

7.1. PUBLIC CONSULTATIONS

The proposed project site is situated in Chincholi MIDC area. Hence, as per Environmental Impact Assessment (EIA) Notification No.S.O.1533 (E)” dated 14th September 2006; and amendment thereat, the proposed project does not requires conducting of public hearing. The EIA report has been complied by incorporating required information with regards to the project as mentioned in the Terms of Reference (TORs) issued by EAC to **Sree Kartikeya Kameshwari Industries (SKKI)** during 8th EAC meeting held on 26th May 2016.

7.2. RISK ASSESSMENT REPORT

The study of risk assessment report in respect of proposed project was done by Functional Area Expert (FAE) **Mr. Vinod Sahasrabuddhe**.

7.3. BRIEF DESCRIPTION REGARDING PROJECT

SKKI has planned to establish a project that involves Indian patented products namely- Niacin, Niacin amide, Nicotinic Acid Methyl/ Ethyl ester, Isonicin and Lutidine. Lutidine will be prepared from crude Lutidine and then mixed to get final product. It involves number of equipments like reactors, condensers and distillation columns. The process involves solvents like Ammonia, Sulphuric acid, Hydrochloric acid and Methanol. The process types are mainly of hydrolysis, oxidation and gas- phase reaction.

7.4. HAZARD IDENTIFICATION**7.4.1. Classification of Chemicals:**

Primary hazard identification is based on the properties of chemicals being used under proposed project. The classification of chemicals for SKKI is as follows.

Table 7.1 Classification of Chemicals

Sr. No	Group of Chemicals	Chemicals	Handling Recommendation	Spill Prevention	Emergency Recommendations	Storage
1.	Flammable Liquids	<ul style="list-style-type: none"> ➤ 2,6-Lutidine ➤ Methanol ➤ 4-Picoline ➤ Niacin 	<ol style="list-style-type: none"> 1. Control of electrostatic charges. 2. Non-sparking tools. 3. Containment 4. Inertisation. 5. Spill control material 6. Eye/skin/ breathing PPE 7. Fire safety training. 	<ol style="list-style-type: none"> 1. Contain spill. 2. Prevent mixing with water sources. 3. Refer TREM card. 4. Arrest Leak by closing the valve if is safe to do so. 5. Contact local police/ supplier 	<ol style="list-style-type: none"> 1. Take vehicle to safe area without endangering life. 2. Place warning signs around the vehicle. 3. Prevent crowd approach to the vehicle. 4. Contact local police/supplier 5. Assist emergency team as per the need. 	<ol style="list-style-type: none"> 1. Ventilated place 2. Containment 3. Leak detectors 4. Absence of oxidizers 5. Fire protection system 6. Non sparking tools 7. FLP fixtures as per IS 8. Hot work permits system. 9. Spill control material. 10.Flame arrester for storage tanks.
2.	Reactive Chemicals	<ul style="list-style-type: none"> ➤ Gaseous Ammonia ➤ Aluminium Chloride ➤ Sodium Hydroxide ➤ Sulphuric Acid ➤ Liquid Ammonia 	<ol style="list-style-type: none"> 1. Refer MSDS before handling 2. Avoid incompatible materials around handling area. 3. Ensure inertisation 4. Make available compatible fire extinguishers 5. Avoid shocks/drops and rolling while handling containers 6. Ensure inertisation while charging in to reactors. 	<ol style="list-style-type: none"> 1. Contain spill. 2. Prevent mixing with water /moisture 3. Refer TREM card. 4. Arrest leak by closing the valve if is safe to do so. 5. Contact local police/supplier 	<ol style="list-style-type: none"> 1. Take vehicle to safe area without endangering life 2. Place warning signs around the vehicle. 3. Prevent crowd approach to the vehicle. 4. Contact local police. 5. Assist emergency team as per the need. 	<ol style="list-style-type: none"> 1. Refer MSDS for compatibility before storage. 2. Store air reactive materials under nitrogen. 3. Store water reactive materials away from water/ moisture/ Aqueous solutions. 4. Use visible sign boards for warning about hazards and cautions for responders 5. Make available compatible fire extinguishers. 6. Do not store the materials in flammables storage area. 7. Avoid shocks/ drops & rolling while handling containers. 8. Ensure water layer above Raney/ Ni catalyst all the times.

