RISK ASSESSMENT

INTRODUCTION:-

Hazard: A hazard is any agent that can cause harm or damage to humans, property, or the environment.

Types of hazards: Following are the type of workplace hazards-

1. Chemical hazards
2. Fire and explosion hazard
3. Electrical hazard
4. Occupational Health hazards

Risk: Risk is a situation involving exposure to danger.

Risk = Severity x Probability

Hazard and risk assessment register with Mitigation measures

Table No. – Hazard due to presence of Chemical dust and vapors in working area

Sr. No	**Hazards**- Type & its sources	**Severity of Hazard/No. of persons affected and/or area involved**	**Frequency of hazard exposure**	**Risk level rating**
1.	**EXPOSURE TO PESTICIDES & INSECTICIDES DUST AND VAPOURS PRESENT IN THE WORKING ATMOSPHERE**– The dust generation will be mainly due to handling of solid material in powder form like Clodinafop, Fipronil, Imidacloprid, Lambda-cyhalothrin, Thiram&Ziram.	**Minor or low level of exposure** – low **No. of persons affected at a time** – two to three Area involved – Not applicable.	Frequency of occurrence – Once or twice in a month	**Risk level** – Low to moderate
		Moderate to High Level of exposure – High **No. of Persons affected –** more than 5 **Area affected – entire section**	Frequency of occurrence- rare once in less than five years	**Risk level** – moderate to high.

Safety systems and Mitigation measures to control the above hazard:

1. The Reaction will be carried out in closed reactor and in controlled condition.
2. The vent gases from the reactor will be scrubbed before letting them out to the atmosphere or in the work place .
3. Workplace monitoring will be done and concentration of various chemical vapours will be maintained well below the threshold limit.
4. Use proper PPE's like facemask, dust mask, chemical breathing apparatus and air breathing apparatus as per requirement. The dust mask use will be made compulsory for those who

are working in production and packing areas or where there is a possibility of chemical dust generation.

5. Use of HDPE lined product bags will be made, to make the bags impervious and to avoid whoosing out of material from the plastic woven bags .
6. Workers will be trained in handling of hazardous solid chemicals.
7. Charging of solid chemicals into reactors will be carried out in enclosed hoppers.
8. The area will be well ventilated to keep the dust concentration low.
9. The spillage of solid material will be controlled and minimised. Secondary containment like tray will be used while transfer and handling of solid chemicals .
10. The area will kept neat and clean. The floors will be regularly cleaned to make them free of chemical dust.
11. MSDS of all chemicals must be kept handy in case of need.

Table No. – Hazard due to fire and heat

Sr. No	Hazards- Type & its sources	Severity of Hazard/No. of persons affected and/or area involved	Frequency of hazard exposure	Risk level rating
2.	**FIRE and HEAT-** Since there is storage of flammable & combustible materials with low flash points; Hence the risk of fire is high.	Small fire – Severity is low Number of persons affected can be from zero to few, It is a localized incidence.	Frequency – once in a year or less	Low
		Large fire – involving flammable materials -Hazard level is High - No. of persons involved – 10 or more -Extend of fire can spread up to total section or entire factory	Frequency of such incidence – once in a five years or less	High. It is to be considered as onsite or offsite emergency

Safety & Mitigation measures to control the fire hazard:

1. The raw materials will be stored either in a closed tank or closed containers (200 litre drums) and transferred by pump to avoid any leakage to reduce the chances of fire.
2. The storage tanks will be properly grounded and bonded to eliminate static electricity hazard.
3. The solvent storage tanks will be designed underground as per engineering feasibility.
4. Proper fire fighting equipment's will be provided to fight the fire in case of eventuality.
5. Fire extinguishers will be installed in all areas and all workers will be trained in its operation .

6. The storage and processing (manufacturing) area where flammable chemicals are handled will be declared as electrical hazardous zone.
7. The electrical and other equipment's used will be flameproof. No spark producing equipment or vehicle will be allowed inside these areas.
8. The complete plant will be declared as no smoking zone.
9. Flameproof equipment's and instruments will be deployed.
10. A fire water network will be provided inside the factory premises. A jockey pump will always be kept running to maintain the fire water line pressure all the time.
11. All the workers including security staff will be trained in firefighting operations.
12. More Fire extinguishers will be provided in the sensitive areas and people will be trained in fire fighting operations.
13. Direct contact of the flammable material with oxidizing agents like acids will be avoided.
14. The compatibility matrix of the materials will be considered while storage of chemicals. Incompatible materials will be stored separately.
15. Training and fire mock drills will be arranged regularly.
16. Adequate provision of foam and water will be made to fight the fire.
17. Emergency management plan will be made and it will be tested periodically for its effectiveness.

