addition to those available locally.

ROLE OF THE "MUTUAL AID" AGENCIES

Some types of mutual aids are available from the surrounding factories, as per need, as a part of the onsite and offsite emergency plan.

THE ROLE OF THE FACTORY INSPECTORATE

In the event of an accident, the factory inspector will assist the District Emergency Authority for information and help in getting mutual aid from surrounding factories. Unit maintains the records of details of emergency occur, corrective preventive measures taken and in future the same practice will be continued. Unit has displayed the details like list of assembly points, name of the persons involve in the safety team like site controller, incident controller etc.