ON-SITE EMERGENCY PLAN (2024)

AN ISO 9001-2015, ISO 14001-2015 & ISO 45001-2018 CERTIFIED COMPANY

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TGV SRAAC Limited

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ON-SITE EMERGENCY PREPAREDNESS PLAN

1. INTRODUCTION

1.0 PREAMBLE

Chemical/Petrochemical Industries, Refineries etc., handles, manufacture and store various chemicals which possesses hazardous properties and also hold potential to cause accidents to personnel and property, the effect of which at times may exceed the plant boundaries.

1.1 NEED

Sections 7-A, 41-B(4) of Factories Act and Rule 13 of Manufacture, Storage, Handling and Import of Hazardous Chemicals Rule 1989 Promulgated under Environment Protection Act 1986 have stipulated that factories handling Hazardous Chemicals in excess of prescribed threshold quantities have to prepare an On-site Emergency Plan and submit it to the statutory authorities. In order to fulfill this statutory obligation this plan has been prepared.

2. PLANT INTRODUCTION

TGV SRAACL have established their plant in 1987 at Gondiparla, Kurnool District which has been promoted as industrial area and is presently manufacturing 1220 MT per day of Caustic soda/Potassium Hydroxide and Chlorine & Hydrogen as co-products. Chlorine is being stored, filled and sold in ton containers for use by Paper and Pharmaceutical manufacturers and also like Chloro methanes, Stable Bleaching Powder, Hi-Strength Hypo, Mono chloro acetic acid, etc. A part of Chlorine is being used for production of Technical grade and Food grade Hydrochloric Acid.

Hydrogen is used partly in the synthesis of HCl, partly consumed in the manufacture of Hydrogenated Castor Oil and partly used as Fuel in the Boiler. Balance quantity is sold for bottling purposes.

About 10 KL of Furnace Oil is used per month for Boiler start up only. In place of D.G.sets we have commissioned coal fired Boilers and Turbines to generate steam and power. To utilize Chlorine we have installed Chloromethane plant manufacture Methyl chloride, Methylene Chloride, Chloroform & Carbon tetrachloride.

TGV SRAACL manufactures and stores the following quantities of hazardous materials. Since the quantity of Hazardous Chemicals stored exceeds the threshold quantity it is required to prepare an OSEP.

Product	**Storage Capacity**
1. Chlorine	4 x 100 MT in storage tanks & has permission To store 500 Nos. filled Chlorine tonners.
2. Hydrochloric Acid	3 x 290 M3 +2 x 65 M3 = 1000 M3/1100 MTS
3. Sulphuric Acid	1 x 38 M3 +3 x 28 M3 = 132M3/230MTS
4. Hydrogen	1x150 Nm^3+3 process vessels of 18m3 and1 process vessel of 22M3 Cap., at 20 kg/cm^2 pr.
5. Caustic Soda Lye	3370MT
6. Caustic Potash	630 MT
7. HSD	35 KL
8. F.O	160 KL
9. Methyl Chloride	270MT(Process Tank)
10. Methylene Chloride	892 MT
11. Carbon Tetra Chloride	335 MT
12. Chloroform	990 MT
13. Methanol	2260 MT

(Please see detailed in **Annexure – 21**)

2.1 Location

Gondiparla village is at about 15km distance from Kurnool town and is about 7 km from the National Highway No.7 connecting Hyderabad and Bangalore. The River Tungabadra is about 1.5 km from the plant. The main access to the factory is thro' National Highway. The nearest Railway Station, Hospital

And Fire Station is all located in Kurnool. Konda reddy Fort is located in Kurnool town and Alampur Temple is near the industrial area.

The area has been developed as an industrial cluster and the Industries that are in the immediate vicinity are as follows:

1. M/s. Sree Rayalaseema Histrength Hypo Ltd.(Unit.1, II , III & IV)
2. M/s.Sree Rayalaseema Galaxy Pvt.Ltd.
3. M/s.Shivtek Chemicals Pvt Ltd.

There is no human occupation in the vicinity of half km surrounding the factory except those working in the neighboring factories. The nearest village is E.Tandrapadu with a population of about 4000 people. The land around the factory is mostly grazing lands and company developed greenbelt in around 220acres.

2.2 Management Philosophy

The Management is highly conscious of their responsibilities towards their employees and society. This plant is the first plant to adopt Bipolar Membrane technology for manufacture of Caustic. This technology is least polluting. The management is consciously undertaking steps to improve Process Operations, Recycling, Reducing, Recovering, so that effluent generation is brought to minimum. A lush green belt has been developed all around the plant to combat any pollution.

2.3 Man Power

The plant employs around 968 people who include operation and maintenance personnel who are well qualified and experienced in the process.

Shift	Regular Employees		Contract Employees		Total Employees
	Male	Female	Male	Female	
General(G)	452	-	02	-	454
First(A)	170	-	28	-	198
Second(B)	165	-	32	-	197
Third(C)	147	-	23	-	170
Total	**934**	**-**	**85**	**-**	**1019**

2.4 Shift Timings

The plant is operating round the clock in 3 shifts besides one general shift.

1st shift	-	6 A.M. - 2 P.M.
2nd shift	-	2 P.M. - 10 P.M.
3rd shift	-	10 P.M.- 6 A.M.
General shift	-	8 A.M. - 4.30 P.M. & 9.30A.M - 6.00 P.M

2.5. Weather Conditions and Regional Meteorology

The thirty year average data collected from the India Meteorological Department are summarised below:

TEMPERATURE, HUMIDITY AND RAINFALL REGIONAL DATA

Month	Dry bulb temperature (in degrees C) Min.	Max.	Avg.	Rel. humidity (percentage) Min.	Max.	Avg.	Rain-fall (mm)	No.of rainy days
January	20.5	31.3	25.9	32	70	51.0	0.2	0.0
February	22.9	34.5	28.7	24	57	40.5	5.0	0.5
March	27.0	38.5	32.7	21	48	34.5	9.7	0.6
April	30.2	39.4	34.8	24	49	36.5	21.6	1.7
May	30.5	40.4	35.4	27	54	40.5	44.4	2.8
June	28.0	37.8	32.9	46	69	57.5	90.5	5.8
July	26.5	34.5	30.5	57	75	66.0	129.6	9.1
August	26.1	32.5	29.3	56	75	65.5	121.6	8.6
September	25.9	31.9	28.9	57	76	66.5	147.1	8.1
October	25.9	34.2	29.1	53	74	63.5	79.3	5.1
November	23.0	33.1	28.0	44	72	58.0	21.8	1.7
December	20.3	30.7	25.5	37	72	54.5	3.0	0.3
Annual	25.6	34.9	30.1	40	66	53.0	673.7	44.3

PREDOMINENT WIND DIRECTION - REGIONAL DATA

Quarter	**Predominant wind directions (as the wind blows from)**
January – March	E, SE and NE
April – June	SE, E and SW
July – September	W, SW and NW
October – December	W, E and SW

2.5.1. Temperature and Humidity

The dry and wet bulb temperatures in three seasons and avg. temp., and Relative Humidity are given below:

	Summer		Monsoon		Winter		Average	
	Max.	**Min.**	**Max.**	**Min.**	**Max.**	**Min.**	**Max.**	**Min.**
Dry Bulb Temp. ºC	44	28	37.6	25.5	29.6	18.2	32.2	25.6
Wet Bulb Temp. ºC	28.8	21.9	25.9	23.4	24.4	18.2	-	
Relative Humidity	-		-		-		66%	

2.5.2. Rainfall

Average Rainfall is 675 mm per annum. Approximately 67% of the total Rainfall occurs during NE Monsoon between June to August and 22% during SW Monsoon.

2.5.3. Wind Pattern

The wind speed is mostly in the range of 2 - 15 km/hr. The predominant wind directions are SW, W and NE.
(Please see wind Rose Diagram attached in **Annex – 29**)

ON-SITE EMERGENCY PLAN

3. ON-SITE EMERGENCY PLAN (O.S.E.P)

An emergency could be defined as a situation which poses a threat of safety and health of a person or/ process, plant, equipment and property. It may or may not require outside help.

There may be two types of emergencies

1. Intended
2. Unintended which may result in

(a) Fire
(b) Explosion
(c) Toxic release
(d) Natural disaster like flood, Earth quake, Cyclone etc.

If the consequences of an industrial accident will be limited to within the factory premises then that can be termed as on site Emergency and a plan developed to tackle such an emergency is called **on-site emergency plan.**

The purpose of the OSEP is aimed at providing basic guidelines to the concerned for effectively managing the resources at their command.

3.1 Scope of the OSEP.

The OSEP will be identifying emergency situations, areas that are likely to be affected, the emergency action to be taken, the key personnel with their responsibilities, along with other general detail like plant layout, infra structural facilities, neighboring industries, and possible mutual aid facilities. This plan will not cover the emergencies leading to off site consequences.

3.2 General Considerations of Emergency Management

An emergency situation arises out of an accident and it can lead to loss of production, damage to property, human suffering etc. A major emergency occurs suddenly with a potential to cause loss of life and serious impairment to property and environment. The OSEP is limited to operations and facilities within the plant.

3.3 Main Objectives of On-Site Emergency Plan.

1. To save the lives of the plant personnel.
2. To minimise the effects of the accident on people and property.
3. To take steps to fight fire or to contain leaks or spills in the early stages so that it doesn't escalate into off site emergencies.
4. To control and localize the emergency.

Steps to minimize the effects will include First aid, Rescue, Evacuation and Rehabilitation apart from controlling the origin of emergency.

ELEMENTS OF ON-SITE EMERGENCY PLAN

3.4 Elements of on-site emergency plan

Detailed **objectives** will be as follows:

1. Control of the occurrence, limiting & localizing the emergency and eliminating the hazard.
2. Arrange for safe shut down of the plant.
3. Ensuring the safety of the people.
4. Rescue and rehabilitation operations as required.
5. Rendering first aid and medical attention.
6. Providing information to the relatives of the injured and statutory authorities.
7. Making sure about the safety of the place before reentry.
8. Preservation of records and evidence for investigation purpose.
9. Inform employees & general public in vicinity about the role to be played by them in the event of an emergency.
10. In case of Flood, earth quake or cyclone, evacuation of the employees or contract labours is to be carried out in such a way that minimum employees or contract labours will remain in the premises to run the plant shut down, if required during above emergency to be done with consent of key personnel.

3.5 Elements of a good emergency plan

To achieve the above stated objective the following elements will be addressed.

1. Management's Commitment.
2. Identification and estimation of possible hazardous events.
3. Good communication systems with necessary back up.
4. Identification of Key personnel and defining their responsibilities.
5. Fixing up the Emergency Control Centre, Assembly Points, etc.
6. Guidelines about emergency action to be taken
7. Making available various information like, Operation manuals, Location and Quantity of Hazardous materials, List of experts/organization for help, District and Statutory Authorities, M.S.D. Sheets, Antidotes, First aid, etc.
8. Familiarizing all concerned by Training, conduct of mock drills, periodical review and updating.
9. Make available PPE.

3.6 Name and Address of persons giving information:

Sri.N.Jeswanth Reddy, E.D (Tech)
TGV SRAAC Limited.
Gondiparla, Kurnool - 518004.
& (08518) 280006/7/8 (R) 252828
Sri. C.Srinivasa Babu, E.D (Tech)
TGV SRAAC Limited.
Gondiparla, Kurnool - 518004.
& (08518) 280006/7/8.
Sri.S.Pallaniyapan, Sr.V.P.(Prod-CMS)
TGV SRAAC Limited.
Gondiparla, Kurnool - 518004.
& (08518) 280006/7/8 Mob: 9542083007
Sri.P.Raghavendra Reddy, V.P. (Q.A)
TGV SRAAC Limited.
Gondiparla, Kurnool - 518004.
& (08518) 280006/7/8 (R) 225802
Sri.E.Ramaiah, V.P.(Mech) & Factory Manager
TGV SRAAC Limited.
Gondiparla, Kurnool - 518004.
& (08518) 280006/7/8 (R) 227796

First person to be contacted in case of emergency			
Name of the Shift	Person to be contacted first in case of emergency		
	Name and Designation	Place of availability	Phone No. Office Resi.
General (G)	1)Sri N.Jeswanth Reddy E.D(Tech)	a) At Factory between 09.30am to 06.15pm b) At Residence during Off Hours/Holidays	(08518)280006/7/8 252828 Mob No. 9848076507
-do-	2) Sri. C.S Babu E.D. (Tech)	-do-	(08518)280006/7/8 Mob No.9848408419
-do-	3) Sri S.Pallaniyapan, Sr.V.P(CMS)	-do-	(08518)280006/7/8 Mob No. 9542083007
-do-	4)Sri E. Ramaiah, Sr.V.P(Mech)	-do-	(08518)280006/7/8 227796 Mob No. 9848013370
-do-	5) Sri P. Raghavendra Reddy, V.P(QA)	-do-	(08518)280006/7/8 225802 Mob No. 9848079064

3.7. Location of different hazardous materials storage and hazardous operations are marked in Plot Plan and is enclosed in **Annexure - 30**

ANTICIPATED EMERGENCY

4. DETAIL OF POSSIBLE EMERGENCIES

4.1 Brief Description of Caustic Soda:

The purified brine having a concentration of 300 gpl is sent to the anode chambers of Ion-Exchange Membrane electrolysers.

The Ion-Exchange Membrane electrolysers consists of intermediate Bi-polar elements, one anodic end element and one cathodic end element. The Bi-polar elements and the end elements are made of solid rigid structure providing strength and electrical current distribution. The electrolyzer is held together by two end grids made of carbon steel and tie rods and rests on a C.S. support resembling a filter press. The assembly is properly provided with insulator bushes. The anodic compartments are lined with titanium and provided with titanium nozzles and the cathodic compartments are lined with nickel and nickel nozzles.

The electrolyzer uses membranes interposed between adjacent bipolar elements. A Patented cathode package, comprising a self-adjustable elastic metallic mat and offset compression points and activated cathodes and anodes, make the electrolyzer suitable for use with:

a. Zero – gap compatible membranes

b. Membranes having catalytic electrodes bonded to their surfaces (SPE)
Not withstanding the cell configuration used, the self-adjusting elastic mat accomplishes the function to keep the membrane from fluttering and from being subjected to chafing during operation. The cathodic and anodic compartments are essentially liquid full during operation. The gas-lift effect of rising chlorine and hydrogen bubbles, disengaging from the electrode screens, creates a continuous flow of brine and caustic soda respectively in the anolyte and catholyte compartment.

Teflon tube connections are provided for each cell for both inlet, recycle lines.

High voltage D.C current is applied and the electrolysis of brine takes place in the cells liberating chlorine and sodium ions. The cell voltage is maintained around 3.0 to 3.3 V. The chlorine gas moves with the depleted brine having a concentration of around 210 - 220 gpl to the anolyte separator vessel where the chlorine gas is separated and gets collected in the chlorine header.