Table – Occupational healthHazard due to handling of Hazardous & Toxic chemicals

Sr. No	Hazards- Type & its sources	Severity of Hazard/No. of persons affected and/or area involved	Frequency of hazard exposure	Risk level rating
3.	**OCCUPATIONAL HEALTH HAZARDS & ITS IMPACT-** Since the facility is handling various hazardous & toxic chemicals, it is likely to cause many workplace incidents.	Level of exposure – Low No of persons affected – one or two Area affected – It is localized phenomena	The exposure frequency is 8 hours in a day	Moderate Low – with proper mitigation measures.

Safety & Mitigation measures to control the hazard:

1. The occupational hazard is likely due to handling of the toxic chemicals like Alpha-cypermethrin, Ziram, Sodium cyanide etc.
2. A proactive approach will be adopted to minimize the health impact of chemical exposure.
3. MSDS of each chemical will be available at the point of use for ready reference.
4. Adequate PPE's will be provided to operating staff. (hand gloves , facemask, goggles and safety shoe use will made mandatory)
5. Safety Showers and eye wash showers will be provided at convenient location for emergency in case of eye contact, skin contact of hazardous materials.
6. The suitable antidotes stock will be maintained in the emergency health centre.

7. Training will be given to the staff in handling of hazardous chemicals. Special training will be given to those handling highly hazardous chemicals like Cyanide, Formaldehyde.
8. Some of the workers will be given training in first aid.
9. First aid box will be available at the point of use.
10. Provision of special antidotes for various chemicals will be available.
11. Occupational health specialist (Doctor) will be appointed by the company and he will be available on call.
12. The storage and processing area will be well ventilated to keep concentration of chemical vapours and gases well within the permissible limit.
13. Periodic ambient air monitoring will be done to monitor and control the concentration of pollutants.
14. Periodic checking of health of the workers will be done as per the factories act.
15. Work permit procedures will be followed for maintenance of equipment's.
16. Electrical permit system will be followed while working on electrically driven or electrical equipment.
17. Periodic safety audits will be done to detect/locate the safety and health hazards.
18. In addition to above periodic safety and good housekeeping rounds will be taken by Sr. Officers periodically.
19. Periodic safety committee meetings will be held for inviting safety suggestions from the workers. Workers participation will be ensured in safety committee meeting.

Table – Hazard due high level of noise

Sr. No	Hazards- Type & its sources	Severity of Hazard/No. of persons affected and/or area involved	Frequency of hazard exposure	Risk level rating
4.	**NOISE-** The noise generation is mainly from DG set which runs when there is a power outage. The DG set is likely to run for few hours in a week. The other source of noise is from operation of Pumps, Grinder machine, Boiler, Cooling tower, Material handling, and vehicular traffic.	Operation of other equipment's , pumps, grinder set – Moderate Operation of DG set – High . The total No. of persons affected due to DG set operations – 2 to 3 operators Other operations – 4 to 5 persons	DG set operation – very low, once or twice in the week.	Moderate
			Operation of other rotating equipment's - high 8 to 10 hours per day.	Low to moderate

Safety & Mitigation measures to control the Noise hazard:

1. DG set will be provided with acoustic enclosure to reduce the noise level by 25 dB as per the noise pollution control act.

2. Earplugs and earmuffs will be provided to workers and management will ensure that the workers will wear them in noisy area. The workers will be trained on the health effects of noise pollution.
3. A Signboard will be displayed where the noise level is above 75 dB to warn the operating staff.
4. Regular noise monitoring will be done as per the Punjab pollution control Board norms and report will be sent to PPCB. (Day and night noise monitoring once in three months or as per the consent condition)
5. All precautions will be taken to control noise level below 80 db.
6. Proper preventive maintenance of the DG set, boiler, and pumps will be done whenever the noise and vibration level goes high. The oiling and lubrication of rotating machinery will done regularly .
7. Periodic health check-up of the staff will be done as per factories act and health check will include checking of hearing capacity (Audiometric test) of persons.