7.5. RISK PRONE AREAS-

Based on classification of chemicals the risk prone areas have been identified in SKKI are

- Reaction and Separation section
- Utility Operations.
- Storage of Chemicals.
- Warehouse for small quantity raw materials.

7.5.1. Reaction and Separation Section

As the process involves the reactions which are exothermic and attends temperature ranging from 60 °C to 160 °C, the mitigation measures are suggested for the same are as follows-

- **For Exothermic Reactions-**

It is strongly recommended to take all the preventive measures to minimize the probability of the accident to the minimum and make the process and reactor operation as intrinsically safe as possible. HAZOP studies will be carried out for potentially dangerous and hazardous reactions as well as chemicals. Reactions involving nitric acid and hydrochloric acid in production of Niacin and Iso-Niacin are of major concern in preview of safety. All safety features will be designed to mitigate the risk and hazard to minimum. For controlling exothermic reactions and possibility of uncontrolled reaction, following safety measures would be adopted as-

- a) Raw material addition will be controlled by actuator valve linked with the reaction mass temperature and agitator tripping.
- b) For Nitric and Hydrochloric acid reactions, addition will be controlled by mass flow meter.
- c) Automated system will be followed for the solution addition and also temperature measurements and pressure measurements will be followed.
- d) Interlocking system will be implemented

7.5.2. Utility Operation.

Operations which involve number of utilities as boiler operations, and electricity etc., it is necessary to look after the hazard if the utility failure occurs. Plant utility systems will be used to enhance chemical processes. Plant operation not only includes production considerations, but also involves safety aspects to control failure which could lead to a catastrophic release (e.g. a flexible hose connection, pump seals, vessel / tank welds.)

Mitigation measures to maintain safety in utility operations –

- Operations will be made end to end automated and well equipped with utility failure prevention system.
- Distillation columns will be automatically operated and connected with PLC or SCADA system.
- Reactors will be interlocked with actuator valves and control panels.
- For electricity failure provisions will be made for continuous operations through D.G. set.
- Reactors will be installed with instant cut – off system in case of failure.

7.5.3. Storage of the Chemicals

- ▶ Bulk chemical storage is a prime aspect for chemical industry in terms of safety considerations. Bulk and liquid raw material will be stored in the horizontal / vertical tanks. Smaller quantities will be stored in warehouse in the form of drums or bags. Dedicated area onsite will be allotted for warehouse.
- ▶ For bulk chemicals, storage tanks will be built as per the chemical requirements, inventory storage and required standards.

Mitigation Measures for Control of Spills and Leakages –

- i. The tanks will be kept above ground level and painted with anti corrosive paint. The tanks will be placed on the PCC platform. Following measures will be followed.
 - a. Clear distance between each tank will be minimum of half the tank diameter.
 - b. Dyke wall will be provided to the tanks. Double valve will be provided for dispensing of material.
 - c. Drainage arrangement inside the dyke will be designed for collection of leakage and recycle to the tanks or manually collecting in drums.
 - d. The tank farm layout and tank farm location will follow the rules of Petroleum Act 2003.
 - e. All the necessary statutory licenses and approvals needed for the Class A flammable liquids will be obtained.
 - f. Stainless steel pump with mechanical seal will be provided to the tank for transfer of solvents. Dedicate transfer line from storage tank to the day tank will be provided to the pump with pressure gauge.
 - g. The tanks will be provided with flame arrestor, breathing valve and vent condenser.
 - h. Automatic sprinkler system will be installed on each tank for cooling of tanks externally and eliminate the possibility of further aggravation of the situation.
 - i. Provisions will be made to the facility for earthing the static charge generation during loading and unloading of tankers.
 - j. Metal wire Jump-over connections will be provided on transfer lines for flange connections.
 - k. The tanks will be properly connected to the earth pit.
 - l. The area will be marked with sign boards.
 - m. Day tanks will be provided in the manufacturing plants to keep the inventory to the minimum required and thus reduce potential risk.
 - n. As per the factories act, the tanks will be frequently tested to its thickness and integrity by competent person.
 - o. Fire hydrant piping will be laid around the tank farm and will be designed as per the IS and other applicable standards.
 - p. Trained fire fighters will be provided for the site.
 - q. The area will be marked with red zone where necked flames, hot work will be strictly avoided.
 - r. Work permit system will be implemented for carrying out any hot or cold work near the tank storage area as well as all over the factory.
 - s. Spill kits, sand buckets will be provided. Spillage control procedure will be provided on site.
 - t. The area will provided with 24 hr security and kept in lock and key. Eye and body shower will be provided just outside the storage.
- ii. All the tanks will be designed and fabricated as per the relevant Indian and International applicable codes.