Our Cell House consist of 10 Nos Cell houses mainly 4^{th} , 5^{th}, 6^{th} , 7^{th}, 8^{th} 9^{th}, 10^{th} , 11^{th} ,12^{th} and 12^{th} A Cell House. Each Cell House is connected to individual

rectifier for supplying DC power to the respective Cell Houses. Like that there are nine rectifiers existing in the total installation.

4^{th} (3^{rd}-generation), 5^{th} (4^{th}-generation), 6^{th} (5^{th}-generation) and 7^{th} , 8^{th} , 9^{th} , 10^{th} , 11^{th} ,12^{th} & 12^{th} A . All Cell houses are operated under pressure systems in chlorine & hydrogen side.

The Sodium ions pass through the selective membranes to the cathode zones and reacts with the water and forms sodium hydroxide and liberating hydrogen gas The chlorine gas leaves the anodic compartment together with anolyte, and next chlorine gas disengaged from lean brine. Chlorine gas and lean brine go to de-chlorination plant for further treatment. Similarly, the hydrogen gas and caustic disengages and distribute for further treatment to various user points like :

1. Boiler / Fusion Plants - Where it is used as fuel.
2. HCl synthesis unit - Where it is burnt with chlorine gas in a furnace to form HCl gas which is absorbed in DM water to form 32-33% commercial grade hydrochloric acid.
3. Castor oil plant - Where it is used in hydrogenation of castor oil to obtain hydrogenated castor oil.
4. Hydrogen bottling unit - Where it is compressed and filled in cylinders and sold.

The depleted brine containing dissolved chlorine is sent to Dechlorination section and the chlorine liberated is sent to the chlorine drying unit. The depleted brine is sent to saturator where the concentration gets adjusted and is recycled. The residual chlorine is released in stripper and sent to hypo section.

The chlorine blower takes the chlorine from the cell house header and discharges to drying towers after washing and the circulating 98% sulphuric acid in the towers removes the moisture from chlorine. The dried chlorine is sent to centrifugal compressors for compression to about $3kg/cm^2$. 98% sulphuric acid is used as a sealant in the compressor and is circulated. The acid is cooled in shell and tube heat exchangers. The compressed chlorine is sent to liquifiers where compressed Freon is used to cool and the chlorine gets liquefied. The liquid chlorine is sent to the chlorine storage tank.

The lean 32% caustic from the Catholyte separator passes thro’ a current breaker and from where it is sent to caustic evaporation plant where it is concentrated in two stages to 48% using steam and sent to the storage and sales.

Part of this 48% lye is sent to caustic flaking unit. Here the water content is evaporated in 2 stages to get analysing caustic flakes of 98.5 % of purity.

Production of Potassium Hydroxide :

The product is manufactured by electrolysis of pure potassium chloride solution. Potassium chloride solution is purified in brine plant by addition of required reagents. In our industry to carryout electrolysis membrane cells imported from M/s. Denora, Italy are used instead of conventional mercury cells. Since mercury is absent in membrane cell technology the product is pure and the co-products chlorine and hydrogen generated during electrolysis are pure and useful in food and pharmaceutical industries.

Potassium Hydroxide liquid obtained during electrolysis is enriched to 48% in evaporation unit from 30% concentration and further processed as flakes in fusion plant.

Production of Hydrogenated Castor oil and 12-Hydroxy Stearic Acid :

The raw-material for the manufacture of Hydrogenated Castor oil and 12-Hydroxy Stearic acid is commercial Castor oil. The route involved in this process is as follows:

Commercial Castor oil -----> B.S.S.Grade Castor oil ----> Hydrogenated Castor oil -------> 12-Hydroxy Stearic acid.

1. **Bleaching** :

Commercial castor oil normally would have a colour of 35 to 40 units on lovibond scale in 1" cell. In the bleaching operation oil would be bleached with Activated Earth and Activated carbon in the continuous bleaching plant at the temperature of about 100 to 105 deg.cell., under vaccum. The bleached oil would be filtered in pressure leaf filters to obtain the B.S.S.grade oil. B.S.S.grade oil will have a colour of about 3 to 6 units on lovibond scale. We have a 50 tons per day continuous bleacching plant. The B.S.S.grade oil so obtained by the above process would be taken up for hydrogenation.

2. **Hydrogenation** :

Hydrogenation is basically a batch process. In this process the unsaturated Recinolic acid, Glycerides will be saturated to 12-Hydroxy Stearic Acid Glycerides. This would be achieved by hydrogenation under controlled conditions in the presence of Nickel catalyst. Normally 3 to 4 kg of nickel catalyst per ton of material would be required. Hydrogenation would be continued till the iodine

value (I.V) is dropped from 95 to about 2 units. When the required I.V. is achieved, the material will be dropped to the Heat Exchangers where the same would be cooled by the incoming oil to be taken up for the next batch of hydrogenation. The material cooled to 110 deg.cent. would be filtered in Heatable filter presses, from where it would be taken to the holding tanks. The material from the holding tank would be flaked and packed.

3. **Saponification and Acidulation** :

If 12-Hydroxy Stearic acid has to be procured, Hydrogenated Castor oil from the heatable filter pressess would be directly taken to saponification vessels

where it would be saponified with 30% caustic soda so as to convert Hydrogenated Castor Oil to Hydrogenated Castor Oil soap. After completing the

saponification the soap would be dropped to acidulation vessels where it would be acidulated with 30% sulphuric acid. The soap would be splitted to 12-Hydroxy stearic acid and Glycerin. Glycerin will go to the aqueous layer. The glycerin water would be pumped to glycerin section for further process. The 12-Hydroxy stearic acid so obtained would be given water washes to remove the mineral acidity. Then the material would be taken to the demoisturising vessel to remove the residual moisture. The dried 12-Hydrogenated castor oil would be flaked in the flaker, weighed and packed.

4. Glycerin Section :

The glycerin water obtained from 12-hydroxy stearic acid section would be subjected to treatment with lime. Caustic soda and Alum to remove the mineral acidity and dissolved fatty acids. After the first treatment the glycerin water will be filtered to the second treatment vessel where it would be subjected to soda ash treatment to remove excess lime after which it would be filtered again. The treated water would be concentrated in double effect evaporation plant to obtain crude glycerin having 85% glycerin concentration. During evaporation sodium sulphate would be crystalized and settled in the salt boxes. Periodically, the dry sodium sulphate would have to be removed. Crude glycerin obtained would be filled in barrels weighed and dispatched.

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Production of Fatty Acids & Derivatives:

Oil is hydrolyzed with water at high pressure and temperature and the spilliting is done when crude fatty acid is produced along with Glycerin and water. The crude fatty acid is distilled under vacuum to remove the unsplit oil and unsaponified water there by the dark colour will be reduced to light colour.

Then the soft fatty acid is hydrogenated to hard fatty acids of desired Iodine value in a converter where Hydrogen is admitted in presence of Ni Catalyst. The exothermic reaction is controlled. The material is filtered in filter press and the filtrate which is Stearic acid is flaked in flaker.

The sweet water obtained from splitting is treated with Sulphuric acid to remove traces of fatty acids. Lime is added to precipitate as Soap and Alum is added for coagulation. Then it is filtered and the filtrate is concentrated to obtain crude Glycerin. The crude glycerin is then distilled, bleached with activated carbon to obtain C.P grade glycerin.

Brief Process Description of Chloromethanes Plant:

PROCESS DESCRIPTION

The Chloromethane plant consists of the following process utility and units.

(1) Process units

- Hydro Chlorination section
- Chlorination section
- Rectification section
- HCl absorption section
- Effluent treatment section
- Refrigeration section

(2) Utility Facilities

- Steam distribution system and steam condensate recovery system
- Recycling cooling water distribution system
- Nitrogen distribution system
- Instrument air distribution system
- Plant air distribution system
- DCS Control room
- Low voltage switch gear and motor control centre (MCC)
- Fire fighting system
- Fire alarm system

1. HYDRO CHLORINATION SECTION

Methanol, vaporized by methanol evaporator is fed to the hydro chlorination reactor at an optimum ration with hydrogen chloride. The reaction is carried out in vapor phase in the presence of catalyst to produce methyl chloride.

Methyl chloride thus obtained is washed with quench liquid itself from condenser in quench tower to remove a small amount of unreacted methanol and hydrogen chloride.

It is further washed with concentrated sulfuric acid in dehydrator to remove by product dimethyl ether and water. After this treatment purified methyl chloride is compressed through methyl chloride compressor and then it is condensed and collected in a receiver from than it is sent to the chlorination section.

21% HCl form quench vessel is sent to HCl absorption system to form 31% HCl. The spent sulfuric acid from the bottom of the dehydrator has a concentration of 85 to 90%

2. CHLORINATION SECTION

Methyl chloride reacts with chlorine in vapor phase in a vessel reactor to form higher chlorinated chloromethane.

The reactions are carried out at high temperatures and middle pressures. By control of reaction conditions and ratio of feed stock and recycling chloromethane, Methylene chloride, Chloroform and CTC are formed at desired production ratios.

Firstly, methyl chloride vaporized by evaporator is sent to the reactor by means of flow control. Meanwhile the vapor chlorine from gas pipe line is also sent to chlorination reactor by means of flow control.

Recycle organics (mainly methyl chloride, methylene chloride and hydrogen chloride), part is through evaporator and other through preheater only. This mixture of vapor methyl chloride and the vapor organic are sent to reactor by means of flow control.

The vapor reactant, with high temperatures, is cooled in quench tower, and then hydrogen chloride is separated from chloromethane compounds through condensers. Large amounts of hydrogen chloride are recycled to

hydro chlorination section to produce methyl chloride, a few of them are sent to HCl absorption section to produce 31% HCl.

The vapor organics (mainly methyl chloride, methylene chloride and hydrogen chloride) from the top of recycling tower, a part is recycled to reactor in order to control the temperature of reactor and the ratio of production, the other is sent to recycling tower as reflux liquid, the bottom of recycling tower is a compound of Methylene chloride, Chloroform and CTC, and sent to rectification section.

3. RECTIFICATION SECTION

In rectification section the product mixture is separated and purified respectively. Then it is fed to caustic washing drum to remove small amounts of acidy and fed to azeo tower where water is removed from the product, in the end each product is stored in a separate check tank. The spent caustic is sent to effluent treatment section.

CMS-1, CMS-2 & CMS-3: PRODUCTION

Methylene Chloride	189.6 T/day
Chloroform	94.8 T/day
CTC	14.4 T/day

CONSUMPTION

Chlorine	420 T/day
Methanol	150 T/day
Steam	750 T/day
Power	150000 KWH/day

No of days on stream : 360 days (8000 hrs/year)

Rated capacity of plant : 300 TPD (109500 TPA)

4.2. Description of Different Manufacturing Activities

The plant consists of the following distinct activities:

a) Primary and Secondary brine treatment and purification.

b) Electrolysis.

c) Chlorine system comprising of Drying, Compression, Liquifcation, Storage and Bottling.

d) Hydrogen system involving usage in HCl synthesis, Boiler, Castor Oil Plant and Sales for bottling.

e) Caustic system including Collection, Evaporation, flaking and Despatch.

f) Hydrochloric acid synthesis consisting of HCl Manufacture, Absorption and Despatch.

g) Sodium Hypo system where all possible emissions from various sections of plant are absorbed and neutralized.

h) Manufacture of fatty acids and derivatives, Hydrogenation of Castor oil in presence of Catalyst, Bleaching, Filtration, Flaking and Despatch.

i) Manufacturing of Potassium Carbonate and Sodium Sulphate Plant.

j) Operation of Captive Power Generation Plant

4.3. Detail of Built in Safety Management System

4.3 i. SAFETY SYSTEMS

The following inter locks have been provided for safe operation at C. S. Division.

1. Rectifier

a) Interlock will stop polarization unit and open DM water addition valve to the electrolysers when rectifier is on.
b) Interlock will start polarization unit and close DM water valve to electrolyser if rectifier is stopped.
c) Interlock will trip the rectifier i) very low level of brine overhead tank and inter lock bypass switch in off position. ii) Emergency tripping from cell house/process control room/rectifier

d) Interlock will stop H_2 blowers, open valve on Cl_2 line to hypo unit on rectifier failure.
e) Interlock will trip the rectifier on very high voltage in elements of the electrolysers.
f) Interlock low level of brine overhead tank will trip the rectifier.

2. PROCESS

a) Interlock the standby caustic catholyte circulation pump will start on auto of the running pump fails and if the stand by pump fails to start an alarm will sound at the control room.
b) Interlock the standby DM water pump will start on failure of running pump.
c) Interlock on failure of depleted brine pump the standby pump will start within 5 sec. and if this does not start the anolyte brine pump and feed brine pump will trip in 5 sec. With an alarm indication in DCS.
d) Interlock the standby feed brine pump to overhead tank will start on auto if the running fails.
e) Interlock high liquefaction pressure opens the vent valve to Hypo.
f) Interlock very low suction pressure of the Hydrogen blower will trip the blowers.

3. The electrolyser section is provided with DCS arrangement and indications, annunciators are available in the control panel.
4. Field indicating instruments like Rotameters, Manometers, Pressure gauges, Temperature indicators are provided.
5. The electrical installations, fittings conform to the area classification.
6. The plant is being provided with a proper ring main hydrant system with TAC approval.
7. First aid fire fighting equipments like extinguishers are provided in requisite members.
8. Respiratory protective appliances like self contained breathing apparatus, air line mask, Cartridge masks are provided especially in all the areas handling chlorine.
9. Chlorine sensors/ alarms are provided in selected locations like chlorine storage, chlorine filling, chlorine drying tower, Liquid chlorine pump area Emergency Scrubber blower vent and chlorine neutralization tower outlet and at Northern side of HCl compound wall, HCl plant, Cell House, Old De-chlorination, Main Gate, SRAAC to SRHH chlorine pipe line, TC building at CMS and Cogen Plant.
10. Wind indicator is provided.
11. Water seals are provided in Chlorine and Hydrogen headers and the seals, vents etc., in the Chlorine header are connected to the Hypo header.
12. Usage of materials like FRP coated PVC, PVDF lines and valves for wet chlorine and corrosive services offers better life and reliability.

SAFETY INTERLOCKS IN O&F Division:

1. Low Suction Pressure Control Switch :

If the Hydrogen suction pressure is low and low level the compressor will trip.

- This is to take care that no air enters the hydrogen compressor.

2. Low Lubricating Oil Pressure Control Switch :

The hydrogen compressor would trip if there is no sufficient lubricating oil present in the lubricating oil pot.

3. High Pressure Control Switch :

If the discharge pressure of the hydrogen gas exceeds 21.5 kg/cm2 the compressor would trip.

