CHAPTER – 10:

RISK ASSESSMENT & DISASTER MANAGEMENT PLAN

10.1 BACKGROUND

Identification analysis and assessment of hazards and risks provide vital information to the risk management, that what should be the type & capacity of any on-site and off-site emergency plan & what type of safety measures and maintenance is required. Risk and consequence analysis has been carried out considering storage and handling of various hazardous raw materials, intermediates and product as well as manufacturing process.

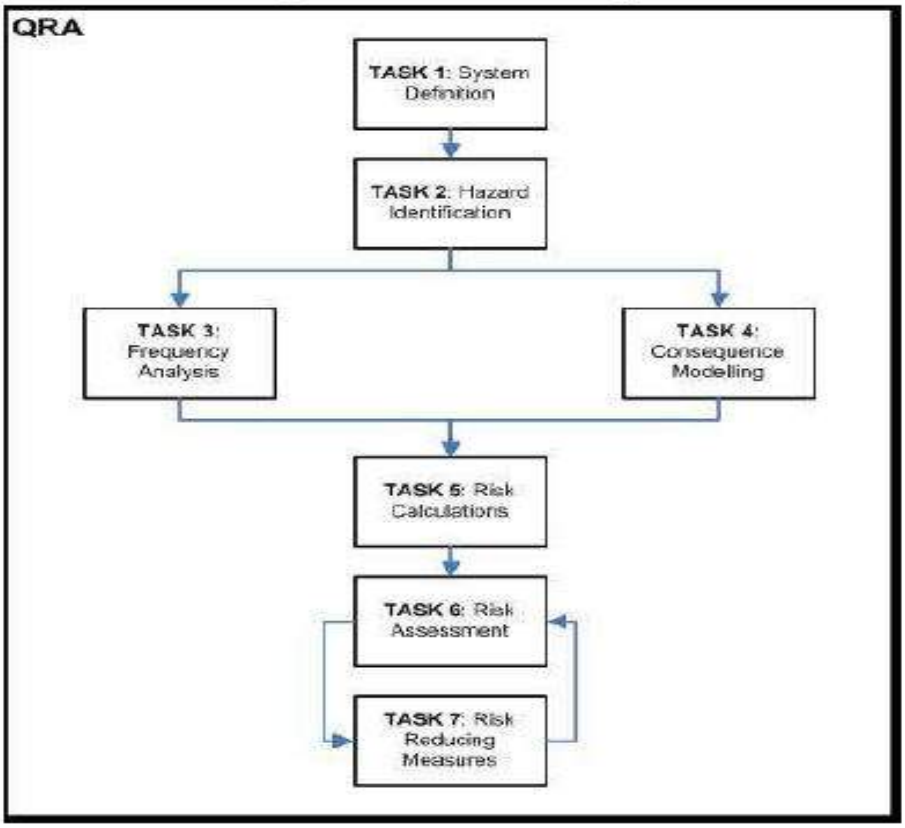
10.2 METHODOLOGY

Quantitative risk assessment (QRA) is a mean of making a systematic analysis of the risks from hazardous activities, and forming a rational evaluation of their significance, in order to provide input to a decision-making process. The term 'quantitative risk analysis' is widely used, but strictly this refers to the purely numerical analysis of risks without any evaluation of their significance. The study has been conducted based on the premises of a traditional Quantitative Risk Assessment. The key components of a QRA are explained below, and illustrated in Figure 10.1.