- iii. The tank layout and tank-farm layout vis-vis factory layout will be as per the applicable Petroleum Rules 2003, for the storage of *Class A* Flammable chemicals.
- iv. The necessary approvals from the CCE (Chief Controller of Explosive) will be obtained.

The areas are segregated as per the property of the chemicals and the storage safety measures are suggested as follows

7.5.3.1. For Acid Storages

Table 7.2 Storage of Acids

Sr. No	Name of Chemical	Container	Tank Dia* Ht.	Capacity of Each Tank	Total Capacity
1	Sulphuric Acid	Storage Tank	2.5 * 4.5	22.0 M ³	30 MT
2	70% Nitric acid	Storage Tank (Horizontal)	7.0 *1.5	12.36 M ³	36 MT
3	30 to36% Hydrochloric Acid	Storage Tank	2.2 *4.0	15.2 M ³	15 MT

Mitigation Measures

Following mitigation measures are suggested to minimize possibility of major leak from HCL and other acid storage tanks. These are applicable and relevant for all acid storage tanks. When selecting the location of acid storage tanks, the following consideration will be given to the distance of the proposed tank farm from-

- ▶ The site boundary
- ▶ Roadways
- ▶ Occupied buildings

The tanks are aboveground and will be installed on the foundation (and on the supports for horizontal tanks). These will normally be of concrete with the required load bearing strength and thickness.

• Dyke wall design

- ❖ The dyke walls and floor will be constructed of materials resistant to the acid being stored.
- ❖ The bund will have sufficient capacity to contain the largest predictable spillage. A bund capacity of 110% of the capacity of the largest storage vessel within the bund will normally be sufficient. Consideration will be given to the provision of individual dyke walls for each acid tank to prevent damage to other tanks if a leak occurs. Chemicals which react with the acid will not share the same bund.
- ❖ The dyke walls will have sufficient strength to contain an acid spill.
- ❖ Rainwater will not be allowed to accumulate in the bund.
- ❖ Provision will be made for the removal of bund contents (e.g. acid spills or rainwater).

• Vents and Overflow lines of the storage tank

- ❖ Atmospheric tanks will have separate vent and overflow lines.
- ❖ The overflow will be sized to prevent any pressure build up within the tank in the event of an overfill. The overflow diameter will be equal to or greater than the inlet diameter.
- ❖ To prevent fuming, a dip leg and small water lute will be used.
- ❖ To prevent release of fumes into the atmosphere, vent lines of bulk acid tanks will be feed into a scrubber unit. The scrubber will be designed to cope with the fumes given off and

the pressures generated during the filling of the tank. The scrubber will be so designed that HCL fumes escaping will be within the norms set by the statutory authorities.

- ❖ The options can be of water, sodium hydroxide solution, dilute acid solution or suitable reaction media will be used as the scrubbing medium. Provision will be made to monitor the pH of the scrubbing solutions.

- **Piping**

- ❖ While designing the piping and piping routing it is advisable to have minimum flange joints. The line will be so routed to avoid walkways and joints over the walk ways.
- ❖ All pipe lines of acid, particularly of HDPE MOC, (used for HCL solutions) will be protected against foreseeable impact from vehicles or mobile plant.

- **Use of Personal Protective Equipments (PPEs) and other measures-**

- a) All personnel working in this area will use recommended PPEs.
- b) PPEs will be individually issued and will be made available at the location.
- c) Masks and SCBA sets will be made readily available.
- d) Operators and maintenance staff will be trained to use PPEs
- e) Strict supervision will be done as per recommended.

7.5.3.2. Ammonia Cylinder Safety Measures:

Table 7.3 Storage Details of Ammonia

Sr. No	Name of Chemical	Nature	Container	Capacity of Each Cylinder	Qty	No of Cylinders
1	Ammonia Cylinders	Toxic Gas	Cylinder	100 kg	50 MT	500

- **Ammonia Cylinders**

Hazard: Damage to cylinder valve or leakage from the connector to gas manifold or from pipeline. Ammonia is classified as Class 2.3 Toxic gas.

