

May 20, 2015

To,
Director & Member Secretary,
Ministry of Environment , Forest & Climate Change
Indira Paryavaran Bhavan
Jor Bagh Road
New Delhi- 110 003

Subject : Submission of additional information for obtaining Environmental Clearance for the proposed project of M/s. Archit Organosys , Survey No. 228/1a Paiki 7, paiki 2, Village: Narmad, Taluka: Bhavnagar, District: Bhavnagar, Gujarat

Reference : Minutes of the 36th meeting of the RECONSTITUTED EXPERT APPRAISAL COMMITTEE (INDUSTRY-2) HELD DURING 16th -17th March 2015 .

Respected Sir,

With reference to the above, we hereby submit Additional Information in attached separate report as asked during referred meeting for obtaining Environmental Clearance for our proposed project of manufacturing Chemicals at Archit Organosys , Survey No. 228/1a Paiki 7, paiki 2, Village: Narmad, Taluka: Bhavnagar, District: Bhavnagar, Gujarat

Based on the above, we request you to do the needful and grant us an Environmental Clearance at your earliest.

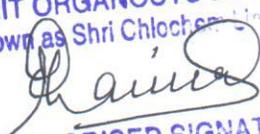
Thanking you.

Yours truly,
For **Archit Organosys** ,

ARCHIT AMIN
[DIRECTOR]

Encl.: Report containing Additional Information

FOR, ARCHIT ORGANOSYS LIMITED
(Formerly known as Shri Chlochan Limited)


AUTHORISED SIGNATORY

ADDITIONAL INFORMATION

**[Ref.: Minutes of 36th meeting of the Reconstituted Expert Appraisal committee
(Industry-2) dated 16.3.2015]**

**For Obtaining Environmental Clearance for the
Proposed Synthetic Organic Chemical Manufacturing Unit of**

M/s. ARCHIT ORGANOSYS

**Survey No. 228/1a Paiki 7, Paiki 2, Village: Narmad,
Taluka: Bhavnagar, District: Bhavnagar,**

21st May 2015

ADDITIONAL INFORMATION

Sr. No.	Additional Information	Compliance
1	Whether any National Park/Wildlife Sanctuary/Reserve Forest is located within 10 km distance? If yes then give details thereof.	No there is no National Park/ Wild life sanctuary/ Reserve Forest present in 10 km radius of the project site. Mangroves are located @ 8.76 km from the project site.
2	During presentation, it was informed that the total water requirement is 343.44 m ³ /day. However, as per page 2.24 of EIA report, water requirement is mentioned as 289.56 m ³ /day. Correct figure to be specified.	Actual water requirement is 343.44 m ³ /day. Corrected Water Requirement detail is attached as Annexure: A (Page No. 3)
3	Source of water supply to be mentioned.	Source of water will be Nirma Industry, Bhavnagar. Letter is attached as Annexure: B (Page No. 6)
4	Give details of treatment scheme for domestic effluent and industrial effluent. Details of usage of treated effluent.	<ul style="list-style-type: none"> • <u>Domestic wastewater:</u> 4.5 KL/day domestic waste water will be treated into sewage treatment plant and reused for greenbelt development. • <u>Industrial wastewater:</u> 4.6 KL/Day industrial wastewater will be generated from the Boiler Blow down and washing activity. Wastewater will mainly contain high TDS so it will be neutralized, evaporated, condensed and reused in scrubbing.
5	Details of measures to be taken for Chlorine leakage from working area and storage area.	Detail measures to be taken for chlorine leakage from working area and storage area is attached as Annexure: C (Page No. 7)
6.	Risk and Disaster preparedness and Management Plan be prepared.	Risk And disaster Management Plan is attached as Annexure: D (Page No. 30)
7	At least 2.5 % of the total cost of the project shall be earmarked towards the Enterprise Social Commitment based on public hearing issues and item-wise details for 5 years. Time bound action plan to be submitted.	Industry will Spend 2.5 % of the total cost of project to Enterprise Social Commitment activity. Annexure: E (Page No. 41)

Annexure: A

EIA Preparation for the Proposed Project of Manufacturing Synthetic Organic Chemicals by
M/s. Archit Organosys Ltd

2.6 Environmental Pollution and Control Measures

2.6.1 Water Pollution

Water Consumption

Outside agency will satisfy the entire water requirement of the unit. There will no consumption of water for the manufacturing of the proposed products. The Industrial water consumption for proposed plant will be 343.44 KL/Day (Fresh water: 310.34 KL/D, Reuse water: 27.04 KL/D), which will be used for Cooling (make up), steam boiler & washing and scrubbing purpose. Domestic water consumption for proposed unit will be 5.0 KL/Day. The unit will develop Green Belt Area within the industrial premises hence the water requirement for gardening purpose will be 32.6 KL/day (Fresh water: 28.1 KL/D, Reuse water: 4.5 KL/D). So, total water requirement will be 343.44 KL/ Day.

2.6.1.1 Wastewater Generation

No water will be consumed in the manufacturing process of proposed products, hence waste water generation from manufacturing process will be nil. Total generated wastewater (4.6 KL/day) from cooling tower, washing activity & boiler blow down will be treated in the Effluent Treatment Plant (ETP). Treated effluent will be evaporated & reused in process. Thus industry will maintain ZERO DISCHARGE.

The Domestic Effluent will be generated 4.5 KL/day and it will be disposed-off into STP for treatment and reuse for greenbelt.

The Category wise details of water consumption and wastewater generation are shown in Table 2.7 and in Fig. 2.7.

Table 2.7(A) Water consumption and Wastewater Generation details

No.	Source	Water Consumption KL/Day	Wastewater Generation KL/Day
1.	Domestic	5.0	4.5 (which will be reuse)
2.	Gardening	32.6 (Fresh:28.1 Reuse:4.5)	Nil
3.	Industrial		
	a. Process	Nil	Nil
	b. Steam boiler	43.8	4.4
	c. Scrubbing for HCL	248.51	
	d. Scrubbing for hypochlorite	44.87	--
	e. Washing	0.2	0.2
	Industrial Water Consumption/ Wastewater Generation	337.38 (Fresh:310.34 Reuse:27.04)	4.6
	Total Water Consumption/ Wastewater Generation	343.44	4.6

EIA Preparation for the Proposed Project of Manufacturing Synthetic Organic Chemicals by
M/s. Archit Organosys Ltd

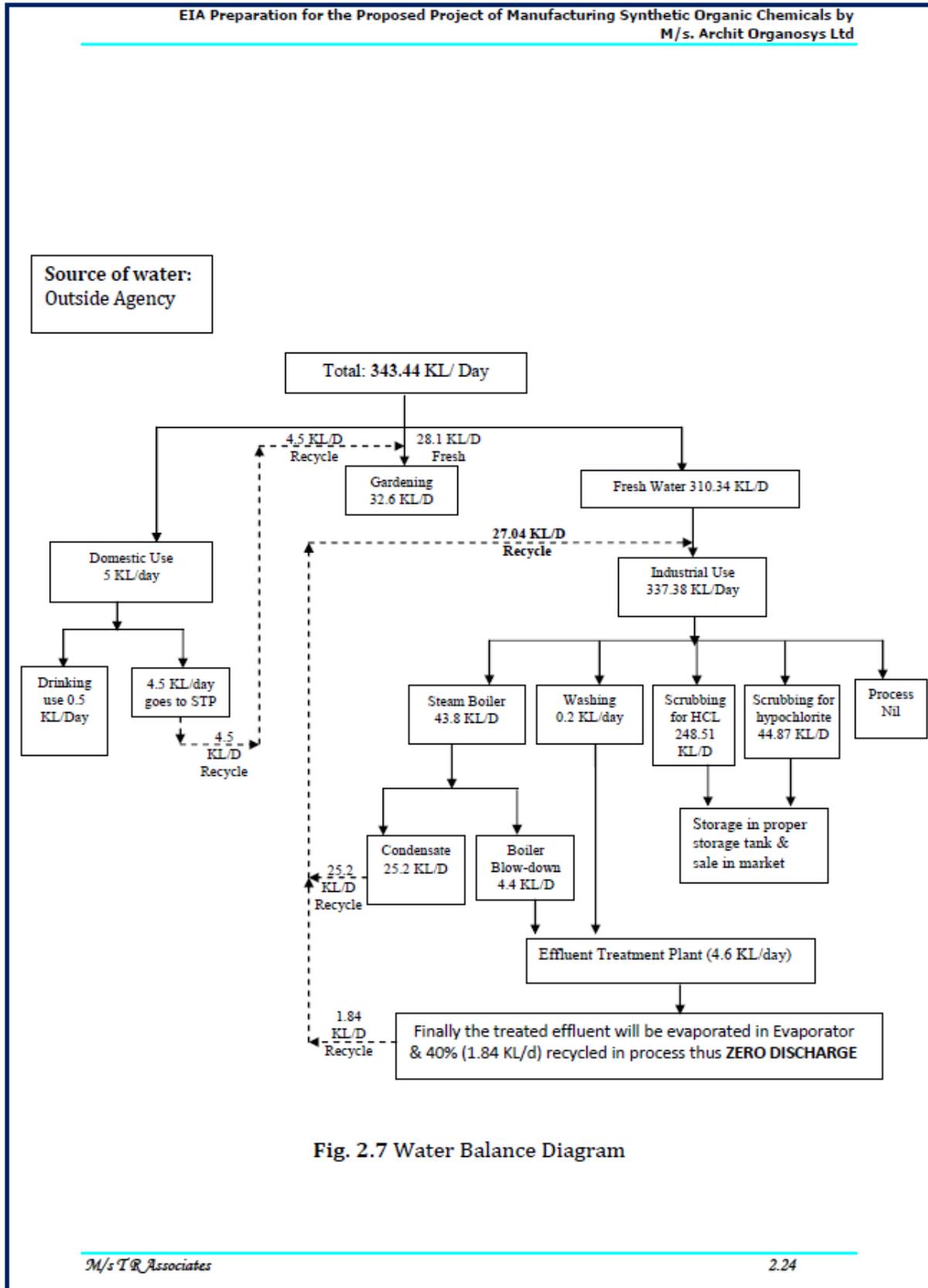


Fig. 2.7 Water Balance Diagram

Annexure: B


NIRMA LIMITED

OFFICE: NIRMA HOUSE, ASHRAM ROAD, AHMEDABAD - 380 009. PHONES: 079 - 27548565, 27549000 FAX: 079 - 27548603, 27546674
Email: info@nirma.co.in CIN: U24240GJ1980PLC009570

Date: 9 May, 2015

To,
Sh. Archit Amin,
M/s. Archit Organosys Ltd.
Bhavnagar.