FIGURE – 10.1

QRA METHODOLOGY

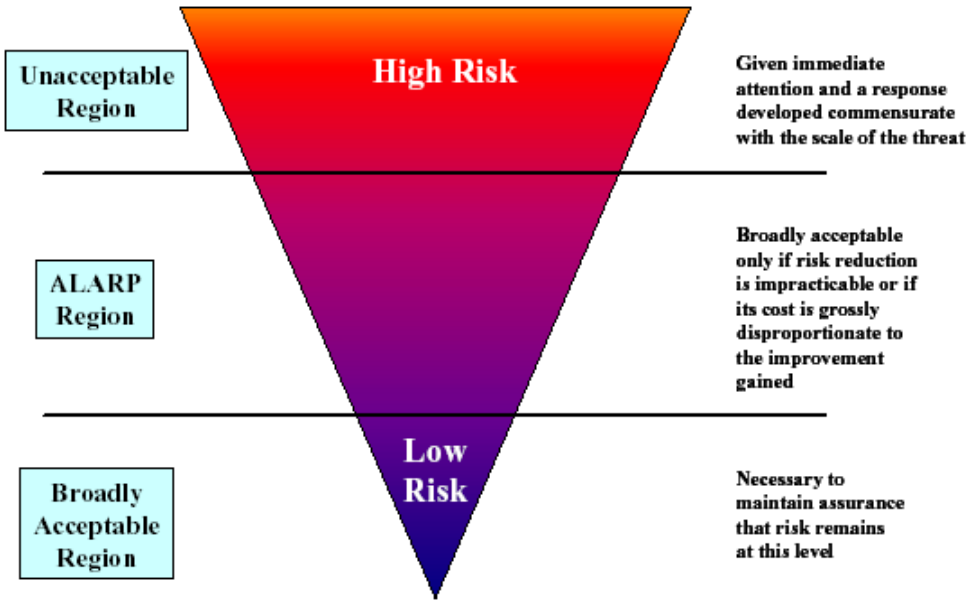
Figure 1: QRA Methodology



The purpose of **Risk Assessment** is to develop mitigation measures for unacceptable generators of risk, as well as to reduce the overall level of risk to As Low as Reasonably Practical.

FIGURE – 10.2

ALARP PRINCIPLE



In order to help assess the viability of Risk Reduction Measures (RRM), the economic costs of the measures can be compared with their risk benefits using **Cost Benefit Analysis** (CBA).

10.3 STORAGE AND HANDLING OF HAZARDOUS CHEMICALS

The details of storage of Hazardous chemicals along with measures taken during storage are given in Table 10-1.

TABLE-10.1
STORAGE DETAILS OF HAZARDOUS CHEMICALS

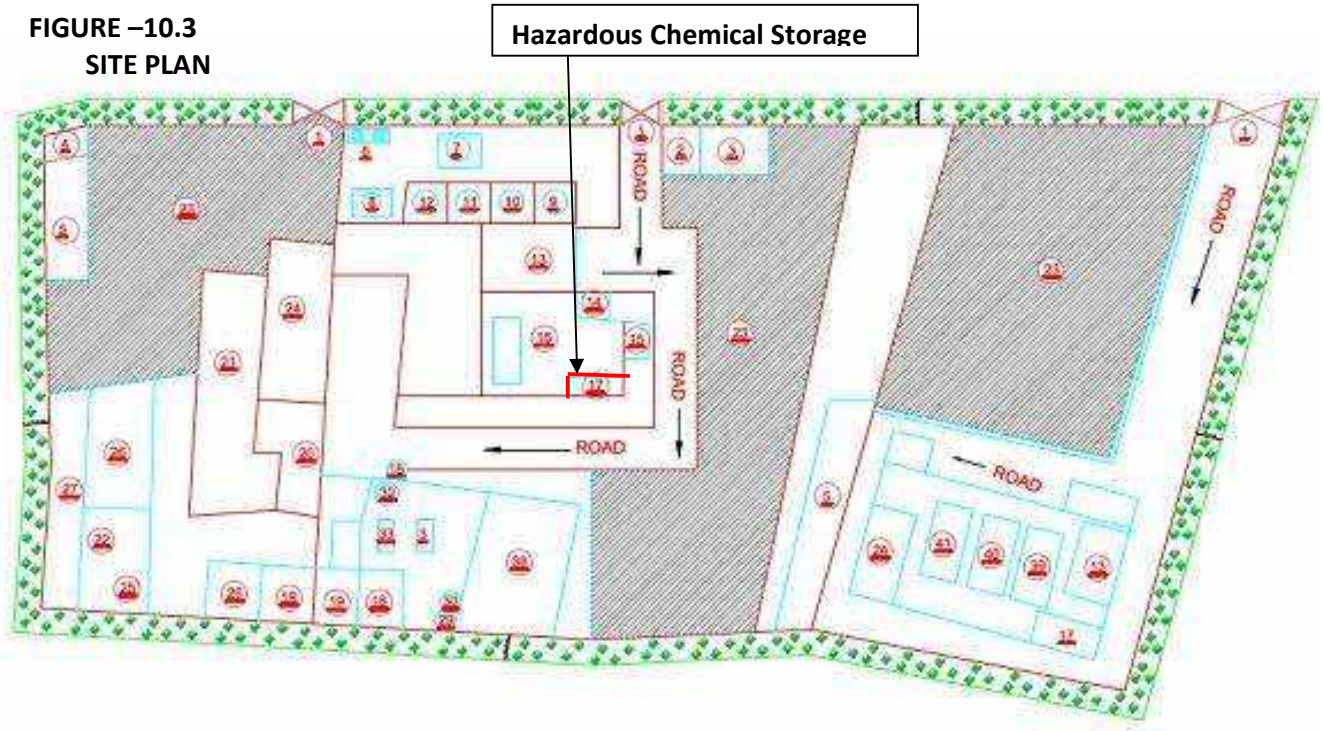
Sr. No	Name of Hazardous	Quantity Max. that Can be Stored (MT)	Places of its Storage (Storage tank /drums/cylinders/barrels)	No. of Tank	Operating Pressure & Temp.	Type of Hazards Possible (Fire, explosive, toxic release, spillage etc.	Control measures provided
1.	Nitrobenzene	20	Tank	1	Atm. Pressure & Room Temp.	Flammable	• Flame proof plant, pumping transfer, close process, etc. • Double Static earthing • Dyke Wall • Tanker unloading procedure • Jumper clips on flanges • Fire Extinguishers • Fencing and No Smoking and prohibited area. • Tanker unloading procedure. • Flame arrestor provided on vent line of the tank • Hydrant system
2.	Xylene	2	Drum	10 drum x 200 Kg	Atm. Pressure & Room Temp.	Flammable	
3.	H_2SO_4	20 KL	Tank	2	Atm. Pressure & Room Temp.	Corrosive	• Level guage provided • Scrubber provided • Required PPEs provided to all employees • Double drain valve will be provided to sulphuric acid storage tank • Full body protection will be provided to operator • Caution note will be displayed and train for the same to all employees. • Safety shower and eye wash will be provided Total close process will be adopted for sulphuric acid handling. • Dyke wall will be provided to storage tank