4. **Safety valves.**

There are safety valves in the 1st stage and 2nd stage of the compressor. The 1st stage has set at 7.5kg/cm2 and the 2nd stage set at 21.5 kg/cm2.

Hydrogen bullets have got double safety valves which also have been set at 21.5 kg/cm2.

Surge vessel low pressure alarm and very low pressure compressor tripping interlock available.

All autoclaves safety valves have been set at 12.5 kg/cm2.

The instrument panel gives the position of the hydrogen surge vessel, hydrogen gas line pressure which ensures double check.

5. SAFETY INTER LOCKS IN THERMOPAC:

Following Safety Inter Locks are provided on the Thermopac unit.

1.	Thermic fluid intlet temperature high	- Unit trips	- Alarm
2.	Thermic fluid flow low	- „	„
3.	Stack temperature high	- „	„
4.	Combustion air pressure low	- „	„
5.	U.V.Cell for flame failure	- „	„
6.	Fuel oil pressure low	- Burner trips	„
7.	Atomizing steam pressure low	- Unit trips	„
8.	Expansion tank level low	- -	„
9.	Thermic fluid circulation	- Pump trips	„
10.	Safety valve is provided in the Thermic fluid circuit.		

6. SAFETY INTER LOCKS IN AIR COMPRESSOR:

1.	Low lubricating oil pressure	- Unit trips
2.	Cooling water pressure low	- Unit trips
3.	Compressed air pressure high	- Unit would go to unloading position.
4.	Safety valves incorporated in the discharge line and the compressed air holding vessels.	

TGV SRAAC Limited

Safety Interlocks in Chloromethane Plant:

Process Shutdown Interlocks in CMS

Shut down interlock - 0

Reason	Result
HS - SD0	Whole plant emergency shut down
PSLL - 2852	C2101 A/B compressor stop
YL - UPS	

Shut down interlock - 1

Reason		Result	
HS - SD1		XCV - 2201 Close	Chlorine flow CV
PSLL - 2201	Chlorine from vapourizer pressure low low	FV - 2203 Close	
PSHH - 2201	Chlorine from vapourizer pressure high high	XCV - 2401 Close	Run through water in T2404
PSHH - 2209	Emergency vessel pressure high high		
PSHH - 2208	Thermal reactor pressure high high		
TSHH - 2209	Quench tower temperature high high		
TSHH - 2211	Thermal reactor TI 2211 high high		
TSLL - 2211	Thermal reactor TI 2211 low low		
TSHH - 2214	Thermal reactor TI 2214 low low		

Shut down interlock - 2

Reason		Result	
HS - SD2		LV - 2201A/B Close	CV for cyclical crude product from V2204 and E2204
LSHH - 2202	Methyl evapourizer level high high	PV - 2204 Close	
		XCV 2202 Close	MP Steam CV

Shut down interlock - 3

Reason		Result	
HS - SD3		PV - 2204 Close	
PSHH - 2202	Methyl evapourizer pressure high high	XCV 2202 Close	MP Steam CV

Shut down interlock - 4

Reason		Result	
HS - SD4		TV - 2220 Close	Cold CMS feed valve
LSHH - 2205	Cold CMS heat exchanger level high high		

Shut down interlock - 5

Reason		Result	
HS - SD5		TV - 2224 Close	MP Steam CV
PSHH - 2220	Recycle column bottom pressure high high		

Shut down interlock - 6

Reason		Result	
HS - SD6		TV - 2303 Close	HP Steam CV
PSHH - 2301	Methylene down column bottom pressure high high		

Shut down interlock - 7

Reason		Result	
HS - SD7		TV - 2323 Close	HP Steam CV
PSHH - 2306	Chloroform down column bottom pressure high high		

Shut down interlock - 9

Reason		Result
HS - SD9		P2405 A/B starts up immediately
FSLL - 2405	HCl scrubber water flow low low	
TSHH - 2402	HCl scrubber outlet water temp high high	

Shut down interlock - 10

Reason		Result	
HS - SD10		FV - 2104 Close	Methanol Flow CV
PSHH - 2117	HCl super heater pressure high high	FV - 2105 Close	HCl Flow CV
		LV - 2102 Close	Level CV in MeOH evaporator
		P2101 A/B MeOH pump stop	
		P2903 starts immediately	
		XCV- 2401 Close	Run through water in T2404

SAFETY MANAGEMENT SYSTEM

1. Pipe lines in Chlorine services is regularly inspected visually, joints are tested with ammonia, and thickness is measured and replaced at an interval of 3 years.

2. Membrane leakage identification system is installed to ensure timely repair.

3. A well-organized safety dept., with a senior person at the level of Sr. G.M (Safety) is head of the department. Safety Officer and graduate trainees are available to oversee the safety function.

4. Safety permit for jobs are being issued.

5. Green belt around the factory is being maintained.

6. Hypo plant is connected on emergency power with design capacity of 10 mints of chlorine production of full capacity absorption of Chlorine. D.G operated direct driven Blowers and pumps are available apart from emergency power from emergency D.Gs.

7. Lean brine and other water sources are being collected and being recycled for brine make up.

8. Company has been consistently taking steps to reduce the pollutants. From the solid waste Barium Sulphate being recovered for sales.
   The floor washing are treated in the treatment plant and the treated water is used for tanker cleaning and gardening etc.

9. Statutory testing being followed.

10. Very high capacity Emergency Scrubbing system is installed to neutralize chlorine in case of storage tank leakages and the suction is extended up to chlorine filling unit also

4.3.(i)-CAPTIVE POWER PLANT

Capacity	**:**	**3 x 6.2 MW**
Engine	**:**	**WARTSILLA**
Alternator	**:**	**A.B.B**
Fuel	**:**	**Starting with HSD and Running With Heavy Furnace Oil**

4.3.(ii)– CO-GENRATIONAL POWER PLANT

Capacity of Boilers	**:**	**1 x 44 T/hr @ 62kg/cm2**
		1 x 100 T/hr @ 100kg/cm2
		1 x 110 T/hr @ 100kg/cm2
Capacity of Turbine	**:**	**1 x 5.1 MW BBC make**
		2 x 25 MW Siemens make

Chlor Alkali unit is power intensive industry and power outage can result in process upsets and loss of production besides the possibility of release of toxic and flammable gases.

Hence operating the plant with in house facility of generating power is preferred by most of the industries. With this background TGV **SRAACL** have erected and commissioned 4 Nos. of 6.2 m.w. Wartsila make Diesel generators.

Considering the high cost of furnace oil, we have opted for coal based thermal power generation since 2004 and D.G.sets are kept as stand by.

The captive power generation plant consists of Wartsila generator running with Heavy Furnace Oil coupled with ABB make alternator to generate power at 11 K.V. Alternatively Company has also installed 30 M.W solar power generation.

The control room of generating plant having S&S make vacuum circuit breakers for switching, the generated power to 11kv operating system. These power switch breakers are suitably interlocked either for independent running of the units or to synchronize with APSEB grid supply.

A micro processor control system of "ABB make" monitors all the safety inter locks necessary for the safe running of generator and alternators. There are

Interlocks provided as per the list. These are continuously monitored and set points have been provided for both alarm and trip function.

4.3. (iii)- 3x6.2 mw WARTSILLA DIESEL ENGINES SAFETY INTERLOCKS

I. Engine tripping:

	Alarm	Tripping
1. Pre lub oil pressure low	-	0.5 bar
2. Lub oil pressure low	3.0 bar	2.0 bar
3. HT water temp. high	105 ^{o}C	110 ^{o}C
4. Charge air temp. high	75 ^{o}C	85 ^{o}C
5. Over speed	-	830 rpm

II. Tripping

1. Lub oil temp. high	80 ^{o}C	85 ^{o}C
2. Fuel oil pressure low	<4 bar	2 bar
3. Engine exhaust gas temp. High (A_1) to (A_9)	500 ^{o}C	550 ^{o}C
4. Engine exhaust gas temp. high B-Bank side (B_1) to (B_9)	500 ^{o}C	550 ^{o}C
5. Engine struts bearing	100 ^{o}C	120 ^{o}C
6. Engine bearings No:1 -10	100 ^{o}C	120 ^{o}C
7. Generator drive end bearing temp.	90 ^{o}C	100 ^{o}C
8. Generator non-drive end bearing temp.	90 ^{o}C	100 ^{o}C
9. Generator wiring temp.		
high (U phase)	140 ^{o}C	150 ^{o}C
high (V phase)	140 ^{o}C	150 ^{o}C
high (W phase)	140 ^{o}C	150 ^{o}C

Both the engine room and the control rooms are kept in good condition. Instruction of starting the engine, switching procedure and synchronizing procedures are exhibited in their respective rooms.

4.4 IDENTIFIED EMERGENCIES HAVING ON SITE POTENTIAL

Preliminary hazard analysis have identified the following possible scenarios capable of having potential for causing On-Site Emergency.

4.5. Toxic Release

Release of Chlorine gas from various process locations, storage, filling, and transfer thro' pipeline and leak from tonner's stored & loaded in trucks within the plant leading to toxic dispersion.

4.6. Fires & Explosions involving Hydrogen or Fuels

a) Hydrogen gas can leak from various process locations, gas holders, compressors, intermediate storage pressure vessels and pipe lines leading to jet fires, vapour cloud explosions and BLEVE.

b) Fires in Furnace Oil and Diesel Oil storages due to catastrophic failures of storage.
c) Fires in large size transformers involving transformer oil.
d) Fires / Explosion in Autoclaves in Castor oil plant involving Hydrogen.
e) Fires / Explosion in Hydrochloric acid synthesis involving Hydrogen.
f) Explosion in Electrolysers.
g) Fires in coal storage.

4.6.1. Fire & Explosions involving Menthanol & Methyl Chloride

a) Leakage of Methyl Chloride from Process tank, Pipe line, Compressors, leading to jet fires, vapor cloud explosion and BLEVE.

b) Leakage of Methanol while unloading, from storage tank, Pipe lines, Vapourizer leading to jet fires,vapour cloud explosion and BLEVE.

4.7. Spills involving Corrosive Chemicals & Hot Material in Fatty Acid Section

Spills of Sulphuric acid, Hydrochloric acid and Caustic soda can occur due to failure of storage vessel & pipe lines causes severe eye injury etc.

Spillage of Hydrogenated Castor Oil or 12-Hydroxy Stearic Acid form Saponification vessel or Acidulation vessel due to spurting causes burns, eye injury etc.

4.8 Fall from height while working at height.

4.9 Unit wise Emergencies :

EMERGENCY IN INDIVIDUAL PLANT SECTIONS
Management of the same – Program

Section/Plant	Nature of Emergency	Corrective Action	Personal designated for Action
1. Cell House	1. Chlorine gas release 2. Occurrence of fire a)Hydrogen b)Electrical 3. Mild Explosion 4. Electrical shock	Reduce load on electrolyser if necessary even to `O' ka. Reduce load on electrolysers to `O' ka. -do- -do-	Emergency reporting-Chargeman/Sup. Correction Action- Control Room Sup./ Shift Engineer. PreventiveAction–ShiftEngineer/HOD. First Aid- First-aid Centre.
2.Cl_2 plant (including Dechlorination)	Chlorine gas release due to pipe rupture.	Reduce load on electrolyser to `O' ka.	Reporting-Cl_2 plant Sup./Shift Engineer CorrectionAction- Control Room Sup./ Shift Engineer. PreventiveAction–ShiftEngineer/HOD. First Aid- First-aid Centre.
3. Cl2 storage and filling.	Chlorine gas release due to pipe rupture (or) valve leaks.	Reduce load on electrolysers and declare emergency.	As per On-site Emergency plan. First Aid- First-aid Centre.
4.HCl plant	1. Fire 2. Explosion 3. Cl_2 gas release.	Trip the furnace Inform control room	Reporting-Chargemen/Sup. CorrectionAction- Control Room Sup./ Shift Engineer. PreventiveAction–ShiftEngineer/HOD. First Aid- First-aid Centre.
5.Hypo	Cl_2 gas release from vent / seals.	-Reduce load on electrolysis. -Stop de-gassing from other plant section. -Check/change circulation liquor.	Reporting-Chargemen. CorrectionAction- Control Room Sup./ Shift Engineer. PreventiveAction–ShiftEngineer/HOD. First Aid- First-aid Centre.
6.Fusion Plant.	1. Fire 2. Explosion 3. Hot caustic spillage.	-Stop the Fusion plant. -Shut of fuel oil or Hydrogen supply to furnace.	CorrectionAction- Chargemen/Sup. PreventiveAction–ShiftEngineer/HOD. First Aid- First-aid Centre.
7. Sulphuric /Hydrochloric acids, Caustic soda & caustic potash storage area-CS Division	Leakage Sulphuric acid/ Hydro chloric acid/ Caustic soda /Caustic potash	Close isolation valve and start water sprinkling	Emergency reporting-Chargeman/Sup. Correction Action- Control Room Sup./ Shift Engineer. PreventiveAction–ShiftEngineer/HOD. First Aid- First-aid Centre.
8.H_2 Bullets	1. Fire 2. Explosion	Supervisor H2 bullet area will declare emergency.	CorrectionAction- Supervisor. PreventiveAction–ShiftEngineer/HOD. First Aid- First-aid Centre.

9.Hydrogena-tion	1. Fire 2. Explosion.	Supervisor Castor oil plant will declare emergency.	CorrectionAction- Shift Incharge PreventiveAction–ShiftEngineer/HOD. First Aid- First-aid Centre.
10.D.G. plant	Fire – Fuel handling System Electrical shock	Stop the fuel supply and the generator	Reporting-Chargemen/Sup. CorrectionAction-Sup./ Shift Engineer. PreventiveAction–ShiftEngineer/HOD. First Aid- First-aid Centre.
11.Boilers	1. Fire 2. Explosion	Stop the boiler and inform control room.	Reporting-Chargemen/Sup. CorrectionAction-Sup./ Shift Engineer. PreventiveAction–ShiftEngineer/HOD. First Aid- First-aid Centre.
12.F.A.Splitters	High pressure release of hot water/oil.	Stop feeds and Thermo pack boiler.	Reporting – Shift Supervisor Prevention Action – G.M(F.A) First Aid- First-aid Centre.
13.CMS Plant: Thermal Chlorination/ Hydro Chlorination/ MCC Panel Room	1. Chlorine gas release at therma due to pipe rupture (or) valve leaks. 2. Occurrence of fire at hydro 3. Chloroform vapours from the distillation columns. 4. Electrical shock 5. Leakage/Spillage of Hydrochloric acid 6. Leakage/Spillage of Sulphuric acid	1 Close the isolation valves and plant shut down 2 Close the isolation valves and stop hydro 3. Close the isolation valves and stop distillation 4. Isolate power 5. Close the isolation valves. 6. Close the isolation valves.	Emergency reporting-Chargemen/Sup. Correction Action- Control Room Sup./ Shift Engineer. Preventive Action–ShiftEngineer/HOD. First Aid- First-aid Centre.
14.Methyl chloride storage	Leakage of methyl chloride	Close isolation valve and start water sprinkling	Reporting – Shift Supervisor Prevention Action – G.M (Prod-CMS) /Shift In-charge-CMS. First Aid- First-aid Centre.
15.Methanol storage	Leakage of methyl chloride	Close isolation valve and start water sprinkling	Reporting – Shift Supervisor Prevention Action – G.M (Prod-CMS) /Shift In-charge-CMS. First Aid- First-aid Centre.
16.Sulpuric /Hydrochloric acids /Caustic Soda Stg. at Acid/ alkali tank–CMS Plant	Leakage of Sulpuric /Hydrochloric acids & Caustic Soda	Close the isolation valves and start water sprinkling	Reporting – Shift Supervisor Prevention Action – G.M (Prod-CMS) /Shift In-charge-CMS. First Aid- First-aid Centre.