Subject: Water supply

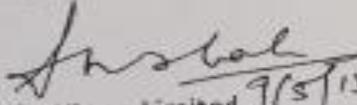
Sh. Architbhai,

This has reference to our discussion in connection with your requirements for water from our unit at Bhavnagar, Village Kala Talav.

You have informed us that there would be a requirement of water of 343.44 m³ per day for industrial purpose at your proposed unit located at Survey No. 228/1a Paiki 7, Paiki 2, Village: Narmad, Taluka: Bhavnagar, District: Bhavnagar, Gujarat.

In this connection, we would like to inform you that subject to regulatory requirements and compliances, we can supply water to you at mutually acceptable terms.

Regards,


M/s. Nirma Limited 9/5/15
(Authorized Signatory)

Annexure: C

Detail measures to be taken for chlorine leakage

General:

Wherever Chlorine is handled, a potential risk is involved, and a serious emergency may suddenly and unexpectedly crop up. Such eventualities should be anticipated and proper schemes to meet them should be formulated in advance. Workers should also be trained be formulated in advance. Workers should also be trained.

Most common emergency that arises during Chlorine handling:

- (1) Through leakage**
- (2) Due to fire (rarely)**

Note: Chlorine by itself is inflammable; but is a supporter of combustion under certain conditions.

In Case of Fire; Chlorine containers should be removed from the fire zone immediately to avoid explosion.

If a container cannot be moved, and provided no Chlorine is leaking there from, water can be applied to the outside of the container, to keep it cool.

Identifying Leakages:

Chlorine gas: Pungent smell (easily identify even if in very low concentration).

(1) Ammonia Torch: In order to ascertain the exact location of the leak, an "Ammonia Torch" is generally used.

Use: This consists of a stick with a cloth bulb at one end. Soak the cloth bulb with aqua ammonia and hold it close to the area of suspected leak. A white cloud will indicate if there is any Chlorine leakage and the source thereof.

PRELIMINARY MEASURES IN FACING LEAKAGES

- The first step to be taken when a Chlorine leak occurs is to remove all persons from the area affected.
- Only trained personnel equipped with suitable gas masks and emergency kits should investigate the leakage and take appropriate action.
- If the leak is extensive, all persons in the path of the fumes must be immediately warned to leave the area, and proceed upwind of the leak and to a higher plane in the open. Because Chlorine gas is approximately 2 times as heavy as air, it usually accumulates close to the ground.

Note: WATER SHOULD NEVER BE USED ON A CHLORINE LEAK. Chlorine is only slightly soluble in water.

- If the leakage is from the process system, supply of Chlorine to that line must be immediately cut off.
- If a Chlorine container is leaking, the first step to be taken is to ensure that only Chlorine gas, instead of liquid, escapes. (This is because the quantity of Chlorine that escapes from a gas leak is only about 1/15th of what would escape from a liquid leak through a hole of the same size. If the container is connected to process, it should be immediately disconnected. Turn the container in such a way as to keep the leak at the top level so that only gas escapes)
- After identifying leakage, for handle emergency situation Emergency already in practices and available with gaskets, yokes, hoods, clamps, studs, tie rods, mild steel channels, spanners, screws, chains, pins, wooden pegs etc. of standard sizes, to fit Chlorine cylinders and tanners generally in use.
- It is very essential that these kits are always maintained properly and kept ready for use. Only authorized and trained persons should use these kits. After every use, these kits should be thoroughly cleaned with alkaline solution and dried. To prevent corrosion, all parts should also be properly oiled. Gaskets should be discarded after
- Every use, and replaced with new ones.
- Leakages from the valve are the most common type encountered in handling Chlorine containers. There are basically 4 types of valve leaks, and these can be adequately controlled with the use of emergency kits.

1. Valve Leaks (See Figure 1.1)

Leakages from the valve are the most common type encountered in handling Chlorine containers. There are basically 4 types of valve leaks, and these can be adequately controlled with the use of emergency kits.

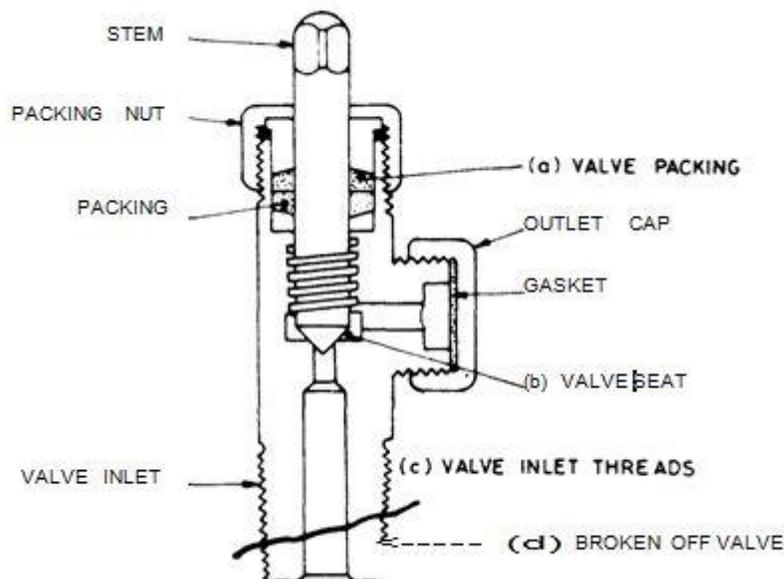


FIGURE 1.1 TYPICAL CHLORINE VALVE LEAKAGE POINTS

a.	Leak from valve packing	Tightening the packaging nut with a spanner should control the leakage.
b.	Leak from valve seat or spindle	This happens due to the valve not closing properly. Gently open and close the valve to remove any scales. If this fails remove the outlet cap, insert a gasket (lead or Teflon) and refit the outlet cap with a spanner.
c.	Leak due to defective inlet threads	The threads might either be worn out or broken. Tighten the valve carefully into the container applying steady (but not too much) pressure with a spanner. If this fails, do not try to repair the valve, but control the outflow of Chlorine through the use of the valve hood, as explained later.
d.	Broken valve	Outflow of Chlorine gas should be controlled through the use of a valve hood described later.

Use of Cylinder Valve Hood (See Figure 1.2)