Table – Workplace injury (Minor & Major) Hazard

Sr. No	**Hazards**- Type & its sources	**Severity of Hazard/No. of persons affected and/or area involved**	**Frequency of hazard exposure**	**Risk level rating**
5.	**Minor and major accidents resulting in work place injury**	Minor accidents – Severity of injury is low to moderate	**Minor accidents –** one or twice in a year.	Low
		Major accident – Hospitalization, disability and sometimes it can be fatal.	Major accidents – rare, less than once in lifetime.	Moderate to high – it can be a onsite emergency case

Safety & Mitigation measures to control the hazard:

1. The use of safety shoes will be made compulsory for all the operating and maintenance staff.
2. Workers will be well trained to prevent accidents and exposure
3. First Aid box will be provided and some employees will be trained in first aid.
4. Doctor will be available on call for 24 hours.
5. All the areas where chemicals are likely to be handled will be well ventilated.
6. Exhaust fans and eco ventilators will be provided to improve the ventilation.
7. Wind socks will be provided at convenient location so that workers will be able to avoid exposure by positioning themselves against direction of wind.
8. The regular workplace monitoring will be done with dragger tubes to know the level of pollutants and harmful chemicals in the work area.
9. The manual handling of chemicals will be minimum and will be handled in closed containers and transfer will be by transfer pumps as far as possible.
10. Preventive maintenance practice will be adopted, to avoid leakage due to corrosion.

11. MS or stainless steel reactor will be used mostly to avoid corrosion and ease of handling and cleaning of chemicals.
12. Good housekeeping will be maintained so that spills of all solid and powder chemicals will be wiped out immediately and will prevent formation of chemical dust.
13. The Hoppers of solid and powder charging will have sufficient height to avoid spillage of chemicals and generation of chemical dust.
14. Hoods with exhaust fans will be provided to extract any dust generated during charging of chemicals in the hopper.
15. The gas cylinders and drums will be moved by special trolley designed to handle them. This will avoid damage to the drums and cylinders and subsequent leakages.
16. The chemical drums will be stored in the shed away from the sunshine. The shed will be open on all sides and well ventilated.
17. **Provision of PPE:** Required PPE should be provided by the company to cover occupational foot, head, hearing, and eye protection from hazardous chemicals.
18. **Foot Protection**: If machines or operations present the potential for foot injury, the company should provide foot protection, which is of safe design and construction for the work to be performed. To avoid the slippage on the floor due to spillage of oils provision of special safety shoes to be made.
19. **Head Protection**: If head hazards remain after all steps have been taken to control them, the Company should provide employees with appropriate head protection. Safety helmet is recommended.
20. **Eye Protection**: When operations present potential eye injury from chemical elements, the company should select, provide, maintain and required affected employees to use appropriate eye protection. Any work which involves looking upside also requires the protection e.g. electrical cabling on walls and ceiling. The various eye protecting devices like safety glasses and goggles should be adequate and reasonably comfortable.

Table – Electrical Hazard (static as well as normal electricity)

Sr. No	**Hazards**- Type & its sources	**Severity of Hazard/No. of persons affected and/or area involved**	**Frequency of hazard exposure**	**Risk level rating**
6.	**ELECTRICAL Hazard: Injury due to electrical shock** Since the facility is electrical power, we need to take care of electrical hazards including static	**Shock level** – upto 220 volts low resulting in minor injury **No**. Of persons – Mosley a single person is involved **Area affected** – Not applicable	**Frequency** – once in a year or less	Low

	electricity hazards.	Shock level 220 volts or more and if the ground or hands are wet – Moderate to high. can be a fatal No. of persons involved – mostly single person	**Frequency** – once in five years or less	Moderate to high.
		Electrical short circuit , electrical spark or static spark resulting in fire – Severity is high **Area involved** – can be a section ofthe facility or complete factory	**Frequency** – once in life time or never	High to very high resulting into onsite and offsite emergency

Safety & Mitigation measures to control the electrical hazard:

1. A licensed electrician should be deployed to do all wiring and electrical installations required for plan activities.
2. Fuses and circuit breakers (ELCB's) should be used to protect motherboards, conductors and equipment to avoid short circuiting and electric shock.
3. Extension boards for equipment or as part of a temporary wiring system should not be damaged or compromised in any way and insulation must be of the highest grade.
4. The joints of electrical wires should be avoided or an extension boards can be used if needed.
5. Any time electrical equipment is deactivated for repair, or circuits are shut off, the equipment will be locked out and tagged at the point where it can be energized.
6. Proper earthing is to be ensured for all stationary equipment and electrical panels.
7. The earthing and earth resistance will be regularly checked once in six months and records will be maintained.
8. If earth pit resistance is found to be more than 2 ohms then the earth pit will be charged with water and salt and resistance will be rechecked to see that it has come down to less than 1 ohms.
9. Temporary lights should not be suspended by their cords.
10. Hazardous area classification needs to be done and flameproof electrical fittings have to be fitted in the flammable area.