Storage area	Hazard	Impact
1.	Leakage /Spillage of Caustic Lye	There is no chance of major hazard as the caustic lye is neither combustible nor explosive in nature. Incompatible metals like Aluminum, Zinc and tin are not kept anywhere nearby therefore there is no chance of formation of flammable /explosive gas.
2	Leakage of Chlorine gas	Chlorine is notable as a danger to health and a certain limited risk of explosion is associated with its manufacture and user because of its high oxidizing power. It is a mucous membrane and respiratory system irritant. It will react with body moisture to form acids and at high concentration, it will act as an asphyxiate by causing cramps in the muscles of the larynx and swelling of the mucous membranes.
3.	Spillage of Sulphuric acid	Sulphuric acid is corrosive on contact, poisonous on ingestion and inhalation of its vapors. On contact with most metals, it liberates hydrogen gas, which is flammable and (when confined) explosive. Sulfuric acid (98% solution) is an oxyacid with a good oxidizing ability – therefore, contact with cellulose based products (e.g., paper and cotton), organic solvents and other organic materials may lead to liberation of large quantities of heat.
4.	Spillage of Hydrochloric acid	Hazardous in case of skin and eye contact. Inhalation of the mist may produce severe irritation of respiratory tract, characterized by coughing, choking, or shortness of breath,Non-flammable substance.
5	Fire in Furnace oil Tank	The fire may propagate to the nearby area
6.	Spillage /Fire of transformer oil	As transformer oil is handled only when there is a major break down in transformer and it requires the access to internal parts of the transformer. So the chances of occurrences of Spillage /fire are very rare.Eye Contact may cause mild eye irritation including watering. Skin Contact may cause mild skin irritation including redness and burning sensation. This material may burn, but will not ignite readily. Vapors are heavier than air and can accumulate in low areas
7.	Release of Hydrogen gas	May lead to fire and Explosion

Other Reasons: **Natural calamities** like cyclone, earth quake etc., also can trigger any of the above emergencies and can also lead to cascade effects.

4.10 : IDENTIFICATION OF MOST CREDIBLE HAZARD SCENARIO

4.10.1 Leakage of liquid chlorine storage tank

Chlorine gas is very toxic obnoxious gas with greenish yellow colour and highly oxidizing agent. It reacts violently with water and Iron at elevated temperature. It is extremely irritating to the mucous membranes of the eyes and respiratory tract and is very toxic. Taking into consideration of the metrological data of the area, one time storage quantity of chlorine gas and its physical and chemical property, it is considered credible Hazard scenario.

The effect of significant concentration level of 0.5 PPM, 2PPM and 20 PPM for different season in case of chlorine gas leakage from chlorine or cylinder valve connecting pipe as assessed is given in table below. The incredible scenario is during rainy season with maximum wind speed.

Storage details	Toxic level in ppm	Experience at distance in kms.			Indication
		Summer	Rainy	Winter	
liquid chlorine 100 m^3	**0.5**	**10**	**8**	**8.1**	Population could experience notable discomfort
	2	**5.2**	**3.9**	**3.9**	Non-reversible/ serious of long lasting effects/ decreased ability to escape
	20	**1.5**	**1.2**	**1.2**	People could face death/ life threatening health conditions

4.10.2 Leakage of hydrochloric acid storage tank

Hydrochloric acid is very toxic obnoxious gas with no colour and highly oxidizing agent. It reacts violently with water and Iron at elevated temperature. It is extremely irritating to the eyes and respiratory tract and is very toxic. Taking into consideration of the metrological data of the area, one time storage quantity of hydrochloric acid and its physical and chemical property, it is considered credible Hazard scenario.

The effect of significant concentration level of 1.8 PPM, 22PPM and 100 PPM for different season in case of hydrochloric acid leakage from cylinder valve connecting pipe as assessed is given in table below. The credible scenario is during summer season.

Storage details	Toxic level in ppm	Experience at distance in Mtrs.			Indication
		Summer	Rainy	Winter	
Hydrochloric acid 250 m^3	**1.8**	941	890	508	Population could experience irritation of skin and eyes.
	22	282	251	144	Irritation of throat.
	100	132	117	67	Population could experience decaying of teeth and severe irritation of skin with rash.

4.10.3 Leakage of sulphuric acid storage tank

Sulphuric acid gas is very toxic obnoxious gas with brown colour and highly oxidizing agent. It reacts violently with water and Iron at elevated temperature. It is extremely irritating to the eyes and respiratory tract and is very toxic. Taking into consideration of the metrological data of the area, one time storage quantity of Sulphuric acid and its physical and chemical property, it is considered credible Hazard scenario.

The effect of significant concentration level of 0.2 mg/cum, 8.7 mg/cum and 160 mg/cum for different season in case of Sulphuric acid leakage from cylinder valve connecting pipe as assessed is given in table below. The incredible scenario is during summer season with maximum wind speed.

Storage details	Toxic level (mg/cu-m)	Experience at distance in Mtrs.			Indication
		Summer	Rainy	Winter	
Sulphuric acid 7.43 m^3	0.2	357	363	276	Respiratory irritation in humans
	8.7	53	55	14	Slight disabling effects
	160	11	12	10	Will develop life threatening health effects

4.10.4 Fire on Furnace oil storage tank

Furnace Oil is a flammable liquid as per schedule-1, Part-II (b) (v) having flash point of > 520C and auto ignition temperature of 2570C and explosive limit of lower value 0.6% & upper value 4.7% by volume in air. Fire classification as per OSHA, it comes under category Flammability-2 (Moderate). So, it is susceptible to fire hazard. Whenever FO catches fire it shall manifest in the form of pool fire. Taking into consideration of the metrological data of the area, one time storage quantity of FO and its physical and chemical property, it is considered credible Hazard scenario.

The effect of significant heat radiation level of 4.5 Kw /m2,12.5 Kw/m2 and 37.5 Kw/m2 for different season in case of fire on FO storage tank as assessed is given in table below. Winter day being producing the incredible scenario with maximum distance of 26.0 m.

Storage details	Significant heat level (Kw/m^2)	Experience at distance in Mtrs.			Indication
		Summer	Rainy	Winter	
Furnace oil 27 cu. m	2	16	16	17	Causes pain if unable cover the body within 20 seconds. However blistering of the skin (2^{nd}degree burn) is likely caused with no lethality
	5	12	12	12	Minimum energy required for melting of plastic
	10	10	10	10	Sufficient to cause damage to the equipment

4.10.5 Fire on transformer oil storage barrels:

Fire Hazard in Transformer Oil Storage Tank is considered as Credible Scenario because of;Transformer Oil is a flammable liquid as per schedule-1, Part-II (b) (v) having flash point of >1450C and auto ignition temperature of 4000C and explosive limit of lower value 0.9% & upper value 7.0% by volume in air. Fire classification as per OSHA, it comes under category Flammability-2 (Moderate). So, it is susceptible to fire hazard. Whenever transformer oil catches fire it shall manifest in the form of pool fire. Taking into consideration of the metrological data of the area, one time storage quantity of transformer oil and its physical and chemical property, it is considered credible Hazard scenario.

The effect of significant heat radiation level of 2.0 Kw /m2,5.0 Kw/m2 and 10.0 Kw/m2 for different season in case of fire on transformer oil storage tank as assessed is given in table below. Rainy day being producing the incredible scenario with maximum distance of 21 m.

Storage details	Significant heat level (Kw/m^2)	Experience at distance in Mtrs.			Indication
		Summer	Rainy	Winter	
Transformer oil 27500Ltr.	2.0	20	21	21	pain within 60 sec
	5.0	15	14	14	2nd degree burns within 60 sec
	10.0	11	11	10	potentially lethal within 60 sec

4.11. Summary Table Showing the Damage Distances for Various Emergencies.

I. Pool Fire – Radiation Intensities

Sl. No.	Scenario	Quantity	Radiation Intensities KW/m^2 / Distance – mts.			
			37.5	25.0	12.5	4.5
2.	HSD	150 KL	28.5	47.4	95.9	259.8
3.	Methanol	1330KL	4.73	37.5	-	-
4.	MethylChloride	5MT	4.00	9.46	50	-

II. Fire Ball - Radiation Intensities

Sl. No.	Scenario	Quantity	Radiation Intensities KW/m^2 / Distance - mts.			
			37.5	25.0	12.5	4.5
2.	HSD	150 KL	81.2	99.4	140.6	234.3
3.	Hydrogen	9 Kg	3.4	4.1	5.8	9.7

III. Vapour Cloud Explosion - Damage Distance

Sl. No.	Scenario	Quantity	Damage Over Pressure (Bar) / Distance - mts.			
			Heavy 0.3	Repairable 0.1	Damage to Glass 0.03	Crack of windows 0.01
2.	HSD	150 KL	130	389	1296	3889
3.	Hydrogen	9 Kg	33	71	195	545

IV. Toxic Release - Dispersion Distance

Sl. No.	Chemical	Source height mts.	Source Strength Kg/cm2	Distance-mts./Concentration (lethality) – ppm			
				833 100% Lethality	433 50% Lethality	217 1% Lethality	25 IDLH
1.	Cl_2 Continuous release						
	Cell House	3.0	0.9	119	339	95.9	1300
	Compressor House	2.0	1.8	223	354	541	2170
	Hypo Stack	14.0	0.1	32	56	68	345
	Cl_2 Tonner Filling	0.5	0.3	56	108	184	683
2.	Cl_2 Instantaneous release						
	One Tonner (900 Kg)	0.5	900 Kg	1290	1310	1310	1320

EMERGENCY ORGANISATION

5. EMERGENCY ORGANISATION

5.0 List of Key Personnel

Executive Director (Technical) shall be the Site Controller for the entire plant. As per the area and nature of accident they will take charge to discharge their duties. HOD (Prod) / HOD (F.A) / HOD (CMS) / HOD (PP) shall be Incident Controller for C.S. division, O&F division and CMS plant respectively.

Shift Engineer will be functioning as Incident Controller in the absence of H.O.D (Production)/ H.O.D(F.A)/ HOD (CMS) / HOD (PP).

H.O.D (Mech.-C.S. Div.), HOD (Mech-CMS), H.O.D (Safety), Fire and Security Officers and S.H. (H.R & Welfare), Medical Officer / Para Medical Staff and All Department heads are designated as Key Personnel and has to respond to emergency call and report to Site/Incident Controller.

Apart from the key personnel certain employees in shifts are identified as essential employees to combat emergencies.

5.1 Essential Employees

Supervisors of Chlorine Plant, Control room and Oil & Fats Division,Chloromethanes plant, D.G. Set Operator, River water pump Operator, Safety and Security Guards on duty , Drivers, Electricians, Instrument technician, Mechanical Fitters, First Aiders, Lab Chargemen, Hypo plant / HCl plant Chargemen and Civil Personnel are designated as essential employees during shift timings. These people will report to their department heads at the site of emergency and carryout their instructions to bring the emergency under control under the overall direction of Incident Controller.

Any other Person(s) requisitioned by Site/Incident Controller(s) from time to time will be treated as essential employees.

Since the Shift Engineer is expected to receive the first message about any emergency, he is considered to hold greater responsibility in controlling the emergency situation till the arrival of Site Controller/Incident controller of respective divisions and other key personnel at the scene of emergency.

(Please see detailed in **Annex – 14 & 15**)

Apart from the above personnel following specific persons are drawn up to tackle emergencies in individual units.

1) Cell House - Shift Supervisor
2) Chlorine plant (including storage & filling) - Shift supervisor
3) HCl plant - Shift supervisor
4) Hypo plant - Shift Chargeman
5) Boilers - Concerned operator
6) D.G.Power plant. - Shift Mechanical/Electrical Supervisor
7) Fusion plant - Shift supervisor
8) H_2 bullets - Castor oil plant supervisor
9) H_2 Autoclaves - Castor oil plant supervisor
10) Fatty acid plant - Shift supervisor Fatty acid plant
11) Hydro chlorination - Shift Supervisor,
12) Thermal Chlorination - Shift Supervisor,
13) HCl absorption - Shift Supervisor,
14) Methyl Chloride Process Tanks – Shift Supervisor,
15) Methanol Storage - Shift Supervisor.

EMERGENCY PROCEDURES

6.EMERGENCY PROCEDURES

6.0 Emergency Procedures

6.1 Declaration of Emergency

6.1.1 Informer of an Emergency

Any person who notices first an emergency situation within the factory will contact the Shift Engineer of respective division / Main Control Room Supervisor of that shift and intimate him about the emergency. Emergency reporting is also done by the personnel mentioned under 4.9.

6.1.2 Particulars to be Furnished

The informer and receiver must identify each other first. The informer then gives the detail about the exact incident and location and along with any other relevant information he can give about the incident. Since it is an emergency communication every one has to be brief and precise.

6.1.3 Declaration of Emergency

The Shift Engineer on receipt of the information will initiate suitable action to contain and control of the emergency situation. He will arrange to inform the key personnel about the incident depending upon the severity of the incident, he will initiate action for declaration of emergency through P.A.system.

6.1.4 Assembly Points

The front side of the Administrative building – Assembly Point -1, and D.G.sets Furnace oil storage area – Assembly Point -2 and Security Main Gate – Assembly Point - 3 are designated as Assembly Points for Caustic Soda Division. The accommodation capacity in each Assembly point is approximately 300.

North-east gate (Security Main gate area) – Assembly Point -1 and South gate (Near DCS Building) – Assembly Point -2 and CMS -2 (North-West Gate)- Assembly Point - 3 are designated as assembly points at Chloromethanes plant. The accommodation capacity in each Assembly point is approximately 200.