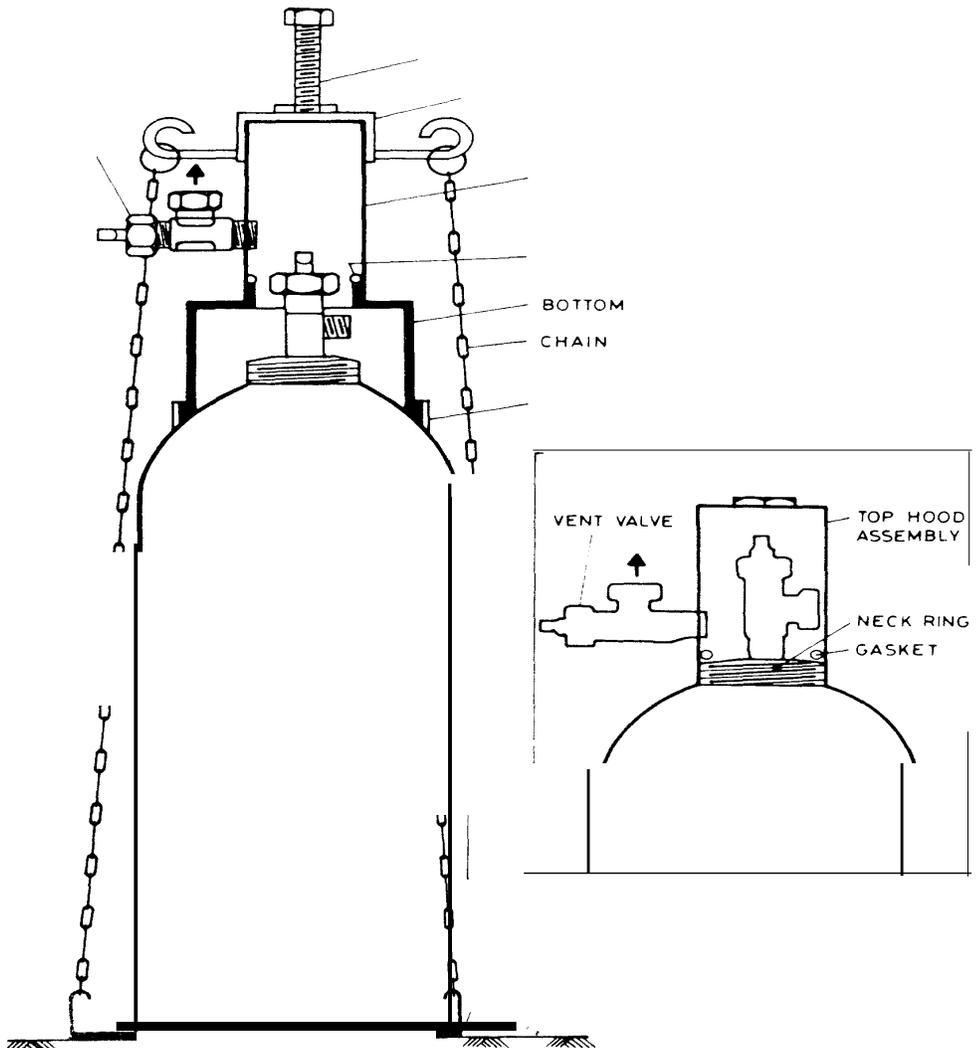


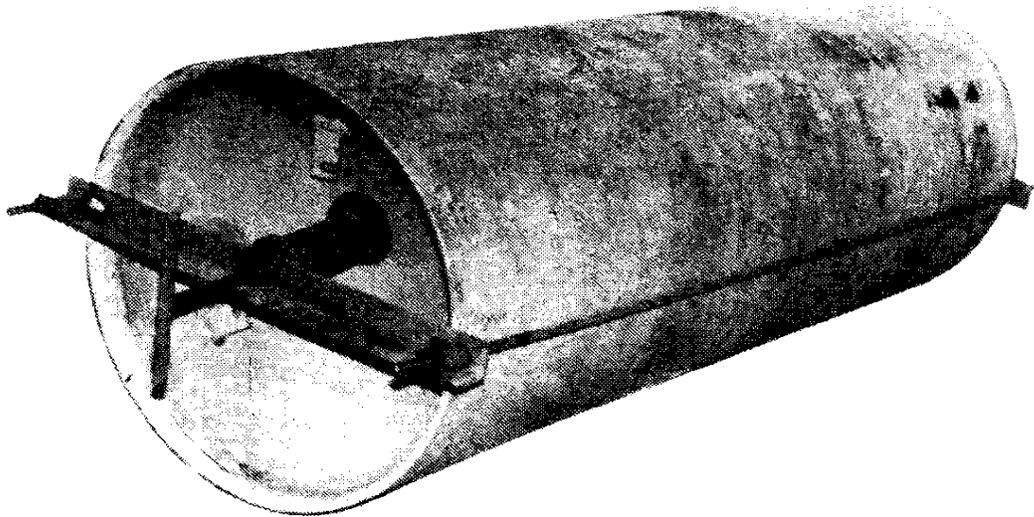
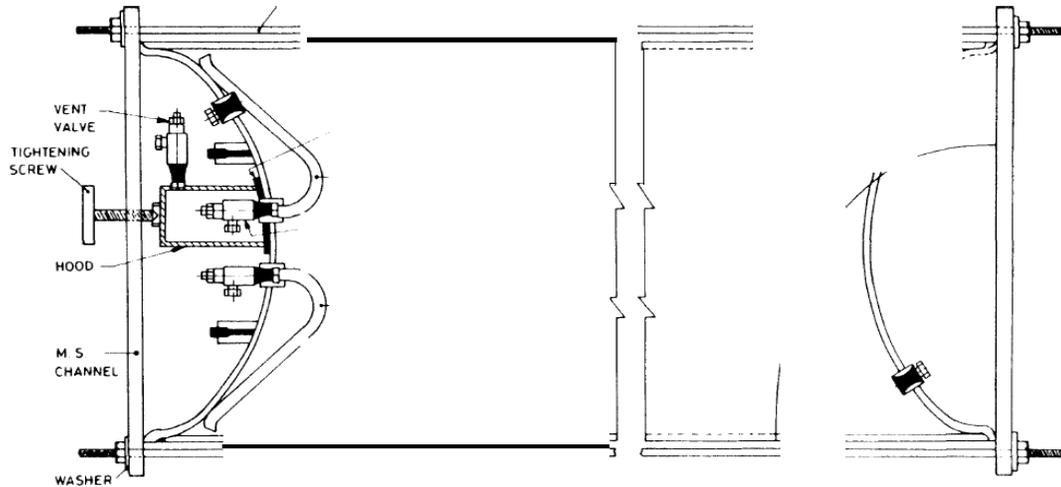
FIGURE 1.2 CYLINDER VALVE HOOD ASSEMBLY

- Remove the outlet cap of the vent valve attached to the top hood assembly in the kit, and open the vent valve.
- Check the threads of neck-ring of the cylinder; if they are not worn out, then mount the top hood assembly directly on to the cylinder enclosing the cylinder valve.
- If the neck-ring threads are worn out, then slide over the cylinder, on a base plate.
- Insert the gasket on the cylinder and then put the top and bottom hood assembly on the gasket.
- Mount the yoke on top hood assembly. Attach chains to yoke and base plate.
- Fit the stud on yoke and tighten the stud to such an extent that the gasket on cylinder provides a sealing.
- Close the vent valve of the hood, and check for any leakage of Chlorine from this valve and the gasket on the cylinder.

- Make connection to the vent valve of the hood for transferring Chlorine to process, or to the neutralizing section, as the case may be.

Use of Tonner Valve Hood

- For tanners having chime ends (See Figure 1.3) If need be, roll the tanner to bring the leaking valve to the upper position.
- Remove the outlet cap of the vent valve which is attached to the hood assembly, and open the vent valve.
- Sufficiently loosen the adjusting screws and jack screws so that the adjustable bar assembly can be inserted behind the chime of the tanner. Take care that the bar assembly is in vertical plane, which will be helpful in making minor adjustments as might be necessary.
- Insert a gasket on the leaking valve and place the hood over it.
- Adjust the lower jack screw in such a way that one of the cap screws comes over the centre of the hood. Then adjust the upper jack screw so that the adjustable bar fits tightly into the chime. Tighten adjusting screws.
- Now tighten cap screws, so that the hood and gasket will be pressed to the head of the tanner and form a seal. Never give undue pressure on cap screw; this may cut the gasket.
- Close the vent valve of the hood and check for any leakages from the vent valve or the gasket below the hood.
- If gas is found leaking from the gasket, tighten the cap screw further.
- Make connection to the vent valve of the hood for transferring Chlorine to process, or to the neutralizing section as the case may be.
- For tanners with or without chime end (See Figure 1.3). If need be, roll the tanner to bring the leaking valve to the upper position.
- Remove the outlet cap of the vent valve which is attached to the hood assembly, and open the vent valve.
- Put the frame of mild steel channels and tie rods around the tanner as shown in the Figure 1.3 and tighten the adjusting screws so that the frame is tightly fitted to the ends of the tanner.
- Insert a gasket on the leaking valve and place the hood over it.
- Insert the tightening screw through the hole on the mild steel channel So that the tightening screw comes over the centre of the hood.
- Now tighten the tightening screw, So that the hood and gasket is pressed to the head of the tanner and form a seal. Do not give undue pressure on tightening screw; this may cut the gasket.
- Close the vent valve of the hood and check for any leakages from the vent valve or gasket below the hood.
- If gas is found leaking from the gasket, tighten the tightening screw further.



1.3 VALVE HOOD ASSEMBLY FOR TONNERS WITH OR WITHOUT CHIMED ENDS

Make connection in the vent valve of the hood for transferring chlorine to the process or neutralization section as the case may be.

2. Container Wall Leaks

a) Use of Clamp for Cylinder Wall Leaks (See Figure 1.4)

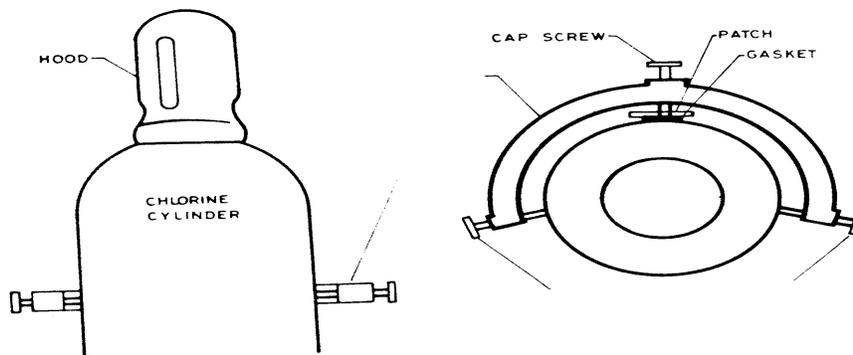
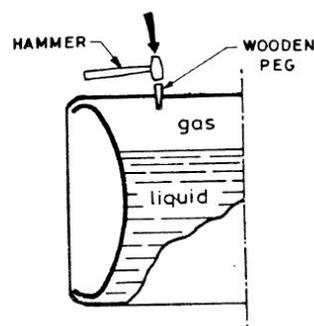
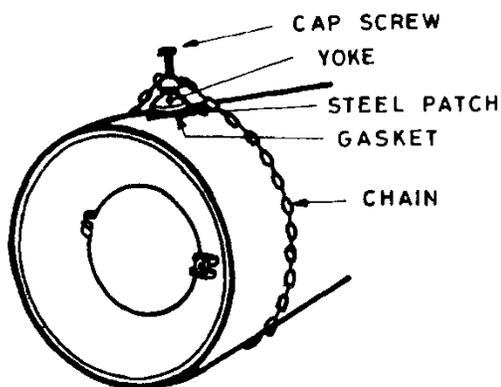


FIGURE 1.4 CYLINDER VALVE HOOD ASSEMBLY

- Bring the leaking point on top by rolling the cylinder.
- Loosen the two side screws and the top cap screw, of the clamp.
- Place the gasket and steel patch centrally on the leak.
- Position the top cap screw in the depression of the steel plate.
- Tighten the side screws over the cylinder surface to keep the clamp firmly in position.
- Now tighten the top cap screw slowly and steadily so that the patch gives a leak-free sealing. (if it is found that the wall of the cylinder is weakening while tightening the top cap screw, do not apply further pressure).
- Check for leak around the steel patch. If gas is still escaping, tighten the top cap screw further, till the leak is completely sealed.

b) Use of Chain and Yoke Arrangement for Tonner Wall Leaks (See Figure 1.5)



**FIGURE 7.7 WOODEN PEG FOR TEMPORARY CONTROL OF WALL LEAKS
NEUTRALISATION OF CHLORINE**



FIGURE 1.5 CHAIN AND YOKE ASSEMBLY FOR TONNER WALL LEAKS

- Keep the tanner on two wooden planks in such a way that the leaking point is on top.
- Fix the cap screw in the yoke in such a way that a small portion of the screw goes into the yoke.
- Attach one end of the chain to one side of the yoke. Pass the other end of the chain under the tanner, and pull it through to the other side.
- Position the top cap screw in the yoke in the depression of the steel plate patch.
- Attach the free end of chain to the other side of the yoke. (Keep the chain as short as possible).
- Place the gasket and steel plate patch centrally on the leak, and the yoke, over it.
- Now tighten the cap screw slowly and steadily which will in turn, tighten the chain, giving a leak-free sealing. (If it is found that the wall of tanner is weakening by tightening the screw, do not apply further pressure).
- Check for leak around the steel patch. If gas still escapes, tighten the cap screw further, until the leak stops.