Table -10.2

Properties of Chemicals

SR. NO.	RAW MATERIALS	HAZARD	FP Deg C	BP Deg C	SP.GR. 20 Deg C	VD vs Air	SOLUBILITY	LEL%	UEL%	TLV (ppm)	IDLH (ppm)	LD50 ORAL mg/kgs	LC 50 mg/L mg/m^3
1	Sulphuric Acid	Corrosive	-	340	1.84	3.4	Soluble	-	-	1	15	2140	320
2	Sodium Hydroxide	Corrosive	--	1390	1.48	2.3 (hydrate)	Miscible	--	--	--	--	---	--
3	Nitrobenzene	F, Xn	87.78	210.8	1.2	4.25	Soluble	1.8	--	--	--	590	--
4	Xylene	Flammable/Toxic	24	138.5	0.864	3.7	Insoluble	1	7	100	--	1700	--

FIGURE –10.3
SITE PLAN



10.4 Facilities / System for process safety, Storage, transportation, fire fighting system and emergency capabilities to be adopted.

10.4.1 PROCESS SAFETY:

Flameproof equipments and fittings will be provided for handling of hazardous chemicals.

- Housekeeping of the plant will be as per prescribed norms. Floors, platforms, staircases, passages will be kept free of any obstruction.
- All hazardous operations will be explained to the workers. They will be periodically trained on the hazardous processes.
- Dedicated supply of firewater will be made available in the plant.
- All instrument and safety devices will be checked and calibrated during installation. They will be also calibrated, checked at a frequent interval. Calibration records will be maintained.
- All electrical equipments will be installed as per prescribed standards.
- All the equipments of the plant will be periodically tested as per standard and results are documented. All equipments undergo preventive maintenance schedule.
- Hydrant system will be pressured with a Jockey Pump.
- In addition to fire hydrant system, nos. of fire extinguishers will be also installed at different locations within premises.
- Adequate ventilation arrangement will be provided for safe and better working in the plant as per the standard.