Main gate of Co-gen Plant Assembly Point -1 and besides Themax Boiler, Assembly Point -2 are designated as assembly points at Co-gen plant. The accommodation capacity in each Assembly point is approximately 100.

6.1.5 Emergency Control Centre

A room in the Administrative Building has been designated as Emergency Control Centre.(Please see **Annex-23**)

EMERGENCY SERVICES

EMERGENCY SERVICES

6.2 Emergency Actions

The following actions are to be taken during emergency.

1. To initiate Safe shut down of the plant.
2. To ensure Safety of persons and property.
3. To take action for controlling the emergency.
4. To take suitable measures to avoid spreading of emergency.

6.2.1 Different Types of actions that are to be initiated by the emergency group is broadly outlined below:

In case of fire:

1. If it is possible try to approach and stop the leak of material or close the main valve.
2. Transfer of material to be done depending upon the circumstances.
3. Try to approach with caution and use extinguisher or water or foam arrangements based on the nature of fire.
4. If the chances of escalation exists and to save the surroundings steps have to be taken to cool the surroundings and storages.
5. If it is possible the source of ignition can be removed.
6. Isolate any power sources near by.
7. Try to contain the leak and avoid spreading.
8. Always use the appropriate personal protective equipments.

In case of toxic release:

1. Approach from upwind direction.
2. Wear all PPE'S including Respiratory Protection.
3. If possible try to arrest the leak using proper gadgets.
4. Take steps to transfer the contents to another storage.
5. If the spill is small use absorbing materials to absorb the spill.

In case of Spurting:

1. Cut off steam.
2. Spray cold water on the mass.
3. Evacuate the people near by.

6.2.2 Key Personnel and Essential Employees

All the designated people will report to their respective place and take whatever action need to be taken under instructions from Site/Incident Controller. (Please see detailed in **Annexure – 17&18**)

6.2.3 Shut Down of the Plant

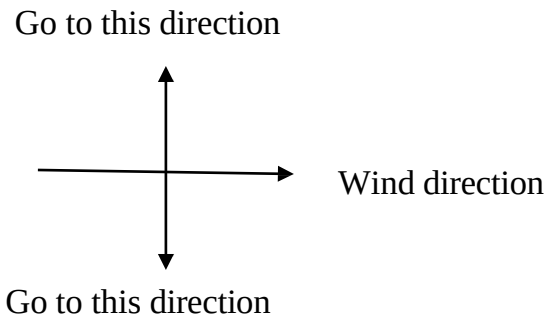
If the emergency warrants shut down of the plant, it must be done according to the procedures laid down in the operating manuals of that section. The procedures are available in all the units and all the operating personnel are familiar about the procedures.

6.2.4 Auxiliary Requirements

In case of fire the main power to that section must be switched off. Diesel Generator must be started to cater to the emergency equipments. Fire water tank level must be maintained so as to ensure adequate water supply for the fire fighting operations.

6.2.5 Instruction to Employees

1. Be calm, do not get panicky.
2. Do not approach the site of disaster as a spectator.
3. Do not believe in rumours, better ascertain facts.
4. Do not engage phones/P.A systems unnecessarily.
5. Ensure that all contract labourers working in the premises are immediately sent to main security gate.
6. Remain at your working place unless called & attend to instructions.
7. All non-essential staff members should collect at the suitable assembly points after assessing the wind direction & wait for further instruction.
8. Come out in open, Check the wind direction & move quickly in perpendicular direction of wind, for wind direction checking see the wind sock installed in the plant.



9. Cover your nose with wet handkerchief & breath through it.
10. Use any possible mode of conveyance to move away.

11. Do not run, walk fast.
12. In case of flood, go to higher level with necessary precautions. In case of earthquake, leave the building & run to open area with necessary precautions or take shelter in corner of building.
13. In case of flood, Chemicals that are highly reactive with water resulting into explosion, such chemicals are to be stored at higher elevation.
14. In case of heavy rain, ensure that ceilings are leakage proof for storage area to avoid any hazardous incidence.

6.3 Procedures to be followed by the Essential Employees

6.3.1 Chlorine Plant Supervisor

Upon hearing the announcement of emergency he will reach the scene of emergency with necessary personal protective equipments like SCBA, Goggles, Gloves, etc., and report to the Incident Controller.

6.3.1 i Chloromethane Plant – Methyl chloride storage / Methanol Storage Supervisor :

Upon hearing the announcement of emergency he will reach the scene of emergency with necessary personal protective equipments like Fire suit, Goggles, Gloves, etc., and report to the Incident Controller.

Under instructions from the Respective division Incident Controller he will try to control the emergency arising out of leak of Toxic/Corrosive material. He will take the help of mechanical fitter and on completion of the work will intimate the Incident Controller.

6.3.2 Mechanical Fitter

Respective division fitter reports to the Incident Controller at the scene of emergency with necessary protective equipments and tools. On instructions from Incident Controller he will assist the Chlorine plant supervisor / **Chloromethane Plant – Methyl chloride process tank / Methanol process tank Supervisor** in stopping the leak of toxic/corrosive material.

6.3.3 Control Room Supervisor

Control room supervisor will intimate the telephone operator to inform the Site Controller, Incident Controller, Safety Officer and other key personnel about the existence of an emergency in the plant.

If the situation warrants evacuation he will make announcement thro' P.A. System about the nature and location of emergency and the prevailing wind direction and instruct all the non essential persons to reach the assembly point thro' a specified escape route.

Carries out all actions accordingly for safe shut down of the plant.

6.3.4 Shift Electrician

Respective division electrician will report to the Incident Controller and carry out jobs like connecting, disconnecting of power to equipments or providing additional lighting as per the instructions from time to time.

6.3.5 Hypo Plant Charge man

Upon hearing of the emergency he will ensure that hypo system is kept ready to receive extra quantities of Chlorine for absorption from both chloroalkali and chloromethanes.

6.3.6 Hydrochloric Acid Plant Chargemen

He will ascertain the prevailing wind direction and intimate the control room supervisor.

He will be ready to shut down the plant if needed.

6.3.7 Fire Officer / Fire Guards

The fire officer along with the designated security guards will be responsible for fire fighting operations. They will report to the Respective division Incident Controller at the scene of emergency and carry out suitable actions like fire fighting with appropriate equipments of required, cooling of adjacent equipments and structures, containing the spread and fire fighting.

6.3.8 Security Personnel

On hearing the announcement of emergency the security will ensure the following:

a) Sealing of all gates except the main entrance.
b) Exercise control on entry of persons and vehicles into the plant.
c) To ensure evacuation of all trucks to the outside parking area.
d) Arranging for head count of people at the Assembly Point.
e) Direct all calls and enquires of people to the Site Controller.
f) Conduct any visitor safely to the Assembly Point.

6.3.9 Plant Supervisor

He will report to the scene and carry out action like isolation, shut down under instructions of Incident Controller and also advise the fire fighting crew about the type of fire fighting media and the need for cooling etc.

6.3.10 Civil Department

H.O.D (Civil) will co-ordinate activities like removal of debris making arrangements for spillage control under guidance of H.O.D (Q.A) and also containment of effluents and fire water reaching public sewers.

6.3.11 Visitors

Any visitor inside the plant upon hearing the emergency siren must leave the plant by the safe escape route as directed and reach assembly point. The Security personnel will be assisting in this.

6.4 Procedures for Evacuation

6.4 Procedures for Evacuation:

On declaration of emergency all persons who have not been designated as essential persons will have to leave their respective places of work and reach the Assembly Point thro' a designated escape route as will be announced thro' P.A.system. The evacuation activity in individual sections will be organised by concerned section supervisor. Arrow markings in fluorescent paint has been made indicating the route to be taken to reach Assembly Point. All employees are made familiar with the routes so they can take the route without panic during emergency.

6.4.1 Evacuation

If any evacuation becomes necessary, persons gathered at the assembly points will be transported to the predetermined shelters by available transports. (Transport Arrangement and Shelters are included in **Annexure-27&28**)

6.4.2 Rescue

Four members trained in first aid will form the rescue team.

The rescue team will report to the incident controller and according to the instructions the team will rescue persons under the guidance of Safety Officer who are either injured or trapped and transport them to the first aid centre/place of safety. The rescue team members will wear necessary personnel protective equipments. The rescue team comprises Safety Engineer, First-aid Nursing Staff, duty security guard cum driver and the fire guard.

6.4.3 Head Count

At the Assembly Point the head count will be taken by the shift Security Supervisor and P&A will be communicated to the Site Controller. Verification will be made with the persons present inside the plant and suitable action for search/rescue will be initiated for the missing persons. The rescue team will go and search for the missing if any.

6.5 First Aid

All the injured will be brought to the first aid centre where the Doctor/Para medical staff will render necessary first aid and refer the cases to hospital for further medical attention depending upon the severity. Necessary transport will be made available for transporting the patients to Hospitals by Shift Security and on duty Time keeper. If necessary additional assistance from First-aid trained personnel in the plant can be made use off.(See **Annexure-26**)

6.6 Emergencies during Holidays

Being a continuous process industry the shift engineer will assume overall charge of any emergency and initiate suitable action to control the emergency till the incident controller/site controller takes charge of the situation.

EMERGENCY COMMUNICATIONS

6. EMERGENCY COMMUNICATION

7.0 Communication of Emergency

The siren is used to intimate everyone about the existence of an emergency in the plant. Siren will be activated by only the designated persons - Shift Supervisor or Shift Engineer.

The siren can be activated based on the area of emergency since switches are provided in different critical locations.

The siren will be sounded in three blasts of "half minute" duration with an interval of 15 seconds in between the blasts.

In case of power outage emergency power is available apart from hand siren which is available will be operated. The location of hand siren is at Castor oil plant and other at Chlorine compressor house.

The Shift Engineer of respective divisions on receipt of the intimation will instruct the Chloro alkali control room supervisor he interim will inform the telephone operator who is present thro' out 24 hours to get in touch with the key personnel and inform them about the emergency. Further he will arrange announcement thro' Public Address system to all plant personnel about the emergency (please see telephone numbers list attached as in **Annexure – 9&17**).

He will ask the control room supervisor to make announcement thro' P.A. System about the nature, and location of emergency and direct the persons to reach the Assembly Point thro' Safe Escape Route based on wind directions.

Intercom is available for internal communication with better back-up. If power has failed and telephones become inoperative walkie-talkie will be used. Cell phones are available with key personnel.

7.1 Emergency Control Centre:

Emergency Control Centre has been designated and site controller will receive and give all communications from this centre. Till the arrival of site controller respective shift in charges will discharge these duties from his post/scene of emergency. In case of any emergency in O&F div., the Shift Incharge of C. S. Div. will discharge the duties of site controller till his arrival.

7.2 Location of Push Buttons for Activating the Siren

The switches for activating the siren are located at the following places:

C.S.Div:

a) Chlorine storage area.
b) Chlorine compressor area.
c) Chlorine filling area.
d) Main control room.
e) Main Gate

CMS Plant

a) Security main gate.
b) Freon Compressor Room.
c) Old DCS Building 3rd Floor.
d) Old T.C. Building 1st Floor
e) Methyl Chloride Compressor Room.
f) CMS-2 TC Building 1st Floor
g) New DCS C.Room
h) CMS -3 TC Buildinf 1st Floor
i) CMS-3 FREON cOMPRESSOR

7.3 Messengers

The lab chargemen in shift will report to the incident controller and carry out all the job as directed. He will carry message between Incident Controller and Site Controller in case the telephones become inoperative due to power failure.

7.4 All Clear

The all clear signal would be sounded as per the instruction of the site controller. It will be one long whistle for one minute duration indicating the conclusion of emergency.

EMERGENCY FACILITIES

7. EMERGENCY FACILITIES

8.0 EMERGENCY FACILITIES

8.1 Emergency Control Centre (E.C.C)

It is necessary that all directions and instructions have to be issued from one particular place and this place must be safe and is unlikely to be affected from the likely points of hazard and it must be easily approachable. Based on these considerations one **Office room in the Administrative Building is designed as Emergency Control Centre.**

8.2 The following facilities are available at the control centre.

a) Intercom and External Telephones (See the **Annexure-9&10** for telephone numbers).
b) Factory lay out plan.
c) Plan indicating hazardous inventories, Control room, Assembly Points, Escape Routes, Sources of safety equipments, Fire fighting appliances etc.
d) Address and telephone numbers of key personnel/essential employees.

e) Address and telephone numbers of District Emergency Authorities like:
   Dist. Collector
   Superintendent of Police
   Dist. Medical Officer
   Nearest Police Station
   Primary Health Centre
   Municipal Commissioner
   Govt. and Private Hospitals
   ESI Dispensary
   Home Guards
   Dist. Veterinary Officer
   Voluntary Organisations
   Regional Transport Officers.

g) Address and telephone numbers of neighboring industries and contact persons.
h) Address and telephone numbers of outside experts/organizations.

i) Address and telephone numbers of mutual aid organizations along with the list of materials available.
J) List of first-aiders and fire fighting crew.
k) Chemical fact sheets and material safety data sheets.
l) List of available personnel protective equipments.
m) List of fire fighting facilities available.
n) Demographic data around the factory and meteorological data.
o) Emergency medical management procedures.
p) Copies of On-site and Off-site Emergency Plans.
q) Public address system.
r) One set of complete personal protective equipments and respiratory protection like SCBA.
s) Fire proximity complete with hood, gloves and boots.
t) One set of hand tools including cylinder keys and emergency light/torch light.
u) Two sets of fire jet blankets.
v) Data about the daily attendance and people working in hazardous areas.

8.3 Assembly Points

Caustic Soda Division:

The front side of the Administrative building – Assembly Point No.1 and D.G.sets Furance oil storage area are designated as Assembly Point No.2.

CMS Plant:

North–East gate (CMS Security Main gate)-Assembly Point No.1 and South side DCS Building are designated as assembly point No.2.

Cogen Plant:

Co-gen plant Main gate No.1 and Thermax Boiler area are designated as Assembly point no.2.

Where people can reach at the time of emergency. All persons not connected with the emergency can await further instructions regarding evacuation & further action.

8.4 Emergency Lighting

Flood lights have been provided from outside the process block. The connections are on mains directly connected from panel so that even if power supply to a section of the plant is switched off or fails these lights will provide illumination.

8.5 Emergency Escapes

The elevated floors in all the process plants are provided with two stairs so that a minimum of one will be available during emergency. All the ground level blocks are open and ventilated and provide adequate egress.

8.6 Wind Indicators

Wind socks are provided on top of Fatty acid building, Old De-Chlorination & 9th Cell House New De- Chlorination, HCl plant, Cl2 drying tower,Cl2 Filling, Store building(South-East corner), 500TPD Evaporation Plant, New Hypo plant at Caustic Soda & O&F Division.