Note : Use of Wooden Pegs. In case the above mentioned gadgets are not immediately available, then the leak could be temporarily sealed by inserting a wooden peg with the hammer, inside the leaking hole, as shown in Figure 1.6

If all efforts to control leak fails, and the leakage continues, suitable provision should be available with all Chlorine consumers for emergency disposal of Chlorine from the leaking containers. Chlorine may be absorbed in solution of caustic soda, soda ash or hydrated lime. Caustic soda is recommended, as it absorbs Chlorine more readily. If hydrated lime is used, the slurry must be continuously agitated for Chlorine absorption.

Chlorine container capacity	Caustic Soda & Water		Soda Ash & water		Hydrated lime & water	
	Weight Kg	Volume LTR	Weight Kg	Volume LTR	Weight Kg	Volume LTR
45	58	182	136	450	58	566
68	90	270	220	680	82	815
900	1160	3680	2720	9050	1160	11350

It is desirable to provide excess over indicated quantities in order to facilitate ready absorption. A suitable tank to hold the solution should be provided in a convenient location. Chlorine should be passed into the solution through a suitable piping with a perforated distributor at the end and appropriately weighted to hold it submerged under the surface. The container itself shall not be immersed in tank.

If the leakage is uncontrollable, and the connection of the leaking container to the neutralization pits difficult to make, an alternate arrangement could be to have a mild steel jacket imbedded in the ground, big enough to accommodate the container, with flange cover, which in turn is connected to the neutralization pit.

Case 1 (Leakage From The Chlorine Tonner Area):

Chlorine tonner handling area will be provided with portable hoods which can be placed over a tonner in case of leakage; the hood will be connected to a caustic scrubbing system as described earlier. In normal case liquid Chlorine will be withdrawn from the tonners, this liquid will be vaporized in a vaporizer and the chlorine will be stored in a surge tank before supply to the plant. The chlorine tonner area is equipped with portable hoods which are connected to the chlorine vent lines via flexible hose pipe. These vent lines are then connected to the scrubbing system. In case of leakage from the Chlorine tonner, portable hood will be placed over the tonner and leaking chlorine gas will be sucked in and scrubbed with dilute caustic solution (5% my mass) in scrubbing system. The holding tank for the packed column will have capacity to hold caustic solution enough to neutralize chlorine coming from one tonner i.e. 900 Kg of Chlorine. In order to neutralize 900 Kg of Chlorine 1014 Kg caustic (as 100%) is required theoretically.

Case 2 (Shut Down For Maintenance Of Chlorine Vaporizer):

While using chlorine from the tonner, liquid chlorine is vaporized in a vaporized, two vaporizers are used one in standby and one in operation, each vaporizer is used for three months and then taken for routine inspection, during this procedure the standby vaporizer is taken in operation.

Before the vaporizer is taken for inspection, total volume of the pipes have to be evacuated, pipe line coming from the tonner to the vaporizer is filled with liquid chlorine, while vaporizer will have chlorine in gaseous phase. The total volume of the chlorine supply line (20 m long, 2 inch Dia.) is 39 Lts, and volume of the chlorine vaporizer is 1 m³. The total amount of chlorine in the system will be 65 Kg (57 Kg of liquid chlorine and 8 Kg of Chlorine in the liquid phase.). In order to neutralize 65 Kg of Chlorine 74 Kg caustic (as 100%) is required theoretically.

Case 3 (Shut Down For Maintenance Of Surge Tank):

While using Chlorine gas supplied via pipe, the gas will first come to a surge tank from where it will be supplied to the process plant. In case there is any maintenance required in the surge tank, all the chlorine in the surge tank and the pipe line has to be evacuated first. During the evacuation of the chlorine the gas will be scrubbed with caustic in the scrubbing system. Total volume of the supple line (2000 m long, 6 inch dia.) and the surge tank (2.0 KL) needs to be scrubbed. Total volume of this system will be 37.3 m³. The operating pressure of the system is 1 Kg/cm² (G) and gas temperature of 40°C. The total amount of chlorine (applying pressure and temperature correction factor) to be neutralized will be 85.6 Nm³ which is equivalent to 271 Kg of Chlorine gas. In order to neutralize 271 Kg of Chlorine 305 Kg caustic (as 100%) is required theoretically. 1100 Kg of caustic (as 100%) will be maintained in the caustic holding tank, providing excess caustic will ensure neutralization of complete chlorine, so that no chlorine will escape from the scrubbing system.

SCRUBBING SYSTEM:

Chlorine emergency scrubbing system will consist of a two stage scrubbing system.

The first scrubber will consist of a packed column, Caustic holding tank, circulation pump, and heat exchanger. Chlorine gas will be first fed to the bottom of the packed column. Caustic and Sodium sulfite solution will be circulated in the packed column. The strength of the solution is maintained such that there is no precipitation of the salts during neutralization. Solution of 5% caustic and molar equivalent of sodium sulfate is prepared and maintained in the circulation tank. Sodium sulfite is added to react NaOCl to form NaCl and Na₂SO₄; with the addition of sodium sulfite free chlorine fixation will be done in situ. Thus ensuring no release of free chlorine to atmosphere.

As a dilute solution of caustic is used and mass transfer will be a limiting factor in the neutralization, in order to ensure complete neutralization of chlorine, packed height equivalent to 10 theoretical stages is considered in the first column.

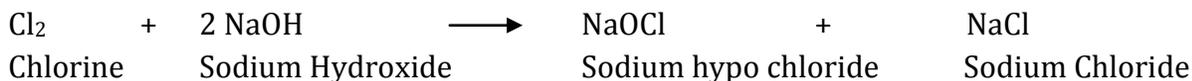
Heat generated during the neutralization process is removed via cooler operating on cooling tower water as cooling utility ensuring a temperature less than 40°C in the scrubbing column. Caustic solution holdup tank is sized considering the maximum consumption, which will be in case of leakage from the chlorine tonner, i.e. 900 Kg of Chlorine. 1100 Kg of caustic (as 100%) will be maintained in the caustic holding tank, providing excess caustic will ensure neutralization of complete chlorine, so that no chlorine will escape from the scrubbing system.

Vent of the packed column is given to a Second packed column containing packed height equivalent to 5 theoretical stages. Solution of 5% caustic and molar equivalent of sodium sulfate is prepared and maintained in the circulation tank.

A driving force of the suction of the chlorine is provided by the blower. The flow rate and head of the blower is selected such that during the suction of chlorine slight negative pressure is maintained in the suction side. This will ensure that chlorine does not spread in the surrounding area. A chlorine gas detector is provided at the vent of the second scrubber to ensure that no free chlorine will escape secondary scrubber.

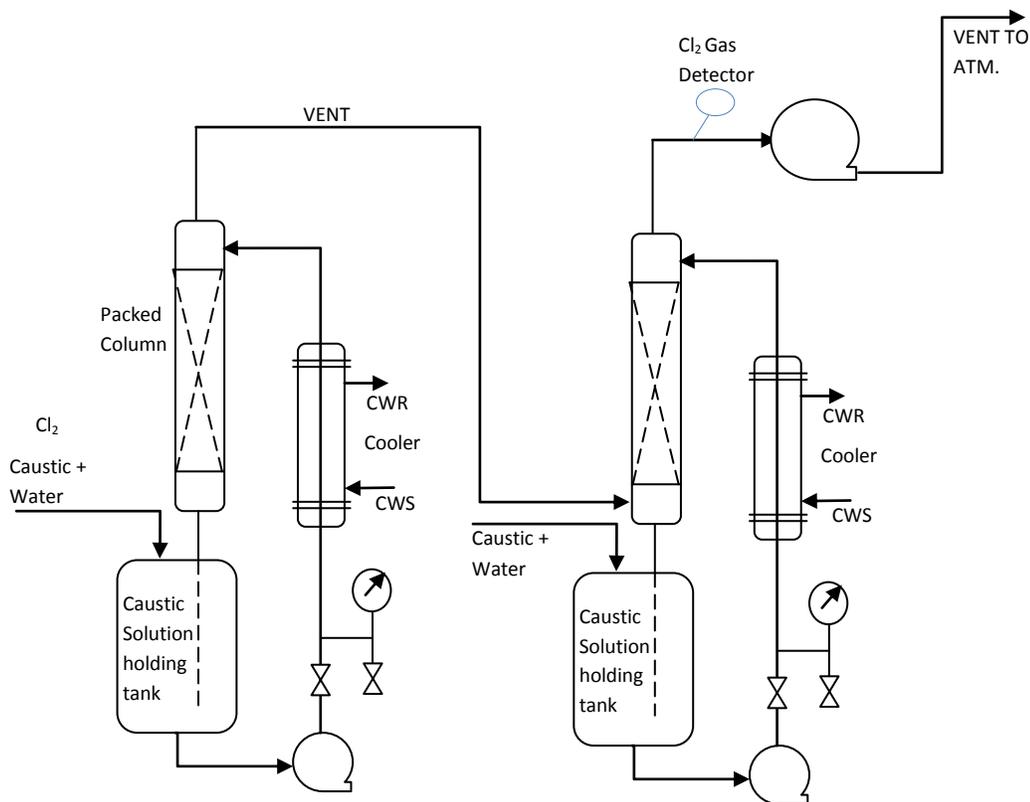
CHEMICAL REACTION:

Scrubbing:



Fixation of free Chlorine:





OTHER SAFETY MEASURES:

Chlorine gas detectors will be installed at 0.00m, 6.00 m & 12.00 m elevation levels near all equipments directly consuming chlorine as well as in the chlorine tonner area, in case of chlorine leakage from any area alarm will be sounded and supply of chlorine will be stopped to that particular equipment from control room by closing the chlorine supply valve, the leakage area will isolated till the leakage is stopped.

A positive pressure suit will be kept at the control room; a worker will wear this suit in case he has to access an area where there is leakage of chlorine e.g. in case of leakage from the chlorine tonner area, a worker will have to go there and place portable hood on top of the tonner.

SCRUBBING OF EXCESS CHLORINE IN THE PROCESS:

MCA Production Plant:

Any excess chlorine used in the process mixes with HCl gas generated in the process and is fed to the isothermal HCl absorber, the HCl gas is absorbed in the water to make 30% HCl solution and the vent of this absorber is fed to a tail gas, tail; gas absorber is a packed tower operated with fresh process water, any HCl escaping the isothermal absorber is absorbed in tail gas absorber, lean acid obtained from the bottom of the tail gas absorber is fed to isothermal absorber for making 30 % HCl solution. Traces of HCl along with un-reacted chlorine are fed to a caustic scrubber (packed column). Solution of 5% caustic and molar equivalent of sodium sulfate is

prepared and maintained in the circulation tank. The pH of the solution is always maintained in alkaline range and is measured by pH meter. As the pH of the tank starts falling below 8 fresh caustic with equivalent sodium sulfite is added to the tank.