10.4.2 SAFE DESIGN AND MAINTENANCE

After studying the properties of the material to be stored, proper selection of the material of construction, metal thickness, design, nozzles, connections, pipe lines, fittings, valves, pumps, lining, coating, jacketing, insulation, cladding etc. and colour coding are necessary.

10.4.3 HANDLING OF CORROSIVE CHEMICALS

Important corrosive substances are: Acids and alkalis

When in contact with human tissues, most corrosive substances will produce chemical burns, while certain other substances produce deep ulceration. Many corrosive substances have a defeating action on the skin and may cause dermatitis.

The safeguards against these hazards will:

- Preventing or minimizing contact between corrosive substances and skin, mucous membranes and eyes.
- Corrosive substances will be not allowed to come in contact with materials that may react.
- All the containers, pipes, apparatus, installations and structures used for the manufacture, storage, transport or use of these substances will be protected by suitable coatings, impervious to and unaffected by corrosives.
- All containers or receptacles are clearly labelled to indicate their contents and should bear the danger symbol for corrosives.
- Adequate ventilation and exhaust arrangement whether general or local, should be provided whenever corrosive toxic gases or dust are present.
- Personal protective devices will be used depending upon the nature of work viz.
  - Corrosion-resistant and impervious suits, or hand-gloves, aprons etc.
  - Respirator, gas mask or self contained breathing apparatus,
  - Barrier cream when exposure is not severe.
- First aid treatment facilities are provided and all concerned will be instructed to follow safe practices such as
  - Prolonged washing with water
  - Removing contaminated clothing
  - Seeking immediate medical help
- Safety showers and eye washers will be provided.

10.4.4 FIRE FIGHTING SYSTEM

Hydrant System

- Fire water reservoir –15 KL
- Fire water pumps: 3 Nos
- Jockey pump: 2 Nos
- Fire pumps operation/status indication panel provided at on automatic
- Single hydrant points: 2 Nos
- Double hydrant points: 2 No
- DG set-500 KVA x 4 Nos. (for emergency)

Fire Extinguishers

Adequate numbers of dry chemical powder type, chemical and mechanical foam type and carbon dioxide type fire extinguishers shall be installed as per the requirement of fire risk in all plants / sections / depts.

No. of Fire Extinguishers at storage area – 4 Nos. of 10 Kg & 4 Nos. of 6 Kg

No. of Fire Extinguishers at processing area – 3 Nos. of 10 Kg & 3 Nos. of 6 Kg

No. of Fire Extinguishers at Administration Building – 2 Kg of 10 Kg & 4 Kg of 5 Kg

No. of Fire Extinguishers at Raw Materials storage area – 4 Kg of 10 Kg & 4 Kg of 5 Kg

Total – 30 Nos. of Fire Extinguishers

Fire Detection System:

Automatic detection of fire is essential especially for hazard, sensitive and unmanned area. Unit shall provide automatic fire detection system which includes heat, smoke detector to give audio / visual alarm / signal locally as well as in the permanently manned area. This in turn helps in early detection of the fire and to start fire-fighting activity at early stage.

Fire Alarm

200 V AC operated fire alarm, with manual call points shall be provided in plant call points location to start, activate alarm, siren shall be indicated in site plant provided in ECC, control rooms and OHC. Zone indication is received at main gate. To identify problem area and

communicate to main gate security officer, coordinate with OHC / fire station, to organize help to respective zones with ambulance and fire tender.

10.4.5 OCCUPATIONAL HEALTH HAZARD AND SAFETY PROGRAM FOR THE PROJECT

Occupational Health is eventually a branch of preventive medicine which examines the relationship between work and health and effects of work on the health of the worker. Occupational health service is operated to achieve the statutory declared aim of occupational health by medical and technical measures. Its role is mainly preventive and to give first aid and emergency treatment. It is certainly useful in early detection of any occupational or non-occupational disease or any man-adjustment of the man-job relationship.

10.4.5.1 OCCUPATIONAL HEALTH AND SAFETY PROGRAM:

1. Medical examinations: Pre-employment, periodic and others
2. Supervision of the working environment industrial hygiene, safety, job analysis and adaptation of the job to the worker in good working conditions.
3. Health education and training.
4. Health statistics.
5. Medical treatment-first aid, emergency and ambulatory treatment.
6. Health counseling-individual.
7. Nutrition.
8. Collaboration with external services.