Wind socks are provided on top of DCS Building, HCl absorber area, ADM building, T.C.Building, CMS-2 Hydro Chlorination, Outside Methanol storage at CMS plant

Wind Socks are provided on the top of Co-gen Turbine building and PF Boiler Conveyor belt crusher building.

8.7 First Aid Centre

The centre is provided with an Oxygen manifold connected with few breather cups so that five persons can be administered with Oxygen at a time.

Additionally 20 Oxygen cylinders with breather masks are available. Trained compounders are available round the clock and during general shift hours one qualified Doctor is available.

Adequate stock of essential medicines and injections are maintained. About 117 employees have been trained in First Aid and they will be available during emergency.

Dedicated 2 Nos ambulance vehicles are maintained for transporting the injured/sick. Shift security guard / Driver is available round the clock.

In addition, Five buses with a capacity of 60 each and One Sumo are available which can be pressed into service for evacuation requirements.

First aid boxes are maintained in control room, maintenance, instrument section, Chlorine filling, HCl synthesis unit, and Castor oil unit, Fatty acid unit D.G.sets, CMS Plant and Co-gen Plant.

A list of first aid material and medicines maintained in the first aid centre is included in the **Annexure - 12 & 13.**

8.8 Fire Water

Water for plant's requirement is drawn from Tungabhadra river. Two water storages having a capacity of 600 m^3 and 700 m^3 are available for fire fighting requirements apart from process water storage. In addition to above we have provided exclusively Electric driven Fire water pump and Diesel driven pump with jokey pump for CMS plant to meet fire emergency and Fire water storage capacity of 2 No's X 250 $m^{3\ and}$ inter connected with main fire water storage.

To combat any emergency fully approved ring main hydrant system has been laid. Electric driven fire water pump and diesel driven pump with jockey pump have been installed. The jockey pump will maintain the header pressure and upon loss of pressure the main pump will take over automatically. Water monitors are installed and provision is made for foam making branches. Fire hoses, branch pipes, jet nozzles and stock of foam compound are maintained.

The Furnace Oil, Diesel tanks , Methanol storage tanks have been provided with foam pouring arrangements.

EMERGENCY RESPONSIBILITIES

8. EMERGENCY RESPONSIBILITIES

9.0 Emergency Responsibilities

9.1 SHIFT ENGINEER (C.S) / SHIFT ENGINEER (O&F) / SHIFT INCHARGES (CMS) PLANT / SHIFT INCHARGE BOILER (P.P)

On receipt of information about emergency in the plant he initiates the following actions.

a) Contact telephone operator intimate him about the emergency and ask him to convey the message to the site controller, incident controller and other key personnel.

b) Instruct the control room supervisor to announce thro' P.A. system about the emergency and also about the wind direction and the safe escape route to be followed.

c) Reach the scene of emergency, assess the situation and initiate necessary action to contain the emergency.

d) If the conditions warrant take steps to shut down the plant.

e) If it is felt that the situation is serious declare emergency, arrange for sounding of siren to alert people and arrange for evacuation of persons.

f) Hold charge till the incident controller arrives at the site.

9.2 SITE CONTROLLER – EXECUTIVE DIRECTOR (TECH)

a) On receipt of the information he will reach the emergency control centre assumes charge of the entire emergency operation.

b) Assess the situation in consultation with Incident Controller/Shift Engineer and Declares emergency if the situation warrants.

c) Be in close touch with the Incident Controller and co-ordinates all action concerning safe shut down, control of emergency, decontamination, etc.

d) Co-ordinates all actions regarding rescue, head count at assembly point, first aid, admission to hospitals, evacuation if required.

e) Directs all operation for fire fighting.

f) Arranges for dissemination of proper information to the relatives of employees, public, media, etc.

g) Inform all statutory authorities like Factory Inspectorate, Pollution control board, Controller of explosives, etc.

h) Inform all neighboring industries about the emergencies.

i) Get in touch with the industries who have agreed upon mutual aid scheme and seek assistance if required.

j) If the situation is likely to get escalated and lead to off-site implications he will inform about the incident to Dist. Collector, Superintendent of Police, nearest Police Station, Dist. Fire Officer, Dist. Medical Officer, Primary Health Centre, Regional Transport Officer, Factories Dept., Government and Private Hospitals, Voluntary Organisations, etc., and proceed with off-site emergency plan.

k) Seek the help of outside experts if a need is felt.

l) Co-ordinate all action for decontamination and make fit for re-entry.

m) Arranges for giving "All clear" signal to announce conclusion of the emergency.

n) Arranges for preservation of evidences for further investigations.

9.3. INCIDENT CONTROLLER – HOD(Production) of respective division /Shift in charge of respective division (C.S Division, O&F Division, CMS Plant & Co-gen Plant)

a) On receipt of information about the emergency he will reach the scene of emergency.

b) After assessing the situation to initiate action for safe shutdown of plant, controlling the emergency and ensuring safety of the plant personnel.

c) Arrange for announcement through P.A. System about location, nature of emergency and the wind direction along with the safe escape route to be taken.

d) Informs 'Site Controller' about the situation for planning further action and acts according to the instruction of the site controller.

e) Advises the fire fighting crew about the methods and precautions.

f) Ensure that all the personal protective equipments, tools and appliances are available.

g) Co-ordinates action regarding evacuation of persons from site to assembly point.

h) Oversees all activities regarding rescue, search and transportation.

i) Arranges all activities for clean up and decontamination of the area.

j) Arranges cell phones / messengers for communication requirements during power failure.

k) Preserve all evidences.

l) Inform site controller about conclusion of emergency and permission for re-entry.

m) Ensure no leakage of Chemicals on the floor takes place during heavy rains, floods, earthquakes, cyclone etc.

9.4 EMERGENCY CO-ORDINATOR (Communication) – HOD (Mech.-CS) / HOD (Mech.-CMS)

a) On hearing about the emergency report at the control centre and site controller.

b) He will maintain the communication link with the incident controller.

c) Based on the information received he will interact with site controller to decide and communicate the further action to the concerned.

d) Maintains contact with the fire fighting crew, rescue team, security, first aid requirements, evacuation requirements, etc.

e) Maintain the inventory of items in the control centre.

f) Ensures availability of runners in case of power failure.

g) He also obtains the prevailing meteorological data from the local offices.

h) He maintains log of the events.

9.5 EMERGENCY CO-ORDINATOR (LIASON & TRANSPORT) – (H.R. & Welfare)

a) He will report to the Site Controller.

b) Under instructions from site controller, he interacts with statutory authorities like police, factory inspectorate, etc.

c) He will obtain information about head count at assembly points.

d) Interacts with the first aid/medical officer and ensures proper attention to the causalities and ensures additional help as required.

e) Co-ordinates with security for control of the traffic movement.

f) Ensures that necessary refreshments and welfare measures are provided for the people.

g) He informs the relatives of the injured about the condition.

h) In the event of fatalities he will co-ordinate all the formalities.

i) He will co-ordinate all relief/ rehabilitation measures.

j) On receipt of the emergency he will intimate the incident controller about his arrival.

k) He remains at the main entrance & makes all arrangements for transport.

l) Co-ordinates actions for additional vehicle requirements and ensures proper condition of ambulance.

m) He will also ensure adequate stock of fuel.

n) He will be in touch with emergency co-ordinator (Communications) and informs about the position on transportation of the injured to first aid/hospital and transportation of evacuated people

9.6 EMERGENCY CO-ORDINATOR (SECURITY) – HOD (SECURITY)

a) On hearing the alarm he keeps open the main gate and arranges to close all the other gates.

b) Ensures that only authorised persons are permitted to enter the gate.

c) Makes sure that all vehicles are sent out of the plant to the designated parking space.

d) Direct all the people coming from the plant to the assembly point.

e) He arranges for head count and carry the detail to emergency co-ordinator (Liason)

f) Maintain law and order inside the factory.

g) In co-ordination with the co-ordinator (Liason) arranges to send ambulance/transport to pick up the injured/victims to first aid centre or hospitals or to places of shelter.

9.7 MEDICAL OFFICER/PARA MEDICAL STAFF.

a) On receipt of information reports at first aid centre.

b) Checks up and confirm availability of all essential medicines, dressings, stretchers, etc.

c) Arranges for necessary first aid for the injured.

d) Co-ordinates with the control centre and advises about persons requiring medical treatment.

e) Establishes contact with medical officers of Government and other private hospital and intimate them in advance about the injured people being sent to them.

f) Arranges for Antidotes, wherever necessary and also ensures that this is made available to outside hospitals also in case they don't have stocks.

9.8 EMERGENCY CO-ORDINATOR (SAFETY) / HOD (Safety)

On receipt of information reports to the incident controller at the scene of emergency.

b) He will advise the incident controller on the safety matters.

c) He will make sure that all the necessary personnel protective equipments are made available.

d) He will co-ordinate all fire fighting operations with fire officer and fire security guards.

e) He will co-ordinate all rescue operations with the rescue team.

f) He will be in close contact with communications officer, liason officer and intimate them about the condition existing at the scene of emergency.

g) Emergency rescue team mentioned under 6.4.2 will also assist the emergency Coordinator.

9.9 FIRE OFFICER / FIRE GUARDS

a) They will report at the scene of emergency and report to incident controller.

b) Arranges for all fire fighting operations.

c) Liaison with safety and ensures adequate supply of hoses, nozzles etc.

d) Intimate Incident Controller on the need for additional requirements of Resources thro' mutual aid scheme.

e) Instruct the guard / driver as per requirements of emergencies.

9.10 TELEPHONE OPERATOR

a) On receipt of the information about the emergency he will telephone Site Controller, Incident Controller, and all other key personnel.

b) He will divert all the outside calls to the Emergency control centre so that liason co-ordinator will handle those calls.

b) List of important telephone numbers is available with the operator and he will contact them as per the instructions of liason coordinator.

9.11 HYDROCHLORIC ACID PLANT OPERATOR (UTILITIES)

a) On hearing the alarm he must make sure that the level in the static water tank is available.

9.12 SECTIONAL HEADS

a) All the sectional heads will report to the Incident Controller of respective divisions and carry out the instructions.

b) They will make arrangements to enlist the help of additional persons required and complete the jobs/to ensure that.

c) Persons with pre assigned responsibilities will not be taken away.

9.13 EMERGENCY CO-ORDINATOR (ETP) – HOD (Q.A) / HOD (CMS-LAB)

a) Upon hearing the alarm/receipt of information he will report to Incident Controller.

b) He will check up the ETP and ensure that it will be able to accommodate additional quantities of water.

c) He will also make necessary arrangements to impound the fire water from reaching the public drain.

d) He will also co-ordinate activities for control of spills in co-ordination with the V.P. (Civil)

9.14 CHLORINE PLANT OPERATOR

Make sure that fire water pump is running and header pressure is maintained.

9.14 OBSERVERS:

V.P. (O&F), V.P. (E&I) and Sr.GM (Prod-Cl2) will act as Observers to evaluate the effectiveness of the mock drill.

GENERAL

9. GENERAL

10.0 TRAINING PLANS AND TESTING FOR EFFECTIVENESS

10.1 AWARENESS ABOUT OSEP

On-Site Emergency Plan would be familiar to all the employees including those in security people, visitors, Key Personnel and Essential Employees. Copies of the OSEP will be distributed to all the key personal and will be prominently displayed at the plant for the benefit of all.

10.2 MOCK DRILL

In order to provide practice to all the key personnel and essential employees so that they will be able to tackle any emergency, mock drills are conducted regularly at least once in 6 months.

Various observers will be enlisted for assessing the effectiveness of different emergency functions like communications, reporting time, search, rescue and treatment, assembly point, transportation, etc.

Based on the observations discussions are held with the concerned officials and necessary corrections will be implemented.

Emergency Co-ordinator (Safety) will be responsible for organizing Mock Drills.

10.3 REVIEW AND UPDATING

OSEP would be reviewed periodically for its correctness and effectiveness. Any changes that has been made in plant operations. Any change/addition of equipments and Products, change of Key personnel etc., will be incorporated and will be updated. The changes made in OSEP will be communicated to all concerned.

Emergency Co-ordinator (Safety) will be responsible for review of Onsite Emergency Plan.

10.4 MUTUAL AID

In certain cases of emergency it is possible that one may fall short of equipments/materials required for tackling emergency. It is also beneficial to enter into an understanding with the neighboring industries, so that resources available with them will be made available. This arrangement also helps in avoiding duplication and overstocking.

Emergency Coordinator (Liason officer) will be responsible for the arrangements and formatting a mutual-aid agreement.

10.5 ADJOINING INDUSTRIES

The following industries are existing in the nearby locations to TGV SRAACL.

1. M/s. Sree Rayalaseema Hi-Strength Hypo Limited

2. M/s. Bharat Petroleum Corporation Limited

The names and address of contact persons along with telephone numbers are provided in the **Annexure - 10.**

ANNEXURE -1
SAFETY EQUIPMENTS AVAILABLE SECTION WISE

Chlorine Filling

1. Four numbers of air line breathing mask with hose and filter.

2. A FRP hood with adequate length of flexible hose connected to exhaust blower which can be used during leakage.

3. 02 Chlorine Cylinder Emergency Kits-100 Kg and 02 Chlorine Tonner Emergency Kits-900 Kg to arrest leaks from containers.

4. Self Contained Breathing Apparatus of 45 minutes duration – 4 Nos.

5. An axial fan to be used to divert the leakage and make approach easy for repair.

6. 5 Nos of Chlorine sensor with alarm which will alert leakages in its early stage.

7. 3 Nos of Chlorine sensors at Cubicle cabins and Auto start the Emergency Scrubber at 5PPM and Cabin Sliding doors get closed with hooter.

8. Push button to activate emergency siren.

9. 03 Nos Emergency scrubber start-up push buttons.

10. Emergency scrubber funnels with hose to suck leaked chlorine.

11 ELBA (Emergency Life Breathing Apparatus) – 6 Nos.

Chlorine Storage

1. Two number of compressed air line gas masks with regulators, filters and hoses.

2. 8 Numbers of funnels fitted with flexible hose to suck the leak and transfer it to the header leading to absorbing system.

3. The storage is completely enclosed with brick walls on all sides and exhaust header is laid and connected to an absorbing system comprising of caustic circulation pumps, caustic holdup vessel and a vent header.

4. Push button system to activate emergency siren.

5. Each tank is provided with 2 numbers of safety valves and rupture discs.

6. Five numbers of chlorine sensors are provided with auto start facility of Emergency Scrubbing system in case of Chlorine exceeds 5ppm

7. Load cells for each tank are provided.

8. Self-Contained Breathing Apparatus of 45 minutes duration – 4 Nos.

Chlorine Compressor

1. 05 Nos of Chlorine sensor with alarm which will alert leakages in its early stage.

2. 2 Numbers of air line breathing masks with flexible air tubing.