TCAC Production Plant:

Any excess chlorine used in the process mixes with HCl & SO₂ gas generated in the process and is fed to the a chlorine trap, the chlorine trap will consist of a packed column, Caustic holding tank & circulation pump. 50% solution of sulfur in sulfur mono chloride is circulated in this scrubber. Sulfur reacts with free chlorine to form sulfur mono chloride (SMC) as per reaction given below. The SMC formed in this process is used as a reactant in the formation of TCAC. The vent of chlorine trap is fed to four stage adiabatic HCl absorber via blower. In this HCl is absorbed in water to form 20 % HCl solution.

The adiabatic HCl absorber consists of four packed columns in series followed by entrainment trap. The vent of this adiabatic absorber is fed to venturi scrubber. Dilute solution of sodium bisulfate (SBS) is circulated in the venturi scrubber, and Cl₂ and HCl escaping chlorine trap and adiabatic absorber is reacted here with SBS,

The SO₂ leaving this scrubber is fed to a soda ash scrubber, where SO₂ is reacted with soda ash to form SBS. Two tray towers are provided in series to ensure complete reaction of SO₂.

CHEMICAL REACTION:

Chlorine Trap



➤ **Measures to be taken for Liquid Chlorine Spills**

As far as practicable, liquid Chlorine spillages should be avoided by bringing the leaking portion on top, so that only gaseous Chlorine comes out.

To control large accidental spillage of liquid Chlorine on the floor, spray chilled water (below 10°C) on it. A film of solid Chlorine hydrate will be formed as a top layer, thus reducing the rate of evaporation from the spillage. Immediate steps may be taken to neutralize the spilled Chlorine with sufficient quantity of caustic soda/soda ash/lime. This operation should, however, be undertaken with great care.

➤ **PERSONAL PROTECTIVE EQUIPMENTS**

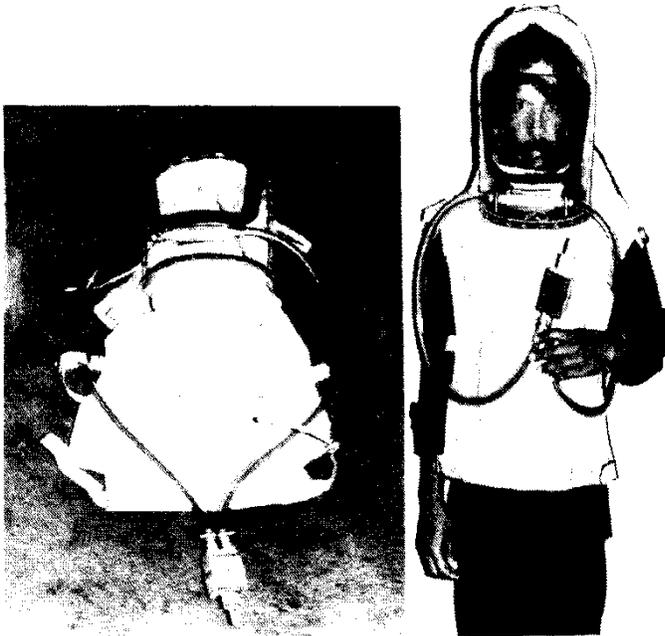
Protection from Chlorine gas must be provided first of all for the respiratory system followed closely by protection for the eyes. This normally takes the form of a full mask with appropriate cartridge or fresh air supply system. Protection for the rest of the body only becomes necessary if the Chlorine gas concentration is high and the exposure period is extended.

A suitable gas mask must be available to every person connected with Chlorine handling. Respiratory protective equipment should be carefully maintained and kept in clean, dry, light-proof cabinets, properly protected by par affined paper or polyethylene bags. Cleaning and inspection by a competent person is generally necessary after each occasion on which the apparatus is used, and should, in any case, take place at least once a month. Equipment used by more than one person should be sterilized after each use. A defective or inoperable mask is worse than none at all. So far as it is possible and consistent with efficient protection and use, the protective equipment should be comfortable to work with. No person wearing a respirator should enter a chlorine contaminated area unless attended by an observer who can rescue him in the event of respiratory failure or other emergencies.

Respiratory protective devices have moulded flexible face-pieces with transparent windows which vary in size and shapes. Eye protection is imperative due to the irritating nature of moist Chlorine gas or liquid Chlorine splashes. Provision for exhaust air is accomplished by various types of valving devices which remain tightly closed during the intake cycle of breathing. Connections between the face-piece and other parts of the apparatus utilize a flexible tube which permits free head movement. This tubing shall be visually inspected and tested for performance at frequent intervals. If leaks in the face-piece, tube, or tube connections cannot be eliminated by tightening the head straps, the complete face-piece and attached tube must be replaced.

I. Air-Line Respirator (See Figure 1.6)

This consists of a half or full mask face piece or a loose fitting hood with a loose fitting apron to which air is supplied through hose connected to an air compressor.



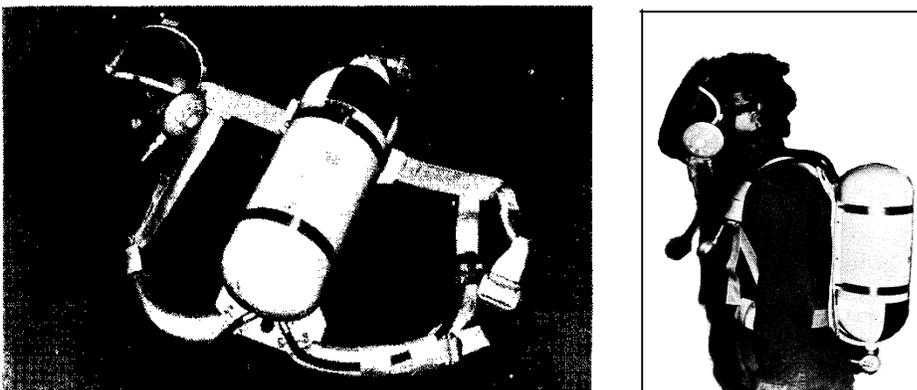
1.6 AIR-LINE RESPIRATOR

This apparatus may be of a continuous type or demand type. In case of continuous flow type, air is supplied continuously and the flow can be controlled manually by regulating a valve. In case of demand type of respirator, flow of the air is automatically controlled by responding to the breathing requirements of the user.

Though simple and easy to operate, usage of this apparatus is limited by the length of the hose supplying air. Further, it should be ensured that the air supplied through this apparatus is unpolluted and Respirable.

I. Self Contained Breathing Apparatus.

This apparatus is equipped with a cylinder containing compressed oxygen or air which can be strapped on to the body of the user or with a canister which produces oxygen chemically when the reaction is triggered. This type of equipment is suitable for high concentrations of Chlorine in an oxygen deficient atmosphere.



1.7 SELF-CONTAINED BREATHING APPARATUS

Air or oxygen from the cylinder passes through a regulator (which controls the draw of air from the cylinder according to the breathing demand of the wearer) and hose pipe to the face piece which is fitted air tight to the face. The exhaled air passes out through the exhalation valve provided in the face piece.

It must be borne in mind that apparatus designed for oxygen, cannot be used with air cylinder and vice-versa. Duration of time the wearer can remain in contaminated atmosphere is restricted by the rating of the apparatus and the rate of breathing. In-canister type self-contained breathing apparatus, the moisture content from the wearer's exhaled air reacts with granular chemical in the canister and liberates oxygen. The exhaled carbon-dioxide is absorbed by the chemicals. This oxygen released enters a breathing bag from which the wearer can inhale.

I. Industrial Canister Type Mask

It is equipped with a Chlorine or all-purpose canister and is suitable for moderate concentrations of Chlorine, provided sufficient oxygen is present. The mask should be used for a relatively short exposure period only. It may not be suitable for use in some emergencies. For example, the rupture of a Chlorine container coincident with oxygen-consuming fire would clearly indicate the use of a self-contained or supplied air protective device, since, at that time, the actual Chlorine concentration may exceed the safe "one per cent by volume" limit, and the oxygen content may be less than 16% by volume. Under this condition suffocation is likely to result.



1.8 INDUSTRIAL CANISTER TYPE MASK

The canister absorbs contaminants during inhalation, but does not supply oxygen. The wearer must leave the contaminated area immediately on detecting the odor of

Chlorine or on experiencing dizziness or difficulty in breathing. These are indications that the mask is not functioning properly, that the Chlorine concentration is too high, or that sufficient oxygen is not available.

Unless the presence of other gases require the use of an all purpose canister, the Chlorine canister should be used. The service life of a canister depends on the size of the unit, the Chlorine concentration and humidity of the atmosphere to which it is exposed and the rate of breathing. It usually varies between 15 minutes or less at high concentration and several hours at very low concentrations. Canisters installed in the mask proper, with plug removed, do not retain their Chlorine-absorptive capacity. The plug shall be replaced immediately after use.

Spare canister should be stored in a cool, dry, accessible place, with plugs intact, and dated, so that rotation of new supplies is possible. Exceeding manufacturer's recommended limits on maximum non-use shelf life might be hazardous. Regular replacement of over-age canisters, even though unused, is recommended. Canisters should be periodically checked for their efficiency.

Apart from respiratory protection devices, protective clothing is also useful for the operators because gaseous Chlorine when combined with water (perspiration) will form a weak acid-hypochlorous acid. This weak acid creates mild skin burns which will become apparent most quickly in the sensitive areas of the body, such as around the genitals, between the buttocks or under the arms. Protective clothing should reduce exposure of all body surfaces to Chlorine gas so as to minimize the physiological damage which might occur.

Protective clothing is needed only for rescue; fire & Emergency rescue crews & is not required for the protection of personnel making routine plant operations.

For dilute chlorine concentrations, normal work clothing & gloves provide sufficient protection. In moderate level of Chlorine concentrations butyl or rubber clothing, gloves and hoods will provide good protection. It must be used in conjunction with self-contained breathing apparatus. An effort must be made to seal the clothing so as to prevent the penetration of Chlorine gas at the wrists, ankles and collar. Smearing of exposed or sensitive skin areas with Vaseline or similar material will provide additional protection.