Other purposes of industrial medical services are:

I) Identifying the Hazards

II) Preventing or minimizing the Hazards

III) Curative treatment in case of exposure

The working personnel shall be given the following appropriate **personnel protective equipments**.

- Industrial Safety Helmet;
- Face shield

- Zero power plain goggles with cut type filters on both ends;
- Welders equipment for eye and face protection;
- Ear muffs;
- Canister Gas mask;
- Self contained breathing apparatus;
- Leather apron;
- Aluminized fiber glass fix proximity suit with hood and gloves;
- Boiler suit;
- Safety belt/line man's safety belt;
- Leather hand gloves;
- Asbestos hand gloves;
- Acid/Alkali proof rubberized hand gloves;
- Electrically tested electrical resistance hand gloves; and
- Industrial safety shoes with steel toe.

Expected Occupational Health Hazards & Safety

- Physical Hazards: Noise, Heat, Dust
- Chemical Hazards: Corrosive, Toxic Substances, Irritants, Carcinogens, Chemical emissions
- Psychological hazards resulting from stress and strain
- Hazards associated with the non-application of ergonomic principles, for example badly designed machinery, mechanical devices and tools used by workers, improper seating and workstation design, or poorly designed work practices

Expected chemical hazards in work environment

Name of Chemical	Health Hazard due to exposure to these chemicals
Acids (Sulphuric Acid)	Corrosive, Irritant. Causes severe eye burns. Causes skin burns. May cause deep, penetrating ulcers of the skin.
Solvents	Hazardous in case of skin contact (irritant, permeator), of eye contact (irritant), of ingestion, of inhalation.

10.4.5.2 Mitigation Measures for the Occupational Safety & Health hazards so that such exposure can be kept within permissible exposure level (PEL)/Threshold Level value (TLV) so as to protect health of workers.

Mitigation Measures for OSH: It is proposed to formulate and implement a structure for Occupational Safety and Health with following aims…

- To keep air-borne concentration of toxic and hazardous chemicals below PEL and TLV.
- Protect general health of workers likely to be exposed to such chemicals
- Providing training, guidelines, resources and facilities to concerned department for occupational health hazards.
- Proposed EMP will be incorporated in Standard Operating Procedure also.

10.4.5.3 The proposed EMP will also include measure to keep air-born concentration of toxic and hazardous chemicals below its PEL and TLV, like…

- Leak Surveys
- Exhaust Ventilation
- Proper illumination
- Close processes to avoid spills and exposures
- Atomization of process operations to hazards of manual handling of chemicals
- Supply of proper PPEs
- Decontamination procedure for empty drums and carboys.
- Regular maintenance program for pumps, equipment, instruments handling chemicals
- Display of warning boards
- Training to persons handling

10.4.5.4 Workplace Monitoring Plan

- It is proposed that a Workplace Monitoring Plan to be prepared & implemented in consultation with FMO and industrial hygienists.
- Each workplace must be evaluated to identify potential hazards from substances or harmful physical agents. Air-borne concentration of chemicals will be measured and record will be kept.
- The current state-of-the-art exposure measurement model is as follows: For purposes of measuring worker exposure across a single shift it is sufficient t o place a reasonably accurate exposure measuring device on the worker, within the worker's breathing zone, and have it operate for nearly the full shift. Client will propose to study the exposure data when the plant is operative.

10.4.5.5 Health Evaluation of Workers

- It is proposed that management will devise a plan to check and evaluate the exposure specific health status evaluation of workers.
- Workers will be checked for physical fitness with special reference to the possible health hazards

- While in work, all the workers will be periodically examined for the health with specific reference to the hazards which they are likely to be exposed to during work. Health evaluation will be carried out considering the bodily functions likely to be affected during work. The parameters and frequency of such examination will be decided in consultation with Factory Medical Officer and Industrial Hygienists. Plan of monthly and yearly report of the health status of workers with special reference to Occupational Health and Safety.

10.5 HAZARD IDENTIFICATION

The major hazards in the M/s. Unity Organics Pvt. Ltd. are described below...