3. 3 Numbers Emergency shower and eye-wash fountain.

4. Two number self-contained breathing set of 45 minutes duration.

5. One number air line mask with hose is available in chlorine liquefier.

6. Emergency Life Breathing Apparatus of 15 minutes duration 6 Nos.

7. Push button system to activate emergency siren.

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Control Room

1. Compressed air breathing apparatus - 3 Nos.
2. One number of chemical suit.
3. Half Face mask for individual members
4. Safety belts.
5. Electrically tested gloves (11KV).
6. Boric acid - 5% solution in 1/2 lit. bottle.
7. Emergency Life Breathing Apparatus of 15 minutes duration 6 Nos.
8. 03 Nos of airline breathing mask with hose and filter.
9. Push button system to activate emergency siren.

Cell House

1. Three numbers of air line breathing mask with flexible hose, regulators and filters.
2. Two number of self contained breathing apparatus.
3. 5% Boric acid solution in 1/2 lit. Bottles.
4. Emergency shower and eye-wash fountain.
5. 10 Nos of Chlorine sensor with alarm which will alert leakages in its early stage.

De-Chlorination Plant

1. Four numbers of air line breathing connected to masks with flexible hose, regulators and filters.
2. 5% Boric acid solution in 1/2 lit. Bottles.
3. Emergency shower and eye-wash fountain. – 3 Nos.

Hydrochloric Acid Plant

1. Five numbers of air line breathing masks with flexible hose, regulators and filters.

2. Two Emergency shower and eye-wash fountain.

3. Two number self-contained breathing set of 45 minutes duration.

4. Emergency Life Breathing Apparatus of 15 minutes duration 3 Nos.

Brine Plant

1. Emergency shower and eye-wash fountain.

Caustic Evaporation Plant

1. 5% Boric acid solution in 1/2 lit. Bottles.

2. Emergency shower and eye-wash fountain 3 nos.

3. Face shield.

4. Emergency Life Breathing Apparatus of 15 minutes duration 2 Nos.

Chlorine Drying

1. Two numbers of airline breathing masks with flexible hose, regulators and filters.

2. One No of Chlorine sensor with alarm which will alert leakages in its early stage.

Hypo Section

1. Two numbers of air line breathing masks with flexible hose, regulators and filters.

2. Two number self-contained breathing set of 45 minutes duration.

SRS Plant

1. Two nos. Emergency shower and eye-wash fountain.

K2CO3 Plant

1. Two Emergency shower and eye-wash fountain

O & F Plant

1. Face shields and helmets.

2. Emergency shower and eye-wash fountain - 4 numbers.

3. Safety goggles.

4. Asbestos suit.

Captive Power Plant

1. Ear muffs and Ear plugs.
2. Electrically tested rubber gloves for 11 KV rating.
3. PVC hand gloves and asbestos gloves.
4. Emergency shower and eye-wash fountain - 4 numbers.
5. Three number self-contained breathing set of 45 minutes duration.
6. Three numbers of airline breathing mask with flexible hose, regulators and filters.
7. Three nos of Chlorine sensor with alarm which will alert leakages in its early stage.
8. Emergency Life Breathing Apparatus of 15 minutes duration 4 Nos.

CHLOROMETHANES PLANT

1. Ear muffs and Ear plugs
2. Emergency shower and eye-wash fountain - 20 numbers.
3. Half Face mask for individual members
4. Self Contained Breathing Apparatus of 45 minutes duration – 13 Nos.
5. ELBA (Emergency Life Breathing Apparatus) – 15 Nos.
6. Push button system to activate emergency siren.

ANNEXURE - 2

Maintenance Programme of Safety Equipments

1. Emergency siren is checked once in a month.

2. Emergency exits are kept unobstructed and is painted in fluorescent paint for easy identification.

3. The following schedule is followed for different safety equipments.

a) Self contained breathing apparatus	-	Daily
b) Chlorine emergency kits	-	,,
c) Compressed air breathing system	-	,,
d) Fire hydrant systems	-	,,
e) Foam system	-	,,
f) Smoke detectors	-	,,

ANNEXURE – 3

LOCATION OF CHLORINE SENSORS

1. The four chlorine storage tanks are equipped with chlorine digital sensors individually & autos start the emergency scrubber at 5PPm. (With audiovisual indicators parallel to the control room) and Fifth chlorine sensor is installed in ground floor hooked up with emergency scrubber system for auto start at 5PPM.
2. In chlorine bottling section digital audiovisual alarm – 5 Nos. and additional 3 Nos of Cl2 sensors at Cabins and auto starts the Emergency Scrubber.
3. In Hypo plant chlorine sensor with digital audiovisual alarm.
4. 07 Nos of chlorine sensor from SRAAC to SRHH with digital indicator and Alarm system.
5. 02 no's of chlorine sensors are installed at HCL plant blower & road side area with digital audiovisual alarm
6. Chlorine sensor near Security gate – West side.
7. Chlorine sensor at De-chlorination plant suction seal vent.
8. At Co-generation plant chlorine cylinder handling area(Old & new water clarifier) and Main Gate –3 Nos.
9. In Cell house chlorine sensor with digital audiovisual alarm- 10 nos
10. In Chlorine plant chlorine sensor with digital audiovisual alarm- 6 Nos
11. In Emergency Scrubber vent chlorine sensor with digital audiovisual alarm-01 No
12. In CMS plant Chlorine Thermal Reactor area sensor with digital audiovisual alarm- 5 nos

LOCATION OF VOC ANALYSER AT CMS PLANT:

1. Shift tank area
2. Check tank area
3. Methanol tank area
4. Product Storage tank area
5. Methyl Chloride
6. Knock Out Drum

Total : 40 nos

ANNEXURE - 4

LIST OF FIRE EXTINGUISHERS, SAND BUCKETS & HAND APPLIANCE

S. No	Location	Fire bucket		Foam		DCP		Co2			
		Sand	Water	Chem.	Mech	10 kg	5kg	22.5 kg	6.8 kg	4.5 kg	2 kg
1.	Thermax Boiler	2	-	-	-	1	-	-	1	1	-
2.	New Thermopac MCC	2	-	-	-	-	-	-	1	-	-
3.	New thermopac	-	-	-	-	-	1	-	-	-	-
4.	Oil Storage tank area	0	-	-	-	-	1	-	-	-	-
5.	Instrument department	0	-	-	-	-	1	-	-	1	-
6.	Store yard	2	-	-	-	-	-	-	1	1	-
7.	Store room	-	-	-	-	-	1	-	1	-	-
8.	MCC-2	2	-	-	-	-	-	-	1	-	-
9.	PLC Room	-	-	-	-		-	-	-	1	-
10.	DG Heat Pump-MCC	-	-	-	-	-	-	-	-	1	-
11	WHR Boilers-MCC	2	-	-	-	-	-	-	1	-	-
12	DG Engine Room	6	-	2	-	2	-	2	-	-	-
13	Control Room(DG)	-	-	-	-	-	-	-	-	1	-
14	PMCC1 & Control Room(DG)	-	-	-	-	-	-	-	-	1	-
15.	NGR & Battery room(DG)	-	-	-	-	-	-	-	-	1	-
16.	PMCC2 & HT Room(DG)	-	-	-	-	-	-	-	-	1	-
17.	HFO Separator room	-	-	-	-	1	-	-	-	-	-
18	Fuel transformer pump House	2	-	-	-	-	-	-	-	1	-
19	FO & HSD Storage tanks	2	-	2	4	-	-	-	-	-	-
20	K2CO3 Plant	2	-	-	-	-	2	-	1	-	-
21	Emergency DG	2	-	-	-	-	-	-	-	1	-
22	MCC-1	2	-	-	-	-	-	-	-	2	-
23	PMCC Room & Bottom	2	-	-	-	-	-	-	-	2	-
24	Elect. 11KV Room	2	-	-	-	-	-	-	4	-	-
25	Elect. Switch Yard	4	-	-	-	-	-	-	3	-	-
26	Rectifier room	6	-	-	-	-	-	5	1	--	-
27	Control room & New DCS room	-	-	-	-	-	-	-	3	-	-
28	Old De-chlorination		--	-	-	-	-	-	-	-	-
29	Cell House –(1 to 6)	-	-	-	-	-	10	-	1	7	2
		Fire bucket		Foam		DCP		Co2			

S. No	Location	Sand	Water	Chem.	Mech	10 kg	5kg	22.5 kg	6.8 kg	4.5 kg	2 kg
30	Cell Houses Bottom	2	-	-	-	-	5	-	-	-	-
31	3rd Cell house H2 holder area	-	-	-	-	-	-	-	-	-	-
32	Cl2 Compressor plant & MCC	4	-	-	-	-	-	-	4+1	-	-
33	Cl2 Storage plant	2	-	-	-	-	2	-	-	-	-
34	Cl2 filling plant	2	-	-	-	1	-	-	-	1	-
35	Sodium Hypo Plant & MCC	4	-	-	-	-	1	-	-	1	-
36	HCL 1,2 & 3	8	-	-	-	1	6	-	-	5	-
37	Evaporation plant	-	-	-	-	-	-	-	-	2	-
38	New De-chlorination & MCC	-	-	-	-	-	-	-	-	2	-
39	New De-Chlorination plant	4	-	-	-	-	5	-	-	1	-
40	Telephone section	-	-	-	-	-	-	-	-	1	-
41	Marketing department	-	-	-	-	-	1	-	1	-	-
42	Canteen	-	-	-	-	-	-	-	-	1	-
43	Castor Oil plant	4+4	-	9	6	2	6	-	6	2	-
44	Thermopac unit	2	-	-	-	-	1	-	-	1	-
45	Fatty acid plant	2	-	-	-	-	5	-	1	6	-
46	Soap plant & Godown grd floor , 1st floor	-	-	-	-	1	-	-	2	2	-
47	Soap noodles plant	-	-	-	-	-	-	-	-	-	-
48	Caustic fusion plant	-	-	-	-	-	2	-	-	-	-
49	Caustic fusion & MCC	-	-	-	-	-	-	-	-	2	-
50	Barium sulphate plant	-	-	-	-	-	-	-	-	1	-
51	KOH plant	-	-	-	-	-	-	-	1	-	-
52	Fire pump house	2	--	-	-	1	-	-	-	-	-
53	Sr. Executives offices	-	-	-	-	-	-	-	1	-	-
54	Air compressors & MCC Room	-	--	-	-	-	-	-	1	-	-
55	Pump house (near river)	-	-	-	-	1	-	-	-	1	-
56	Hydrogen bottling plant	-	-	-	-	-	-	-	-	-	-
57	Central lab	8	-	-	-	-	-	-	2	-	-
58	Glycerine plant	-	-	-	-	-	-	-	-	2	-
59	Conference hall	-	-	-	-	-	--	-	1	-	-
60	E.D.Tech(office)	-	-	-	-	-	-	-	-	1	-
61	Mechanical office	--	-	-	-	-	-	-	1	-	-
62	Galaxy plant	-	-	-	-	-	2	-	-	-	-
63	Brine plant MCC Room	-	-	-	-	-	-	-	-	2	-
		Fire bucket		Foam		DCP		Co2			

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S. No	Location	Sand	Water	Chem.	Mech	10 kg	5kg	22.5 kg	6.8 kg	4.5 kg	2 kg
64	New fusion plant	-	-	-	-	-	-	-	2	3	-
65	6th cell house de-chlorination 1st floor	-	-	-	-	-	-	-	-	1	-
66	4th Evaporation plant	-	-	-	-	-	-	-	1	-	-
67	Resin stocks (Brine Plant)	-	-	-	-	-	-	-	-	1	-
68	Paints godown	-	-	-	1	-	-	-	-	-	-
69	CMS plant	16	-	-	12		4		46	59	-

ANNEXURE - 5

DETAIL OF FIRE FIGHTING SYSTEM (CAUSTIC SODA/O&F/POWER PLANT)

1. Fire Hydrants - Ground -94 + Riser - 56
2. Delivery Canvas Hose pipes - 63 x 15 mts.-100Nos. + 63 x 7.5 mts.20 Nos.
3. Branch pipes 5/8" - 68 Nos. + Fog Nozzle – 4 Nos.
4. Foam Making Branch Pipes - 3 Nos. + Foam Makers -05 (Tank)
5. Foam Compound - 2000 Lts.
6. Dividing Beaching - 1 No.
7. Fire water pump - Cap. 273 m^3/h. Pres. 7.5 kg/cm^2 Elect. Driven HP- 120 HP-1 No
8. Fire water pump - Cap. 273 m^3/h. Pres. 7.5 kg/cm^2 Diesel Driven HP- 120 HP-2 No
9. Jockey pump - Cap 10.8 m^3/h. Pres. 7.5 kg/cm^2 Driven HP 20 HP-2 Nos.

The jockey pump will maintain the header pressure and on drop in pressure the pressure switch will activate main pump and supply header pressure will be maintained at 7 kg/cm^2.

10. Static fire water storage tank - Cap. 700 m3 + 600 m^3.=1300 m3
11. Foam pourers on fuel oil tank - 05 Nos.

CHLOROMETHANES PLANT

1. Water + Foam monitors - 12 Nos
2. Water monitors - 8 Nos
3. Ground Hydrant - 45 Nos
4. Riser hydrants - 46 Nos
5. Fire water pump - Cap. 273 m^3/h. Pres. 7.5 kg/cm^2 Elect.Driven HP- 100 HP-2 Nos
6. Fire water pump - Cap. 273 m^3/h. Pres. 7.5 kg/cm^2 Diesel Driven HP- 100 HP-1 No
7. Jockey pump - Cap 10.8 m^3/h. Pres. 7.5 kg/cm^2 Driven HP 20 HP-1 No
8. Static fire water storage tank - 2 Nos. X 250 m3 = Cap. 500 m^3.

Water sprinklers (250 Nos) are provided for Methyl chloride process tanks and methanol storage tank

ANNEXURE – 6

LOCATION OF FIRE GUARDS IN EACH SHIFT

The plant is divided in to six posts and one fire guard for each post in each shift will be available.

One fire leading man with 3 persons in each shift will come along with 3 off relievers. The total of fire guards will be twelve.