Table 7.4 Toxic Properties of Ammonia

Sr. No	Vapour Conc. (ppm)	General Effect	Exposure Period
1	1-5	Odour detectable by most person	Prolonged repeated exposure produces no injury
2	25	No adverse effect for average worker	Maximum allowable conc. for 8 hour working exposure
3	35	No adverse effect for average worker	Exposure should not be longer than 15 minutes and should not occur more than four times per day
4	400 to 700	Nose and throat irritation, Eye irritation with tearing	Infrequent short (1/2 hour) exposure ordinarily produces no serious effect
5	2000 to 3000	Convulsive coughing Severe eye irritation	No permissible exposure. May be fatal after short exposure.
6	5000 to 10 000	Respirator spasm. Rapid asphyxia	No permissible exposure. Rapidly fatal

- **Basic safety measures for dealing with Ammonia leak:**

- ❖ Ammonia gas sensors will be installed at selected location with alarm system.
- ❖ Adequate number of eye washes will be installed on the basis of ammonia is used & handled.
- ❖ Approved, Self-Contained Breathing Apparatuses (SCBA) will be made available.
- ❖ Safety equipment will be inspected and maintained in accordance with the manufacturer's instructions.
- ❖ Emergency kits will be made available which can seal off most leaking areas of ammonia containers. Only trained personnel familiar with this equipment will use these kits.

- **Safety measures for safe handling of cylinders:**

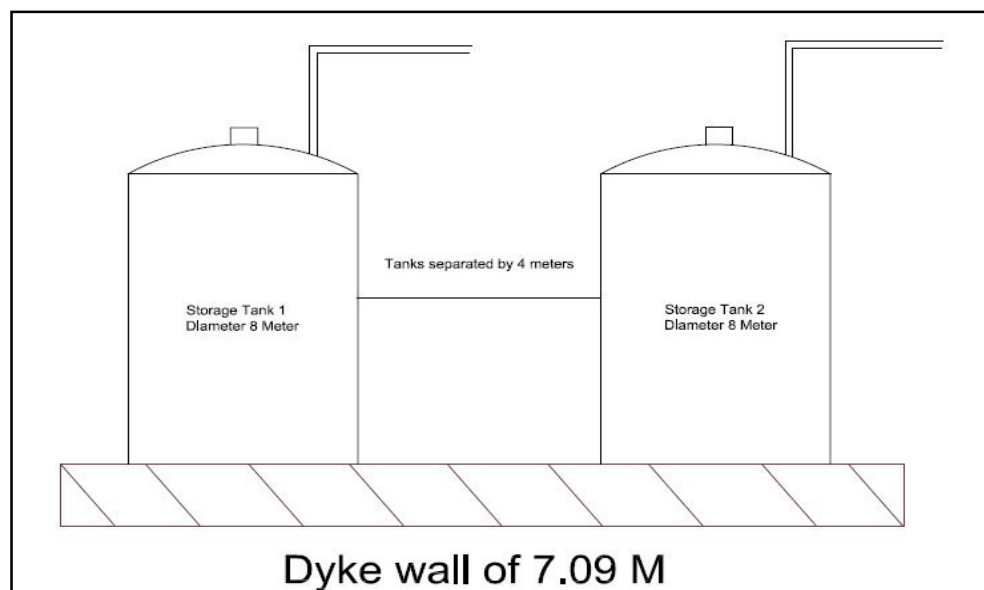
- ▶ Ammonia cylinder pressure is 7.77 bar at 21 °C and 10 bar at 30 °C. Maximum withdrawal rate recommended is 1.3 lbs/hr
- A. Bulk cylinder stores will be located outdoor, preferably in a secure cage protected from sunlight.
- B. Indoors storage will not be recommended.
- C. Cylinders will be stored in an upright position.
- D. Cylinders will be placed in a dry, well-ventilated area.
- E. Cylinders will be placed in a location where they will not be subject to mechanical or physical damage, heat, or electrical circuits to prevent possible explosion or fire.
- F. Gas cylinders will not be located where they may block stairs, exits, and ladders or walk ways.