- Fire and Explosive hazard due to leakage of chemicals Xylene, Nitrobenzne etc.
- Corrosive hazard due to leakage of chemicals like H_2SO_4, etc .
- Electrical hazards due to the electrical major equipment/ machinery, operations, welding, motors, and heavy lift devices, cabling, human intervention (short circuit possibility), maintenance work (due to machinery breakdown etc.), plant lighting related electrical hazards.
- Possibility of human injury due to working with mechanical machines, manual handling etc.
- Fires in any part of the plant working areas – there is a possibility of rapid escalation if it is not brought under control quickly.
- Possibilities of fire hazards at transformers, switchgear and other electrical equipment etc.

10.6 Risk Management

M/s. Unity Organics Pvt. Ltd. will be managed the economical and social aspects of risk. Improvement in scientific and factual basis for risk assessment is necessary for better risk management decisions and public creditability of those decisions. However, M/s Unity Organics Pvt. Ltd. will do the QRA to be undertaken prior to risk management decisions.

M/s. Unity Organics Pvt. Ltd. will consider the Risk management strategies including all the specific activities. First step involves taking a decision about the weather any actions are

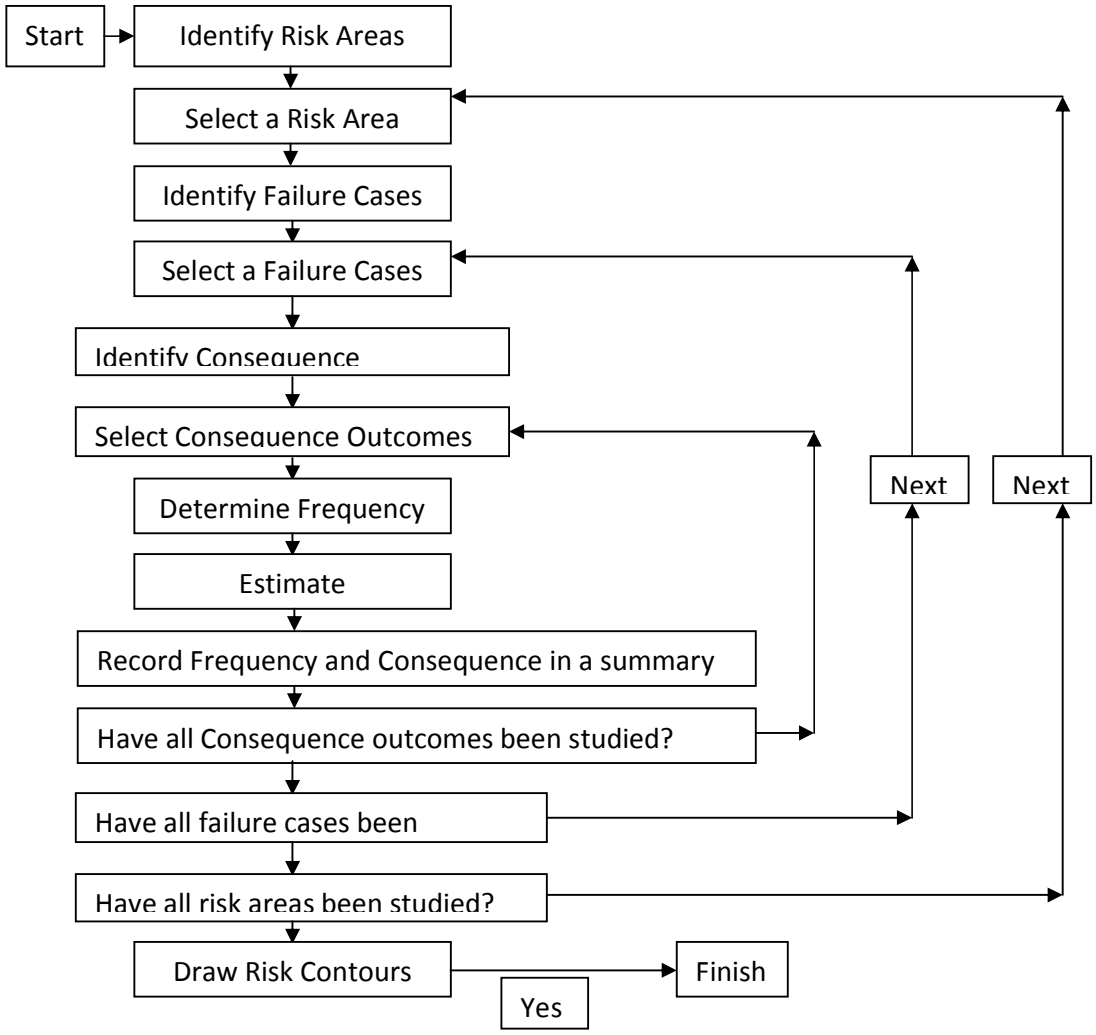
necessary and if so, what nature of the action should it be. Industries' risk management decision shall be based not only computed risk in terms of fatality probability (fatality/year), but also on judging the acceptability of the risk – a matter of personal and social value judgement. The risk management includes implementing the actions, decided upon and evaluating their effects.