FIRE POST NO.1

1. 9th -12th A Cell House- De-chlorination
2. Rectifiers area
3. Chlorine Compressor House
4. Fire Pump House
5. Drying Towers
6. Chlorine Storage
7. Emergency Scrubber
8. Chlorine Filling

FIRE POST NO.2

1. All HCl Plants
2. All Hypo Plants
3. All Evaporation Plants

FIRE POST NO.3

1. DG Area
2. W.H.R. Boiler area
3. Control Room (D.G.)
4. H.F.O. Operator Room
5. H.S.D. & F.O. Storage Tanks area
6. Thermax Boiler Area
7. 20 TPH H2 Boiler Area
8. Old Fusion Plant
9. Brine Plant
10. SRS Plant
11. New Air Compressor
12. K2CO3 Plant

FIRE POST NO.4

1. Rectifiers
2. 11 KV Room
3. 132 KV Switch Yard
4. Electrical Work shop
5. 36 MCC Panel
6. 28 MCC Panel

FIRE POST NO.5

1. Cell house (4,5,6,7,8,9,10,11,12,12A)
2. Control Room
3. 4,5,6,7,8 De-Chlorination

FIRE POST NO.6

1. Fatty Acid Plant Area & storage tanks area
2. Thermopac Unit.
3. Castor oil plant and its storage tanks area
4. Electrical panel room and Hydrogen compressor room
5. Hydrogen surge vessel and Hydrogen bullets area
6. New Fusion
7. Bertram Plant
8. Mechanical Work Shop
9. Main Store
10. Fabrication yard
11. Central Lab & Administrative building
12. Personnel Dept. & Time Office.
13. New Caustic Loading area.

FIRE POST NO.7

1. Turbine Ground & 1st Floor
2. New MCC & PCC Building at Co-gen
3. DM Plant
4. Cooling Tower at Co-gen
5. Store power plant

FIRE POST NO.8

1. HLL, 100 TPH & 110 TPH Boiler (PP)
2. HLL, 100 TPH &110 TPH Boiler conveyor beltsPP)
3. All Silos (PP)
4. Scrap Yard

FIRE POST NO.9

1. Coal Go down (PP)
2. Coal Yard (PP)
3. Salt Yard Area(PP)
4. Effluent Recycle Plant (ERP)

FIRE POST NO.10

1. Methanol Storage Tanks (CMS)
2. Stores (CMS)
3. ADM Building (CMS)
4. Drum Filling (CMS)
5. Cooling Towers
6. CMS Lab

FIRE POST NO.11

1. DCS & MCC Rooms (CMS)
2. Transformers (CMS)
3. Nitrogen Compressors (CMS)
4. HCl Absorbers (CMS)
5. Run down tanks

FIRE POST NO.12

1. CMS 1&2 Thermal & Hydro Chlorination plants

FIRE POST NO.13

1. CMS 3 Thermal & Hydro Chlorination, HCl Absorber plant
2. Acid Alkali storage area
3. Methyl Compressor and Utility
5. Cooling Towers (CMS-3)

FIRE POST NO.14

1. Methyl new storage tank (outside)

ANNEXURE - 7

QUALIFIED AND EXPERIENCED PERSONNEL IN HANDLING HAZARDOUS CHEMICALS

Name of the Person	Designation
1. Sri. N. Jeswanth Reddy	E.D. (Tech)
2. Sri. C. Srinivas Babu	E.D. (Tech)
3. Sri. B. G.N.S.Murthy	H.O.D. (Proj., & O & F)
4. Sri. S. Palaniappan	Sr. V.P. (Prod-CMS)
5. Sri. P. Raghavendra Reddy	V.P. (Q.A.)
6. Sri. E.Ramaiah	Sr. V.P. (Mech) & Factory Manager
7. Sri K.V.R Ramakrishna	V.P. (E&I)
8. Sri.P. Ramesh Babu	V.P (Prod-CS Division)
9. Sri A. K. Singh	V.P (Prod- CS Division)
10. Sri T. Ravichandran	V.P (Mech.- CMS)
11. Sri Sekhar Patel	G.M (Prod. CMS)
12. Sri Vijay Jadhav	G.M (Prod. CMS)
13. Sri. B. B. Gantayat	Sr.G.M. (Safety)
14. Sri M. Bathkanna	C.G.M. (Prod-CS Division)
15. Sri P.S. Naidu	C.G.M (Cogen.)

ANNEXURE -8
QUALIFIED AND EXPERIENCED PERSONS IN PLANT OPERATIONS

SL. No.	Name	Designation
	C.S./O&F/PP	
01.	Fayaz	Sr. GM(Prod)
02.	Ravi Shankar	Sr. GM(Prod)
03.	Banik	Sr. GM(Prod)
04.	Chandra Sehkar	DGM(Prod)
05.	V.B.Singh	GM(Prod)
06.	D.V.Reddy	Sr. GM(Prod)
07.	K. Ramachandrudu	DGM(prod)
08.	Sai Kumar	DGM(Prod)
09.	A.Rang Mohan Singh	Sr.GM(Prod)
10.	J. Ramesh	GM(Mech)
11.	Rajasekar	Mgr(Mech)
12.	Prahald Reddy	Sr. Supr(Mech)
13.	Narayana Reddy	Sr. Engr(Mech)
14.	V.K. Gupta	Mgr(Inst)
15.	Somalinga Reddy	Supr(Elect)
16.	Mahesh Gupta	DGM(Mech)
17.	M. Kumara Swamy	DGM(Elect)
18.	Naresh Yadav	Mgr(prod)
19.	Ramana	DGM(Elect-PP)
20.	K. Ravi	Mgr(Elect)
21.	Rajasekharappa	GM(PP)
22.	M.V.Kishore	GM(Prod-O&F)
23.	L.N.Reddy	DGM(DM Plant)
	CMS PLANT	
	Muthumanikam	Sr.Mgr(Prod)
1.	S.Sarangapani	Sr. Mgr(Prod)
2..	Ravi	GM(Mech)
3.	Jayaram	Mgr(Elect)

ANNEXURE -9

LIST OF EXPERTS WHO CAN RENDER ASSISTANCE IN CONTROL OF TOXIC RELEASE - PLANT OPERATIONS

Name- Designation	Organisation Address	Residential Address	Telephone / Mobile Nos.
1. SRI. N. JESWANTH REDDY E.D (Tech)	SRAAC LIMITED GONDIPARLA KURNOOL - 4	51-971-B-2-D, Municipal Employees colony, Near water works, KURNOOL	252828 9848076507
2. SRI. C. SRINIVAS BABU, E.D. (Tech)	SRAAC LIMITED GONDIPARLA KURNOOL	Plot No- 291, Silver Oka Appartment, Venus Colony, V. R. Colony, Kurnool-518003	6303801608
3. SRI. P. RAGHAVENDRA REDDY V.P. (QA)	SRAAC LIMITED GONDIPARLA KURNOOL	H.NO. 301B RAYAL TOWERS PRAKASH NAGAR KURNOOL	225802 98480 79064
4. SRI E.RAMAIAH Sr.V.P. (Mech) & Factory Manager	SRAAC LIMITED GONDIPARLA KURNOOL	44/17, 103 B Royal Towers, KURNOOL	227796 98480 13370
5 SRI. P. Ramesh Babu V.P. (O&F)	SRAAC LIMITED GONDIPARLA KURNOOL	Flat No-103, Chandra lok Appt. Nehru Nagar, KURNOOL	222094 99480 46480

6. Sri. B. B. Gantayat **Sr. G.M. (Safety)**	**SRAAC LIMITED** **GONDIPARLA** **KURNOOL**	**Tirumala Residency,** **Flat No. 101,** **Venus Colony,** **SAP Camp,** **KURNOOL**	**9948646468**
7. Sri S. Palaniappan **Sr. V.P. (Prod -CMS)**	**SRAAC LTD.** **GONDIPARLA,** **KURNOOL.**	**44/17, 102 A,** **RAYAL TOWERS** **PRAKASH NAGAR** **KURNOOL**	**9542083007**
8. Sri A. K.Singh **V.P (Prod.-CS)**	**SRAAC LTD.** **GONDIPARLA,** **KURNOOL.**	**H. No 4-23B-8** **Maruthi Nagar,** **Balaji Nagar** **Kurnool**	**9912601820**
9. **Sri M. Bathakanna** **C.G.M (Prod.-CS divi.)**	**SRAAC LTD.** **GONDIPARLA** **KURNOOL** **,**	**45/24- D-15,** **Besides Sivalayam** **Asok Nagar,** **Kurnool**	**9948646465**

ANNEXURE -10
IMPORTANT GENERAL TELEPHONE NUMBERS

DESIGNATION	TELEPHONE NO.
DISTRICT COLLECTOR	220396
JOINT COLLECTOR	220328
DIVISIONAL REVENUE OFFICER	240140
REVENUE DIVISIONAL OFFICER	241380
DISTRICT FIRE OFFICER	236735
SUPERINTENDENT OF POLICE	225600
POLICE CONTROL ROOM	279001
SUB INSPECTOR OF POLICE	9121101069
GOVT. GEN. HOSPITAL	255423
DM & HO	255133
GOWRI GOPAL HOSPITAL	255499
AMBULANCE(GOWRI GOPAL HOSPITAL)	9494425000
ENVIRONMENTAL ENGINEER(APPCB)	235800
SUPERITENDENT ENGINEER(APSPDCL)	9440813316
E.E PUBLIC HEALTH DEPT.	230155
DY. DIRECTOR (I&PR DEPT.)	9121215312
MUNICIPAL COMMISSIONER,KURNOOL	221847
DY. COMMISSIONER OF TRASPORT, KURNOOL	9154294112
DISTRICT AGRICULTURE OFFICER,KURNOOL	8331057415
SUB INSPECTOR SDRF,KURNOOL	9000848138
DY. CHIEF INSPECTOR OF FACTORIES,KURNOOL	9010641556
GENERAL MANAGER DIST. INDUSTRIES	9640909830
DIST. MANAGER CIVIL SUPPLYOFFICE,KURNOOL	7702003541
EXECUTIVE ENGINEER,R.W.S, KURNOOL	9100122400
JOINT DIRECTOR, ANIMAL HUSBANDRY,KURNOOL	9989997102
TAHSILDAR, KALLUR	8333988961
MANDAL PARISHAD DEVELOPMENT OFFICE, KALLUR	9849903229
ASSISTANT FOOD CONTROLLER, KURNOOL	944139787
SUPERITENDENT, GOVT. GENERAL HOSPITAL,KURNOOL	9849903109
DISTRICT CONTROLLER HOSPITAL SERVICE,KURNOOL	8008553760
DISTRICR MANAGER 108 AMBULANCE SERVICE, KURNOOL	7013727716
NEIGHBOURING INDUSTRIES	
BHARAT PETROLEUM CORPORATION LIMITED- LPG BOTTLING PLANT , LAKSHMIPURAM,KALLUR (MANDAL)	9869833824
SREE RAYALASEEMA HI STRENGTH HYPO LIMITED UNIT-I, GONDIPARLA ,KURNOOL	9848994507
SREE RAYALASEEMA HI STRENGTH HYPO LIMITED UNIT-IV, GONDIPARLA ,KURNOOL	9666680655

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ANNEXURE -11

INVENTORY OFHAZARDCHEMICALS

Chlorine (Four storage tanks of 100 MT capacity) (One tank is kept as dump tank for emergency)	**:** 300 tonnes in tanks+450MT in tonners.
Hydrogen	: (1) {18 KL x 3 Nos.,} {24 KL x 2 Nos.} Process vessels installed at Oil & Fats Division at 20 kg/cm^2 pressure. (2) 1 No. Gas holder of 50 m3 1 No. Gas holders of 100 m^3. 1 No. Gas holder of 150 m^3.
Sulphuric Acid	: 60 MT (98%), 70MT(75%)
Caustic Soda (100% basis)	: 2100MT(48% lye), 100MT(32%Lye)
Caustic Potash (100% basis)	: 400 MT (30% lye)
Hydrochloric Acid	: 3 x 300 MT in Storage Tanks.
Furnace Oil	: 1700 KL in Storage Tanks.
High Speed Diesel Oil	: 220 KL.
Methylene Chloride	: 2 x 144.8M3
Carbon Tetra Chloride	: 1 x 51M3
Chloroform	: 2 x 166.4M3
Methanol	: 1 x 155M3, 2 x 553M3
New Methanol	**: 2 x 255 M3**

TGV SRAAC Limited

ANNEXURE -12

ARTICLES IN FIRST AID CENTRE

01.	Examination tables	2
02.	Examination stool	1
03.	Cots, Beds and Pillows	9
04.	Backrests	4
05.	Hand – Stretcher	1
06.	Ambulance	1
07.	Exhaust Fans	2
08.	Ceiling fan	1
09.	Wall fans	2
10.	Air cooler	1
11.	Water filter	1
12.	Toilet and Wash basin	1
13.	Emergency lamp	1
14.	Stethescope	1
15.	B.P.Apparatus	1
16.	Thermometer	2
17.	Torch	1
18.	Tongue-depressor	1
19.	Weighing machine	1
20.	Cemtral Oxygen supply	5
21.	Nebullizers	1
22.	Spacehalers	2
23.	Inhalers	2
24.	Resuscitatios	1
25.	Tourniquet	2
26.	Hot water bags	2
27.	Sterilisers and Disposable syringes	1
28.	IV Stand	1
29.	Refrigeration	1
30.	Suturing and dressing materials	1

31.	Bowel enamel 3”	1
32.	Tary enamel	1
33.	Dust bin	1
34.	Plastic bucket	1
35.	Syringe 10ml	4
36.	Syringe 20ml	2
37.	Bed sheets colour	5
38.	First aid boxes	6
39.	Resuscitators	3
40.	Pillows foam	5
41.	Pillow covers	10
42.	Steel Almirah	1
43.	Torch light	1
44.	Water filter	1
45.	Water jug plastic	1
46.	Weighing machine	1
47.	Sutute needles (Half circle)	1
48.	Super thread black	1
49.	Surgical scissor	1
50.	Disposable Syringes	1 box
51.	Disposable Needles	1 box
52.	Disposable masks	1 box
53.	Medical waste bins	3 Nos
54.	Used needles cutting machine	1 No.
55.	Surgical gloves	24 Nos.

ANNEXURE – 13

MEDICINES NORMALLY AVAILABLE IN FIRST AID CENTRE

1.	Adrenaline	Injection
2.	Mephantine	,,
3.	Avil	,,
4.	Lingnocaine 4%	,,
5.	,, 2%	,,
6.	Betnisol	,,
7.	Deriphyline	,,
8.	Decadron	,,
9.	Dopamine	,,
10.	Lasix	,,
11.	Hydrocoroisone	,,
12.	Cyclopam	,,
13.	Anti Snakevenum	,,
14.	Perinorm	,,
15.	Paracetamol	,,
16.	Calmpose	,,
17.	IV fluids	,,
18.	Aminophyline	,,
19.	Sorbitrate	Tablet
20.	Calciguard	,,
21.	Bactrim dis	,,
22.	Digine	,,
23.	Dexadron	,,
24.	Baralgan	,,
25.	Halls	,,
26.	Strepsils	,,
27.	Dependim	,,
28.	Lomofen	,,
29.	Perinorm	,,
30.	Avomine	,,
31.	Glucose	Powder
32.	Electrobion	,,