Gas-proof clothing must be considered in a situation where the concentration of Chlorine gas is extremely high combined with the necessity for a long period of exposure.

➤ **EMPLOYEE SELECTION AND TRAINING**

Chlorine is particularly irritating to persons afflicted with asthma, certain types of bronchitis, other chronic lung conditions, and Irritation of the upper respiratory

tract; such persons should not be employed where exposure to Chlorine gas might occur. Pre-placement medical examination including a chest X-ray is recommended for all new entrants and follow-up medical examinations at suitable intervals for all workers handling Chlorine.

Training classes for both new and old employees should be conducted periodically to keep them conscious and informed of the hazards. There should be periodic drills and instructions regarding location, purpose and use of personal protective equipment, safety showers, eye fountains, first aid kits, emergency kits etc. Workers should be cautioned to prevent leaks, avoid inhalation of gas and direct contact with the liquid. They should be told to report to proper authorities immediately in case of any equipment failure.

All workers should be instructed and trained to adopt preventive measures in case of emergency. Such training should include knowledge of emergency, firefighting equipment, fire alarm, crash shut-down procedures for valves and switches, steps to be taken before starting repairs anywhere in the plant use of personal protective equipment, emergency kits and first aid. Regular and surprise drill for the above should be conducted to improve further the training on preventive and emergency aspect.



Training and Emergency Awareness Session at Project Site to Employees

RECOMMENDED STANDARD PROCEDURE FOR HANDLING CHLORINE CONTAINERS

GENERAL

1. Unless otherwise specified, "containers" means either "cylinder" or "tanner".
2. It is to be realized that Chlorine is a hazardous and toxic chemical, and as such all

- operations involving the same must be carried out directly by /under the personal supervision of suitably trained and competent persons.
3. Further it is advisable to have the process area well ventilated with frequent air changes so as to minimize the impact of any sudden leakages. Under the provisions of the Gas Cylinder Rules, 1981, any person possessing, storing or using five containers or more at a time has to obtain an appropriate license from the Chief Controller of Explosives.
 4. The receiving/dispatching facilities for the filled containers/empties may be suitably established, in relation to the storage & processing unit, so the distance between containers that have to be moved, are minimum.
 5. While cylinders can be transported within the factory in handcarts, tanners are generally moved by rolling. In order to avoid any damage to the containers as also as a matter of safety, care should be taken that the surface over which it is moved is as smooth as possible, and does not involve sudden drops or tumbling's. It will be preferable to have railings laid for moving the tanners.
 6. Particular care has to be taken to ensure that the valve hoods are in place while the containers are moved.
 7. In case of any leakage of Chlorine from the containers, immediate and appropriate action is to be taken only to control the leak. A CONSUMER SHOULD NOT MAKE ANY EFFORT TO REPAIR THE AFFECTED PORTION OF THE CONTAINER. After controlling the leak, the supplier should be immediately informed to take suitable action.
Ammonia torches (dilute ammonia solution and a stick with a cloth bulb at one end) should be located at nearby places where Chlorine containers are generally received, stored or used in process, so as to facilitate easy detection of any leakage.
 8. Gas masks and emergency kits should be located at strategic points, to be easily accessible in the event of any emergency. These are to be periodically inspected to ensure that they are properly maintained in working condition.
 9. Use of canister type gas masks is recommended only in case of minor leakages where Chlorine concentration in the air is only in traces. In case of major leakages involving high Chlorine concentrations in the atmosphere, or when a person has to work in an atmosphere containing Chlorine for longer periods, a self-contained breathing apparatus should be used.
 10. All Chlorine users must establish and maintain appropriate facility for Chlorine absorption through caustic soda/lime/soda ash solutions to be of use in the event of major leakages.
 11. Valve hood should be removed from the container only during the time it remains connected to process. Care should be taken to ensure that the valve hood remain fitted to the container at all other times.
 12. Even the slightest leak should not be neglected. A CHLORINE LEAK NEVER GETS

CORRECTED BY ITSELF. IT CAN ONLY GET WORSE.

13. WATER SHOULD NEVER BE USED DIRECTLY ON THE CONTAINER FOR CONTROLLING LEAKAGE.
14. As Chlorine is heavier than air, it tends to accumulate near the ground. In case of any Chlorine leakage emergency, it is advisable to move all personnel to higher areas on the windward side. Only suitable trained personnel with appropriate safety devices and emergency kits should be allowed to approach a leaking container.
15. Full details of any incident/ accident involving a Chlorine container should be reported immediately to the supplier without fail.
16. If withdrawal of Chlorine from a container connected to the process has to be suspended for long intervals, it should be disconnected from the system, and the valve hood replaced.

RECEIPT OF CONTAINERS

1. Ensure that all the containers are properly fitted with appropriate hoods.
2. In absence of any roll on platform for receipt of containers, these should be unloaded with mechanical or electrical hoist, without removing the valve hoods. Lifting magnets or slings should not be used. Manual unloading should be only through a slant ramp, with particular attention being taken to ensure that the container is moved down slowly without any sudden drops. Dropping of containers from the truck either to the ground directly, or any cushioning media, should be scrupulously avoided, as any sudden jerk or impact may damage the valve and lead to leakages. The whole operation of unloading should be undertaken only under the charge of an experienced person, competent to take immediate action in case of any unforeseen emergency.
3. Using valve hood as a support for unloading in the case of small cylinders should be avoided, as these are not designed to carry the weight.
4. After unloading, physically test the containers for any dents or damages. Also check for any leakages, with an ammonia torch.
5. Check the date of hydraulic test of the container. Do not accept any container if the due date for re-testing is over (Two years from the date of last test).
6. Any short-comings with regard to the general conditions of any of the containers and the markings thereon as stipulated by the Gas Cylinder Rules, 1981, should be made note of and communicated to the supplier.

STORAGE

1. Containers should be stored only in a cool, dry well ventilated and covered, place, away from boilers, open flames, steam pipes or any other potential sources of heat. They shall not be left in the open exposed to sun.

2. Chlorine containers should never be stored together with acids and articles of corrosive and inflammable nature. They should also be kept out of contact with other chemicals.
3. Ensure that the storage area is not wet or muddy.
4. Filled tanners should be stored in a single row on their sides with the valve hoods in proper position. Cylinders are to be kept in an upright position.
5. Never store containers near elevators or gangways or any locations where heavy objects may fall and strike them.
6. The containers should be arranged in such a way so that these can be taken to the processing section on a first-come-first-used basis. This method is advisable in order to avoid the same container remaining in storage for longer periods, leading to hardening of valve pickings' and possible leakages.
7. Empty containers should be separately stored in order to avoid any confusion during the course of handling.
8. Do not allow any unauthorized persons in the storage area.
9. Keep one set of safety kit and emergency kits ready, and in working order, within immediate access of the container storage area.

CONNECTING TO PROCESS

1. After moving the container to the desired location for connection, the same is to be appropriately secured so that it does not roll or trip.
2. Tanners should be kept in a horizontal position, in such a way that the two valves are in a vertical plane. In this position, Chlorine in gaseous form can be drawn from the upper valve, whereas liquid Chlorine can be drawn from the lower one.
3. In the case of cylinders, Chlorine gas will come out from the valve when the cylinder is kept in an up-right position. Liquid Chlorine can be withdrawn from the cylinder by inverting it with the help of an inverting rack. This operation calls for special skill and training.
4. It is advisable to keep the container loaded on to a weighing platform so that the extent of Chlorine remaining in the container can be readily known.
5. All operations of connecting to process should be undertaken only by experienced and competent personnel.
6. Only approved tools should be used for making connections and valve operations. NEVER FORCE CONNECTIONS THAT DO NOT FIT.
7. Flexible connection of seamless copper tubes, brass yoke clamps and adapters, and lead washers are to be used between the container and the piping systems for proper and leak proof connections. Rubber tubes, gaskets, washers, etc. are to be avoided, as these get damaged fast in Chlorine service, and lead to leakages. Use valves, gauges, regulators and fittings which have been approved for Chlorine service. Ordinary devices are not suitable.
8. For giving connection, remove the valve outlet nut, and attach the flexible tube to

the connecting nipple and tighten the yoke clamp properly on the container valve

9. Open the valve slowly using an appropriate size valve spindle spanner. Never use loose or worn out spanner or pipe wrench, as this might damage the valve spindle. Do not apply too much force while operating the valve. It may twist and damage the spindle leading to gas leakage. If the valve is jammed, and is not opening by applying a little force on the spindle spanner, loosen the valve gland by about one round, and then try-again. After the valve is opened, the gland nut should be retightened. If the valve does not open even after the above manipulation of the gland nut, do not try to force open the valve. Detach the container from the system, roll it so that the other valve comes in the desired position, and repeat the above connection procedure. If this valve also fails to function properly, inform the supplier. DO NOT TRY TO REPAIR THE CONTAINER VALVE.
10. Open the valve slightly, and check the connections for any Chlorine leakage with an ammonia torch. If any leakage is observed, tighten the clamp. This should normally stop any leakage.
11. If there is no leakage and the connections are found to be safe, the valve can be opened fully, by giving one complete turn to the valve stem in a counter clockwise direction with the spindle spanner. This is sufficient to permit maximum discharge of Chlorine. Additional turns of the valve stem will not increase the rate of flow. It will only damage the valve.
12. Keep the spindle spanner fitted on to the valve on which connection has been given. This helps in closing the valve immediately in case any sudden leakage develops.
13. The container should be used only as a storage vessel and not as a process vessel.
14. The container valve is not to be used for controlling the flow of Chlorine. Frequent operation will cause damage to the valve. A separate regulating valve on the process side should therefore be used for this purpose.
15. Connection to the upper valve of the tanner brings forth Chlorine in gaseous form. The gas comes out automatically at the normal atmospheric temperature. However, the container tends to cool down with Chlorine discharge, and the rate of flow may diminish. Do not heat the container with hot water, steam or direct flame to withdraw Chlorine at a faster rate, as this might result in the inside pressure building up to dangerous proportions. To have discharge at constant or increased rate, the proper arrangement would be to set up a "manifold" by connecting two or more containers in parallel to a common header. It is however to be noted that the manifold should be properly designed by qualified designers taking into consideration various aspects of the process.
16. Increased and steady supplies of gaseous Chlorine at the desired rate can also

- be had, by drawing liquid Chlorine from the container and passing it through a vaporizer to convert it into gas.
17. It is appropriate to always use an inverted 'U' type barometric leg for connecting the Chlorine container to the process piping, particularly one containing any process liquid. This will avoid the back-flow of the liquid into the container in the event of any pressure difference developing. In case of gas being used at high pressure, a non-return valve should be installed to avoid backflow.
 18. It is also advisable to have a pressure gauge (range 0-25 kg/cm²) between the Chlorine container valve and the regulating valve. This will be useful to monitor the pressure inside.
 19. Withdrawal of Chlorine should be stopped when the gas pressure inside the container drops to 0.5 kg/cm².