The fatality probability is function of:

- Probability of occurrence of hazardous events
- Probability of weather condition, wind direction
- Probability of number of persons exposed which depends on the severity of the consequences
- Lethality factor
- Probability of ignition source

Any potentially hazardous installation or operation in individual member industries could be made safer through enhances implementation of safeguards, diverse control systems, multiple containment barriers and redundant structures.

10.7 Quantitative Risk Assessment



10.7.1 Identification of Hazardous Areas

The procedure for QRA starts with identification of major risk areas in the installation. Operation carried out in chemical Industry usually come under certain board, general categories.

- Bulk storage of liquids (e.g. Solvent) area in M/s. Unity Organics Pvt. Ltd. at ambient temperature and atmospheric pressure.
- Process Plant involving Piping, pumping, transportation, reactors, distillation, heating, cooling, electricity etc.
- Drum Storage Area.

10.7.2 Identification of Failure cases for Hazardous areas

- Release due to catastrophic failure of drum or process vessels.
- Rupture of connected pipe with process vessels.
- Continuous release at significant rates for long durations transfer pipelines caused by sudden, major break of the pipeline.
- Continuous release at low rate through small holes or cracks in piping and vessels, flange leaks, and leakage from pump glands and similar seals.

10.8 CONSEQUENCE ANALYSIS

In a plant handling hazardous chemicals, the main hazard arises due to storage, handling & use of these chemicals. If these chemicals are released into the atmosphere, they may cause damage due to resulting fires or vapour clouds. Blast Overpressures depend upon the reactivity class of material and the amount of gas between two explosive limits.

Operating Parameters

Potential vapour release for the same material depends significantly on the operating conditions. Especially for any liquefied gas, the operating conditions are very critical to assess the damage potential.

Inventory

Inventory Analysis is commonly used in understanding the relative hazards and short listing of release scenarios. Inventory plays an important role in regard to the potential hazard. Larger the inventory of a vessel or a system, larger the quantity of potential release.

The potential vapour release (source strength) depends upon the quantity of liquid release, the properties of the materials and the operating conditions (pressure, temperature). If all these influencing parameters are combined into a matrix and vapour source strength estimated for each release case, a ranking should become a credible exercise.

Loss of Containment

Plant inventory can get discharged to Environment due to Loss of Containment. Certain features of materials to be handled at the plant need to the clearly understood to firstly list out all significant release cases and then to short list release scenarios for a detailed examination. Liquid release can be either instantaneous or continuous. Failure of a vessel leading to an instantaneous outflow assumes the sudden appearance of such a major crack that practically all of the contents above the crack shall be released in a very short time. The more likely event is the case of liquid release from a hole in a pipe connected to the vessel. The flow rate will depend on the size of the hole as well as on the pressure, which was present, in front of the hole, prior to the accident. Such pressure is basically dependent on the pressure in the vessel. The vaporisation of released liquid depends on the vapour

pressure and weather conditions. Such consideration and others have been kept in mind both during the initial listing as well as during the short-listing procedure. In the study, Maximum Credible Loss accident methodology is to be used, therefore, the largest potential hazard inventories have been considered for consequence estimation.

10.8.1 DAMAGE CRITERIA

In consequence analysis, use is made of a number of calculation models to estimate the physical effects of an accident (spill of hazardous material) and to predict the damage (lethality, injury, material destruction) of the effects. The calculations can roughly be divided in three major groups:

a) Determination of the source strength parameters;

b) Determination of the consequential effects;

c) Determination of the damage or damage distances.