- **Transport with Vehicles**

If a vehicle is required to transport cylinders, then it will be done as follows-

1. Gas cylinders will only be transported on an open back truck.
2. Cylinders will be prevented from rolling.

Figure 7.1 Storage Safety



7.6. WAREHOUSE SAFETY

Raw materials required in smaller quantities are mainly in form of solid as well as liquids. It would be stored in the warehouse. These chemicals would be stored in drums as well as bags. In warehouse, fire hazards could occur if there are spillages / leakages. Safety measures to be adopted in warehouse areas are as follows –

1. The facility will have standard work permit system for carrying out any maintenance work, hot or cold near the storage of flammable liquids. Ensuring that this is implemented strictly.
2. In the design of storage of warehouse ensuring implementation of following 5 principles will reduce the possibility of accidents to the minimum.
 - i. **Ventilation-** Good ventilation means vapours given off from a spill, leak, or release, will be rapidly dispersed. A good standard of ventilation is required in buildings or rooms used for storing flammable liquids, to disperse the vapours from any small releases. The ventilation arrangements need to take into account the heavy nature of the vapours and to ensure adequate air movement at high and low levels. Five air changes per hour are normally sufficient to ensure vapour levels in the store are kept to a low level. For small buildings, the simplest method of ensuring adequate ventilation is to provide fixed, permanent openings
 - ii. **Ignition-** Ignition sources will be removed from the storage area, by flame proof electrical fittings, no sparking by ensuring permit system during maintenance work, Declaration of *No Smoking* and *No Naked Flame* area will be followed.
 - iii. **Containment** - Use of proper containers, providing spill kit, proper drainage of spillage to safe place, collection and recycle ,Containers will be stored in at ground level (singly or in stacks). This enables leaks or releases to be quickly seen, and allows for any vapours to be dispersed effectively by natural ventilation.
 - iv. **Exchange** - Substituting with less flammable liquid.
 - v. **Separation:** Flammable liquids will be stored well away from other processes and general storage areas. If necessary the storage will be separated by a physical barrier, wall or partition.

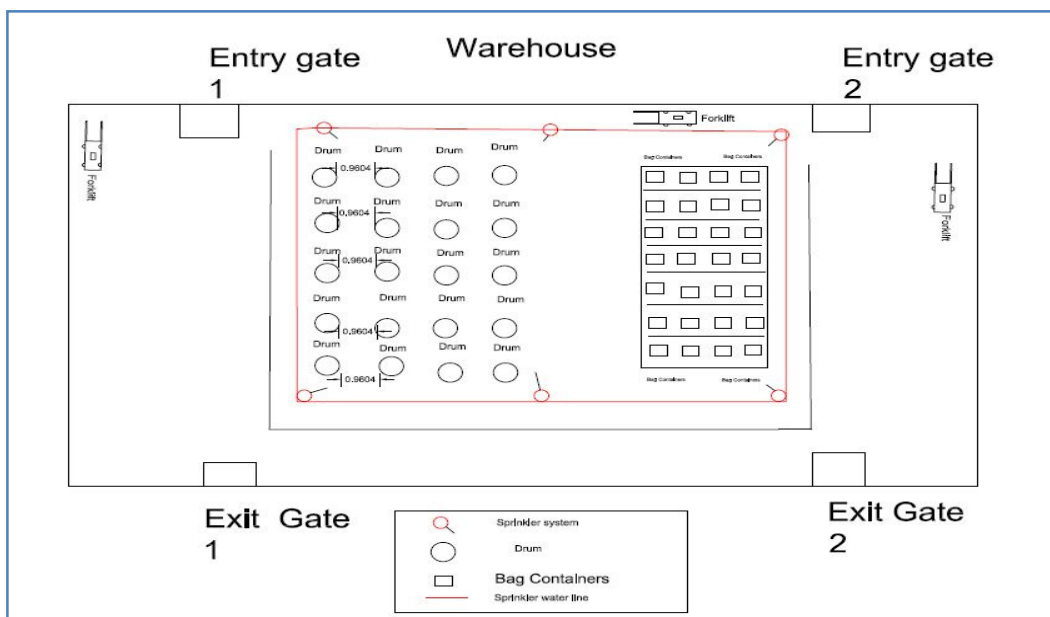
Table 7.5 Hazardous Chemicals Stored In Drums