DISCONNECTING FROM PROCESS

1. While stopping off-take of Chlorine, first close the container valve, and then the process valve. Close the container valve fully by turning the spindle spanner in a clock-wise direction without using undue force. This way, chances of trapping of liquid Chlorine in the pipe line between the container valve and the process valve are minimized.

Fit the valve outlet nut and the valve protection hood. The container can now be moved to the storage area earmarked for empties. These should never be used as rollers or supports.

Annexure: D

RISK AND DISASTER MANAGEMENT PLAN

1.1 INTRODUCTION

DISASTER

An emergency is said to have arisen when operations in the plant are not able to cope up with a potential hazardous situation i.e. loss of control of an incident cause the plant to go beyond its normal operating conditions, thus creating danger. When such an emergency evolves chain of events affect the normal working within the factory area and/ or which may cause injuries, loss of life, substantial damage to property and environment both inside and outside the factory and a disaster is said to have occurred. Disaster is an event which causes severe disruption to life of number of people or to the project activities resulting in suffering and loss of life and property.

Disaster can be,

- Plant oriented –due to design errors, Operational defects, Chemical changes, failure of equipment, human error etc.
- Natural- Flood ,Cyclone, fire, earthquakes ,biological disaster
- Man Made –war, riot, sabotage

The various steps involves in the process of Disaster Management can be summarized as:

- Minimize Risk Occurrence (Prevention)
- Rapid Control (Emergency Response)
- Effectively Rehabilitate Damaged Areas (Restoration)

Stages of Disaster

- The duration of disaster's effect can be divided into following stages:
 - Warning
 - Impact
 - Rescue
 - Relief
 - Rehabilitation

1) Warning: The natural calamities which may lead to disasters e.g. flood, cyclone can often be predicted. There are possibilities of disasters during local trouble, riot and war etc. also. All facilities to encounter the disaster should be kept ready and employees in full alert.

2) Impact :

This is the time when the disaster actually strikes and very little can be done to counter the situation. The impact period may be of few seconds (like explosion or earthquake) or for days (like flood, fire etc.).

3) Rescue:

This is the most important stage which starts before the predicted disaster or just after the impact. All available resources need to be immediately engaged in operation.

4) Relief:

This is a longer stage of work depending on the degree of disaster. Work during this stage will need external help for medical, food, clothing and shelter.

5) Rehabilitation:

This is an important stage in terms of future planning. It includes rebuilding of damaged properties, restart of project work, compensation etc.

Emergency Plan

On site Emergency Plan is required to meet the emergency condition during disastrous event in the plant. Its objectives are to:

- Rescue and treat casualties
- Safeguard other people & Installations
- Minimize damage
- Control initially and restore ultimately to normal situation
- Arrange rehabilitation of the affected people.

The obligation of an occupier of hazardous chemicals to prepare an on - site emergency plan is stipulated in Rule 13 of the Manufacture, Storage and Impact of Hazardous Chemicals Rules, 1989. Section 41B (4) of the Factories Act, 1948 (as amended) also states that every occupier is to draw up an on site emergency plan with detailed disaster control measures.

It is therefore necessary to develop an on site disaster management plan through a systematic study of the hazard possibilities.

Basis of Plan

M/s. Archit Organosys Ltd is already follow an onsite emergency plan. The basic guidelines of the Plan are as given below:

- Informative broacher on emergency will be distributed to each staff member of the plant and telephone numbers of key personnel to be contacted during an emergency will be placed at all the operator placement point in the plan.
- Workers would be trained regularly on fire hazard drill, which will be organized once in a here mock drill from the safety and fire agency. The industry will provide the wall surrounding the chemical storage area.
- 24 hours vehicle for service and in-plant first aid emergency kit would be provided.

Post Disaster Analysis and Evaluation

The adequacy of the disaster preparedness plan will be evaluated and any short comings will be rectified. When emergency is over, it is desirable to carry out a detailed analysis of the causes of the accident to evaluate the influence of various factors involved and to propose methods to eliminate them in future.

Key Persons and their role

Site Controller is the person who assumes absolute control of the Factory and determines the action necessary to control the Emergency. He/She will wear a Red & White Helmet to confirm his identity. The General Manager will be the site controller.

Site controller will ensure that all members of his/her team have been informed to collect at Emergency Control centre. He/ She will then proceed to Emergency Control Centre to take charge.

After firsthand assessment of situation he/she will give necessary instructions to Emergency Control Team. He/She will maintain a Log book of all the activities. He/she will keep in touch with the external communication Team. He/she will ensure that information is sent to outside emergency services (Police and Fire Brigade).

He/she will depute people to,

- Attend to telephone
- Keep in touch with incident controller
- Communicate with Assembly Points
- Meet outside emergency services
- Ensure proper flow of traffic and security

- Meet media/ other people coming at site from outside.
- Arrange for Medical Aid

Incident Controller is the person who goes to the scene of emergency and supervises the actions taken at the incident to overcome the Emergency. Shift Manager will act as Incident Controller. His responsibilities will be

- Direct all efforts to contain and control the incident.
- Keep non-essential persons away from the site.
- Guide outside emergency services at the site.
- Arrange to remove any casualties at the site.
- Keep in touch with Emergency Controller.

❖ Security In-Charge will

a) Actuate the Emergency Siren, if not done already.

b) Send one guard to start the fire pump.

c) Attend to incoming telephone.

d) Await instructions from the Emergency Controller

Communication Officer

- Public Relations Officer will act as Communication Officer.
- On hearing alarm He will proceed to Emergency Control Centre.
- Maintains communication with Incident Controller and Deputy Incident

Controller

- Recruits suitable staff to act as messengers if telephone and other communications fail.

Organizes all requirement of Emergency Control Centre

- Arranges Food, Transport, Nursing Home etc

Personnel Manager

- He/she will work as Liaison officer. He should be positioned in the office near by gate.
- Will deal with police, media and outside enquiries in consultation with Site Controller.
- Will keep in touch with Union

- Will arrange for refreshments if required
- Will control traffic movement inside the factory and arrange for alternative transport if required
- Will keep a record of attendance of workers, staff, contractor's personnel, and visitors at the Gate which will act as Assembly Point.

Safety Officer

- Will assist the Incident Controller with his special knowledge on the safety aspects in the factory. He will help to identify the hazardous chemicals, hazard zones and zone of probable impact in different accident scenarios
- Will select people with special training in safety matters to assist in the control activities

Fire & Security Officer

- His/her main task is fire fighting and control
- Announce through PAS about the incident zone and any other immediate information needed for the people nearby
- Maintains liaison with the Fire Brigade team from outside

Medical Officer

- Will immediately open a First Aid Centre at Control Centre .

Assembly Point.

- Will take up the full responsibility of providing medical assistance during emergency
- Will arrange for outside medical help if required.

Telephone Operator

- On hearing the emergency alarm, he/she will immediately contact Site.

Controller

- On the advice of Site controller/Incident Controller/Security Officer will ring Fire brigade, Police etc
- Keep telephone board free for urgent communications.

General employees who have not been specified a duty in case of emergency should proceed to/contact the Emergency Assembly Point in their area. Designated persons will carry out the

actions detailed in the Individual Plant Emergency Procedure. The Roll Call leader will hold a Roll call. Personnel not at their normal work place must go to the emergency assembly point. Personnel will remain at these points and await instructions from the Site Controller.

Contractor's Employees

Contractor's employees will be instructed in the Emergency Procedures before commencing work on this site. They will report to the emergency assembly point on this site. Personnel Manager will guide them in case a major decision like evacuation from the factory is taken.

Visitors

Infrequent visitors are registered on each visit. They will be given a Visitors pass which includes an emergency action statement. The responsibility for visitors in emergency situation rests with the person being visited.

Responsibilities outside general shift hours

Shift Supervisor

He/she will act as Site controller for the time being. As soon as becomes aware of the emergency and its location, he will proceed to the scene. He will assess the scale of the incident and direct operations within the affected areas.

He/she will contact and inform the Site Controller and Incident Controller immediately. Till their arrival he will continue to perform their duties. He/she will contact the departmental head to act as incident controller and guide Safety Officer and Security Officers for containing the damage. He/she will call the Medical Officer to the plant if necessary. Other staff with designated responsibilities will act as instructed.

Infrastructure

Fire Fighting Facilities: The plant will have adequate fire fighting aids including fire hydrants close to the required locations. There is Portable Fire Extinguishers of different types and sizes are already installed in specific places.

The factory siren will be used for raising the alarm and also for ALL CLEAR signal.

First Aid boxes are provided in specific locations including at the Assembly point for administering preliminary treatment. A number of employees are trained for first aid use.

Emergency Control Centre is the point from which the Site Controller directs the movements of Personnel and Equipment during an Emergency.

Contents of Emergency Control Centre:

External telephone line and a list of relevant telephone numbers.

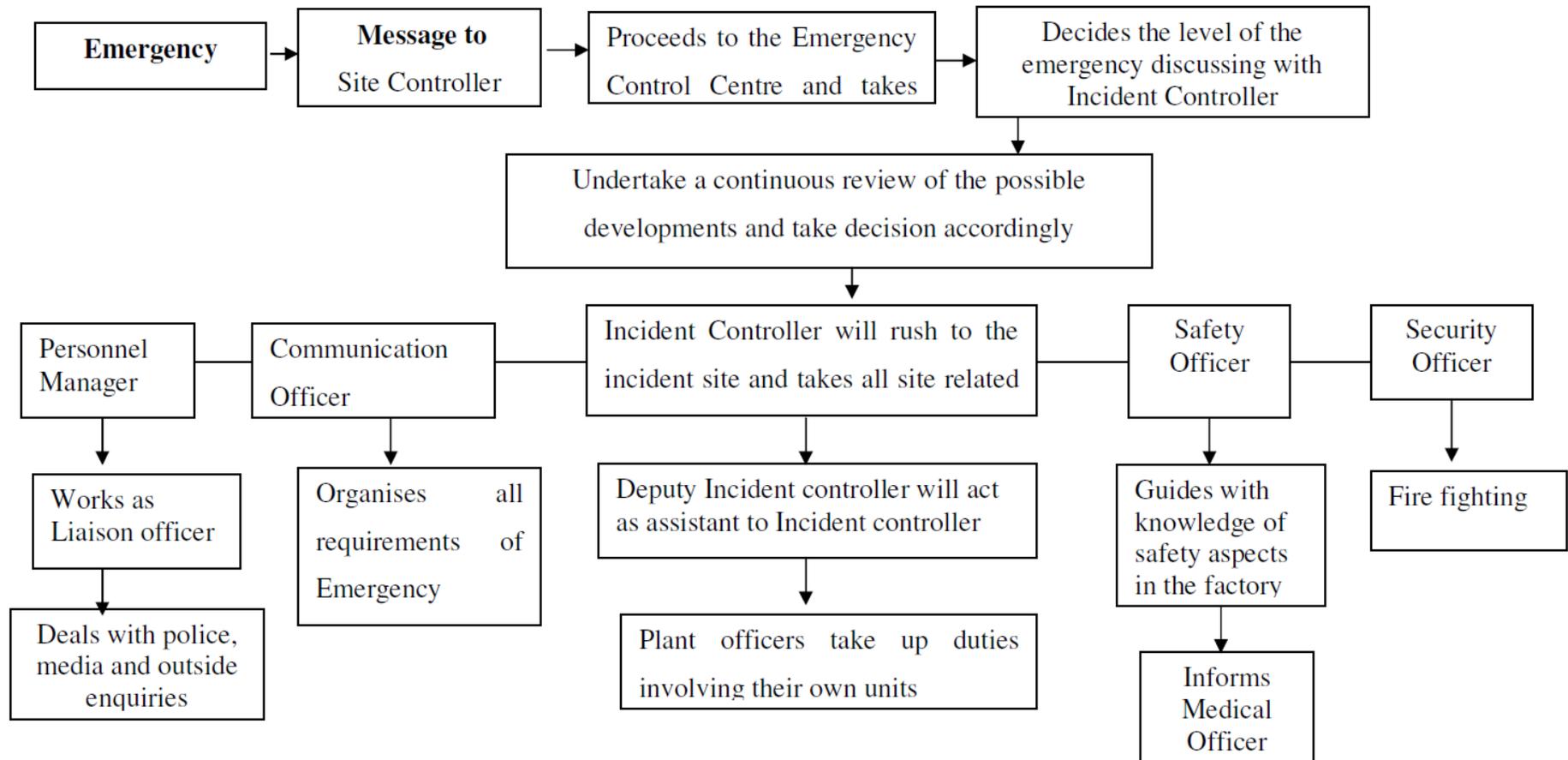
Internal telephone and telephone list of Emergency Assembly Points.

List of Emergency Control Team, who must be called showing addresses and telephone numbers. Assembly Point is a place containing an internal telephone and paging system, where people can wait in a group during emergency to receive instructions from the Emergency Controller. External Communication will be done by Site Controller. The following persons and offices may be given updated information as necessary and ask for necessary help

Important Telephone Numbers :

S. No	Name	Numbers
1	Inspector of Factories	0288- 2551630
2	District Magistrate	0278-2427756
3	Fire Station	0278-2429814
4	Superintendent of Police	0278-2428197
5	The Chief Inspector of Factories Govt. of Gujarat (Directorate of Factories)	079-25502347
6	Near by Fire Service	0278- 2430061
7	Environmental Engineer, Gujarat Pollution Control Board, Bhavnagar	0278 - 2524108
9	Member Secretary, Gujarat Pollution Control Board, Gandhinagar	079-23232152
10	Police Station -	100

Emergency Response Diagram



Fire Fighting Facilities

Fire Buckets / Fire Extinguishers

Fire buckets and portable fire extinguishers (45 nos.) will be provided in all the areas depending upon the specific needs of the area. Some spare equipment will also be maintained in the inventory at an identified fire & safety equipment store.

Fire Alarm Sirens

It shall be provided to alert all the employees inside the premises about the situation of an emergency.

Sand Buckets

20 nos. of sand buckets will be provided within the industrial premises in case of emergency fire.

Oxygen cylinder

5 no. of oxygen cylinder will be provided for emergency.

Safety Equipment

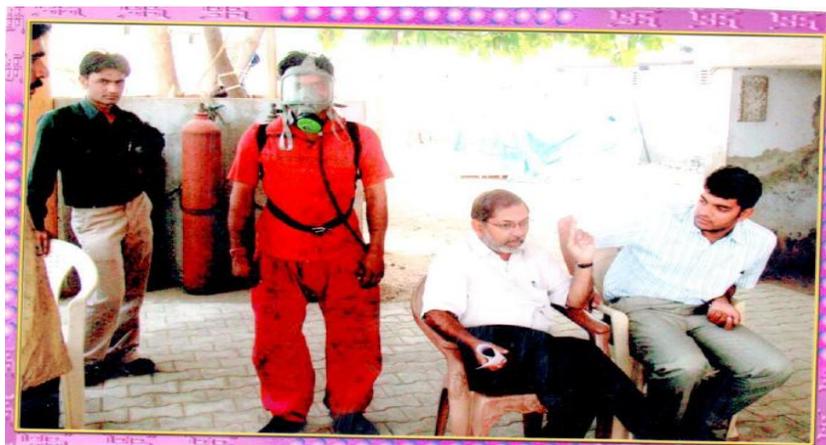
All types of personnel protective safety equipment required for handling the emergency are to be arranged in the Wonder Industry site. Some of the protective equipment is as follow:

- Canister/Cartridge type masks
- Dust Masks
- PVC suits, Aprons
- Safety showers/ Eye Wash fountains
- Other personnel protective appliances, like safety glasses, gumboots, helmets, hand gloves, face shields, safety belts, safety ladders, safety torches, blankets.

Mock Drill

In order to evaluate the plan and see whether the plan meets the objective of the onsite emergency plan, occasional mock drill are contemplated. It would be necessary to give adequate training to all action during emergency. For reviewing and assessing the level of emergency preparedness mock drills has been conducted once in six months. Simulating the covered emergencies and will maintain record of the trails.

Training of use Personal Protective Equipments



Training on Safety Procedure

CHLORINE

Synonyms: bertholite, molecular chlorine

Molecular formula: Cl₂

CAS No: 7782-50-5

EC No: 231-959-5

Physical data

Appearance: light greenish-yellow gas with an irritating odour

Melting point: -101 C Boiling point: -34 C Vapour density: 2.98 g/l

Vapour pressure: 5.8 bar at 20 C

Specific gravity: 1.47 g/ml at 0C

Auto ignition temperature: n/a

Stability

Stable. Incompatible with reducing agents, alcohols.

Toxicology

Toxic by inhalation, ingestion and through skin contact. Inhalation can cause serious lung damage and may be fatal. 1000ppm (0.1%) is likely to be fatal after a few deep breaths, and half that concentration fatal after a few minutes. May irritate or burn skin. OEL (8hr TWA) 1 ppm.

Toxicity data

IHL-HMN LCLO 2530 mg/m³/30m

IHL-HMN LCLO 500 ppm/5m IHL-RAT LC50 293 ppm/1h IHL-MUS LC50 137 ppm/1h

Environmental information.

Very toxic to aquatic organisms.

Personal protection.

Safety glasses, gloves and good ventilation.

Annexure: E

DETAILS OF PROPOSED CSR ACTIVITIES

CSR activities are planned under the following two categories:

1. CSR activities within identified villages.
2. General CSR activities in other nearby villages falling in study area of Project (10 km radius)

Sector	Proposed CSR Activities
Health awareness campaign & health camps	campaigns & health camps in entire project study area
Women Empowerment	
Formation of Women SHGs and training for income generation etc.	Providing necessary support such as initial funding and provision of loans, trainings etc.
Livelihood/ Social Improvement	
Dinking & Sanitation facilities	Development of Overhead tank, hand pumps, bore well and sanitation facilities etc.
Water Management /Conservation system	Rainwater harvesting, Artificial ground water recharge by construction of wells, percolation ponds, etc.
Vocational training / Employment Opportunities	
Vocational trainings for skill development for employment opportunities for groups or individuals	Necessary support/ training facilities shall be provided.
Employment opportunities	Provision of Employment for Employable Educated local youth in the plant

CSR FUND ALLOCATION

The project proponent proposes to allocate a sum of Rs. 1.0 Crore which would be 2.5 % of its total project costs to CSR activities. Break-up costs of the abovementioned CSR fund for the proposed power plant are presented below:

Budgeted Expenditure for CSR and Community Development Activities:

S. No.	Resources	Budgeted Amount (Rs. In Lakhs)
1.	Educational Infrastructure Development, & skill development Training programs	20.0
2.	Water Conservation/Management Program such as rainwater harvesting, irrigation support facilities/structure etc.	12.0
3.	Social Infrastructure such as Panchayat Ghar, bus stop shelter, Development/improvement of road infrastructure, etc. Women empowerment schemes by giving Training cloth stitching machines , awareness for literacy , awareness and training to women about health , make self dependant programme and promote small scale unit (Cottage Industries).	8.0
4.	Up-gradation / Development of Health Facilities	10.0
5.	Drinking & Sanitation Facilities	25.0
6.	Training on Aids awareness programme in near by villages and workers , regular training to Village people about Traffic awareness.	5.0
8	Eye Check up camp for Old age People and giving Spectacles	10.0
	Total	100.0

Note: All the CSR programs will be initiated by M/s Archit Organosys Pvt Ltd. along with the project construction activity. However, major CSR activities will be carried out from the date of one year of the power plant operation.