Sr. No.	Name of the Chemical	Mean of storage Drums of 200 lit capacity	Maximum quantity stored on site	No. of Drums
1	Methyl-3-Methyl – 3 - Phenyl Butanone	HDPE Drums	17.7 MT	88-90
2	Ethylene chloride	MS Drums	37.5 MT	180-200
3	4-Chlorobutyl Chloride	MS Drums	25.0 MT	120-140
4	3 Cyano Pyridine	MS Drums	50.0 MT	250

Table 7.6 Other Less Hazardous Chemicals Stored In Drums/Bags

Sr. No.	Name	Nature	Mean of Storage Drums of 200 lit Capacity	Maximum Quantity Stored on Site
1	Aluminium Chloride	Solid powder Non hazardous	PP Bags	20 MT
2	Sodium Hydroxide			22.7 MT
3	Potassium Permanganate			18 MT
4	Sodium metabisulphite			1.95 MT
5	Sodium Bicarbonate			1.95 MT

Figure 7.2 Warehouse Layout with Sprinkler System



7.7. STORAGE OF COAL

► Mitigation measures for Coal storage

- Fire hydrant lines (self auto-mode fire fighting) will be laid around these areas.
- No hot work will be permitted in this area without safety permit.
- There will be no High Voltage Transmission (H.T.) lines over and near coal storage.
- All useful material will be stored far away from storage of coal area.
- Proper supervision staff with necessary communication facility will be deployed.
- Training will be arranged for all the staff in normal and emergency operating system.
- Proper training will be imparted for creating awareness among workers about sudden coal fire and emergency action plan. This will be included as a part of On-site-emergency plan.

7.8. HANDLING OF THE CHEMICALS

- As the manufacturing process involves number of chemicals, their handling is most important factor during which workers are directly exposed. The mitigation measures are as follows-

► For Sulphuric acid –

➤ Precautions-

- Sufficient ventilation will be provided with suitable respiratory equipment. If the chemical is ingested, medical advice will be immediately provided.
- Skin and eye contact will be prevented.

► **For Hydrochloric acid-**

➤ **Precautions**

- Sufficient ventilation will be provided, suitable respiratory equipment will be provided.
- If ingested, medical advice will be immediately provided.
- Contact with skin and eyes will be prevented.

➤ **For Methanol –**

❖ **Precautions**

- All equipment containing material will be grounded.
- Sufficient ventilation will be provided with suitable respiratory equipment.
- If ingested, medical advice will be immediately provided.
- Skin and eye contact will be avoided.

➤ **For Methylene Dichloride**

❖ **Precautions**

- ❖ Protective clothing, footwear will be provided.
- ❖ PPE such as chemical splash goggles and safety gloves will be provided.
- ❖ Work will be carried out in a well-ventilated area (preferably in an environment with a fume extraction system).

- **Storage-** Dichloromethane is highly volatile and will be stored in a cool, dry area in tightly closed, labelled containers. This chemical needs to be kept away from metals, light and any source of heat or ignition. The same will be followed.

➤ **What to Do When Exposed to Methylene Chloride**

- Good work practices and proper maintenance procedures will be followed.
- Ideally, all work with methylene dichloride will be conducted in a chemical fume hood or in another type of appropriate exhaust ventilation.
- Appropriate Personal Protective Equipment (PPE) such as safety glasses with side shields, splash-proof goggles, and/or chemical-resistant aprons, coveralls, lab coats and gloves will be provided.
- Eating, drinking, smoking and the storage of food will be prohibited in areas where methylene dichloride is stored or used.

➤ **Disposal / Recovery**

Methylene chloride/ dichloride will be collected with halogenated solvents. It will recover all the through safe handling procedure and send back to the supplier/ original manufacturer.

7.9. NFPA RATING

Table 7.7 NFPA Ratings

Sr. No	Name of the Chemicals	NF	NH	NR	TLV values	Type of the Chemical
1	Ammonium hydroxide	0	0	2	TLV-TWA -25 ppm TLV-STEL–35 ppm	Non Flammable

ADDITIONAL STUDIES...7

Sr. No	Name of the Chemicals	NF	NH	NR	TLV values	Type of the Chemical
2	Ammonium Sulphate	1	2	0	----	Combustible at High temp.
3	H ₂ SO ₄	0	3	2	TLV-TWA -1 ppm TLV-STEL – 3 ppm	1. Corrosive, 2. Non Flammable
4	2,6-Lutidine	3	2	0	---	Flammable liquid & vapour
5	4-Chlorobutyl Chloride	1	4	0	---	Corrosive
6	Aluminum Chloride	0	3	3	TLV-TWA-0.2 mg/m ³	Non-Flammable.
7	Hydrochloric Acid	0	3	1	TLV-TWA - 1 ppm TLV-STEL –5 ppm	1. Corrosive, 2. Non Flammable
8	Manganese Dioxide	0	2	0	TLV-TWA -0.2 mg/m ³	Non - Flammable
9	Methanol	3	1	0	TLV-TWA-200 ppm TLV-STEL 250ppm	1. Corrosive 2. Non flammable
10	Methylene chloride	1	2	0	TLV-TWA -50 ppm	1. Combustible at 2. High temp.
11	Potassium Chloride	0	1	0	-----	Non-flammable.
12	Potassium Permanganate	0	1	0	TLV-TWA - 5 ppm	Non-flammable
13	Sodium Acetate	1	2	0	-----	Combustible at High temperature
14	Sodium Chloride	0	1	0	----	Non-flammable
15	Sodium Hydroxide	0	3	1	TLV-TWA -2ppm TLV-STEL–2 mg/m ³	Non-flammable
16	Toluene	3	2	0	TLV-TWA-200 ppm TLV-STEL–500 ppm	Flammable.
17	Gamma Picolin	2	2	0	TLV-STEL – 5 ppm	Flammable.
18	Sodium Sulphate (anhydrous)	0	2	0	-----	Non-flammable.
19	Nitric acid, 70%	0	4	0	TLV-TWA-2 ppm TLV-STEL–4 ppm	1. Highly corrosive 2. Non-flammable.

7.10. WORST CASE SCENARIO

Table 7.8 Worst Case Scenario

Sr. No.	Raw Material	Scenario of Spillage/ Leakage	Area of Spread	Mitigation Measures
1	HCL (30 %)	Evaporating Puddle	<ul style="list-style-type: none"> Red : 38M--- (100 ppm = AEGL-3 [60 min]) Orange: 8 M --- (22 ppm = AEGL-2 	<ul style="list-style-type: none"> Small Spill: Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container. If necessary: Neutralize the residue with a dilute solution of sodium carbonate. Large Spill: Corrosive liquid. Poisonous

ADDITIONAL STUDIES...7

Sr. No.	Raw Material	Scenario of Spillage/ Leakage	Area of Spread	Mitigation Measures
			[60 min]) • Yellow: 395M (1 ppm)	liquid. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material .Do not get water inside container. Do not touch spilled material. Use water spray curtain to divert vapour drift. Use water spray to reduce vapours. Prevent entry into sewers, basements or confined areas; dike if needed. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.
2	Toluene	Leak from hole in vertical cylindrical tank Non-flammable chemical is escaping from tank	• Red : less than 10 M (10.9 yards) --- (3700 ppm = AEGL-3 [60 min]) • Orange:11.5M --- (560 ppm = AEGL-2 [60 min]) • Yellow: 28M --- (200 ppm	• Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal. • Large Spill: Toxic flammable liquid, insoluble or very slightly soluble in water. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Be careful that the product is not present at a concentration.
3	Methanol	Leak from hole in Vertical cylindrical tank Flammable chemical escaping from tank (not burning)	• Model Run: Gaussian • Yellow: 50M - -- (1 ppm)	• Small Spill: Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container. • Large Spill: Flammable liquid. Poisonous liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Use water spray to reduce vapours. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV.

Sr. No.	Raw Material	Scenario of Spillage/ Leakage	Area of Spread	Mitigation Measures
				Check TLV on the MSDS and with local authorities.
4	Nitric Acid 72%	Evaporating Puddle for	<ul style="list-style-type: none"> • Red : less than 10 M- (10.9 yards) --- (92 ppm = AEGL-3 [60 min]) • Orange: 31 M --- (24 ppm = AEGL-2 [60 min]) • Yellow:439 M --- (0.16 ppm = AEGL-[60 min]) 	<ul style="list-style-type: none"> • Small Spill: Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container. If Necessary: Neutralize the residue with a dilute solution of sodium carbonate. • Large Spill: Corrosive liquid. Oxidizing material. Poisonous liquid. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Avoid contact with a combustible material (wood, paper, oil, clothing).Keep substance damp using water spray. Do not touch spilled material. Use water spray curtain to divert vapour drift. Use water spray to reduce vapours. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Neutralize the residue with a dilute solution of sodium carbonate. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.
5	Gamma Picolin	Leak from hole in Vertical cylindrical tank Flammable chemical escaping from tank (not burning)	<ul style="list-style-type: none"> • Red : less than 10 M - 10.9 yards) (270 ppm = PAC-3) • Yellow:120 M - (5 ppm = PAC-1 • Orange: 36 M (45 ppm = PAC-2) 	<ul style="list-style-type: none"> • Small Spill: Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container. • Large Spill: Flammable liquid. Poisonous liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled.

Severity mapping of the chemicals may be referred at **Appendix – M**

7.11 COLOUR CODING FOR SAFETY DURING IN-HOUSE MATERIAL TRANSFER

Following ASME (American society of Mechanical Engineers) colour coding will be implemented onsite for pipes carrying materials in industrial premises.

Table 7.9 Colour Coding For SKKI Plant

Substance	Colour
Water	Green
Steam	Grey
Acid & Alkali	Purple
Air	Blue
Other liquid	Black
Gaseous	Yellow

7.12. OCCUPATIONAL HEALTH CENTER (OHC)

Company will define the specific information for the workers and will plan a well equipped health centre. OHC will be provided as per factories act. Health check-up of all employees and contract labours will be carried out before employment and at regular intervals and record for the same will be maintained.

Table 7.10 Details of Occupational Health Monitoring

No	Solvent	Target organs	Parameters for occupational Health monitoring	Frequency
1	Hydrochloric acid	<ul style="list-style-type: none"> • Skin • Respiratory system. 	Pre-placement medical check-up of function and integrity of eyes, skin and lungs.	Pre-placement & Annual
2	Ammonia	<ul style="list-style-type: none"> • Skin ,eye • Respiratory 	Pre-placement medical check-up of function and integrity of eyes, skin and lungs.	Pre-placement & Annual
5	Methanol	<ul style="list-style-type: none"> • Skin-dermatitis • Liver Optic atrophy • Blindness 	Pre-placement medical check-up	Pre-placement & Annual
6	Nitric Acid	<ul style="list-style-type: none"> • Skin ,eye • Respiratory 	Pre-placement medical check-up of function and integrity of eyes, skin	Pre-placement & Annual
7	H ₂ SO ₄	<ul style="list-style-type: none"> • Skin-dermatitis, • Eye • Respiratory 	Pre-placement medical check-up	Pre-placement & Annual
8	Aluminium Chloride	<ul style="list-style-type: none"> • Skin-dermatitis 	Pre-placement medical check-up	Pre-placement & Annual
9	Sodium Hydroxide	<ul style="list-style-type: none"> • Skin-dermatitis 	Pre-placement medical check-up	Pre-placement & Annual

7.13. SAFETY HEALTH AND ENVIRONMENT POLICY

The company will define Safety Health, Environment and Risk policy. The content of same are presented as -

- ❖ The safety committee will be an advisory body for recommending measures to management for Improvement of safety, safer working conditions and ensuring implementation of safety measures decided upon.
- ❖ The committee will be constituted consisting of Production Manager as chairman and Four other members. From the management, the Administration Officer and one Production Supervisor will be nominated as members and there will be two worker members. The Administration Officer will function as the Secretary of the Committee.
- ❖ The members will have a term of 2 years and are eligible for re-nomination at the end of the term.
- ❖ The function of the Committee will be to:
 - a. Assess safety requirements on machines, jobs, work places, work rooms and other places in the company and assess safety equipment like Appliances, devises, apparel etc. to prevent accidents. Also standardize appliances, apparel etc. required for more than one job.
 - b. Assess jobs in the company to avoid hazards to health.
 - c. Decide upon and implement safety campaigns and programs within the company.
- ❖ To avoid accidents and damages to health of all employees.
- ❖ To integrate safety practices completely with production and operation requirement.
- ❖ To ensure that the safety measures in force are fully complied with and by all employees.
- ❖ To maintain neat, clean, safe, attractive& healthy working conditions.
To comply with all statutory & legal requirement pertaining to accident, prevention, pollution control, improvement in working.

7.14. ONSITE AND OFFSITE EMERGENCY PLAN

Onsite and offsite emergency plan will be prepared as factory act and will be implemented on site for betterment of safety.