The basic physical effect models consist of the following.

Source strength parameters

- Calculation of the outflow of liquid, vapour or gas out of a vessel or a pipe, in case of rupture. Also two-phase outflow can be calculated.
- Calculation, in case of liquid outflow, of the instantaneous flash evaporation and of the dimensions of the remaining liquid pool.
- Calculation of the evaporation rate, as a function of volatility of the material, pool dimensions and wind velocity.
- Source strength equals pump capacities, etc. in some cases.

Consequential effects

- Dispersion of gaseous material in the atmosphere as a function of source strength, relative density of the gas, weather conditions and topographical situation of the surrounding area.
- Intensity of heat radiation [in kW/ m^2] due to a fire or a BLEVE, as a function of the distance to the source.
- Energy of vapour cloud explosions [in N/m^2], as a function of the distance to the distance of the exploding cloud.

- Concentration of gaseous material in the atmosphere, due to the dispersion of evaporated chemical. The latter can be either explosive or toxic.

Selection of Damage Criteria

The damage criteria give the relation between extent of the physical effects (exposure) and the percentage of the people that will be killed or injured due to those effects. The knowledge about these relations depends strongly on the nature of the exposure. For instance, much more is known about the damage caused by heat radiation, than about the damage due to toxic exposure, and for these toxic effects, the knowledge differs strongly between different materials.

In Consequence Analysis studies, in principle three types of exposure to hazardous effects are distinguished:

- Heat radiation, from a jet, pool fire, a flash fire or a BLEVE.
- Explosion
- Toxic effects, from toxic materials or toxic combustion products.

In the next three paragraphs, the chosen damage criteria are given and explained.

10.8.2 MAXIMUM CREDIBLE LOSS ACCIDENT SCENARIOS

A Maximum Credible Accident (MCA) can be characterised as the worst credible accident. In other words: an accident in an activity, resulting in the maximum consequence distance that is still believed to be possible. A MCA-analysis does not include a quantification of the probability of occurrence of the accident. Another aspect, in which the pessimistic approach of MCA studies appears, is the atmospheric condition that is used for dispersion calculations. As per the reference of the study, weather conditions having an average wind speed of 1.89 m/s have been chosen.

The Maximum Credible Loss (MCL) scenarios have been developed for the Facility. The MCL cases considered, attempt to include the worst “Credible” incidents- what constitutes a credible incident is always subjective. Nevertheless, guidelines have evolved over the years and based on basic engineering judgement, the cases have been found to be credible and modelling for assessing vulnerability zones is prepared accordingly. Only catastrophic cases

have been considered and not partial or small failures (as is the case in Quantitative Risk Assessment where contributions from low frequency - high outcome effect as well as high frequency - low outcome events are distinguished). The objective of the study is emergency planning; hence only holistic & conservative assumptions are used for obvious reasons. Hence though the outcomes may look pessimistic, the planning for emergency concept should be borne in mind whilst interpreting the results.

10.8.3 CONSEQUENCE ANALYSIS CALCULATIONS

The Consequence Analysis has been done for selected scenarios. This has been done for weather conditions having wind speed 1.89 m/s. In Consequence Analysis, geographical location of the source of potential release plays an important role. Consideration of a large number of scenarios in the same geographical location serves little purpose if the dominant scenario has been identified and duly considered.

10.8.4 SOFTWARE USED FOR CALCULATIONS

10.8.4.1 Phast Micro:

Phast is the most comprehensive software available for performing Process Hazard Analysis (PHA), Quantitative Risk Assessment (QRA) and Financial Risk Analysis (FRA). Our extensively validated software for consequence and risk analysis is used by governments and industry helping them to comply with local safety regulation and their own corporate best practice. Phast contains all the discharge, dispersion, effects and risk models you will need to accurately assess all your major hazards and associated risks. Phast Consequence provides you with comprehensive hazard analysis facilities to examine the progress of a potential incident from the initial release to its far-field effects.

Toxic and Flammable Impact

It calculates the initial discharge, as the material expands from its storage conditions to atmospheric, through dispersion, as the material mixes with air and dilutes, and the subsequent toxic or flammable effects. Phast includes a wide range of models for discharge and dispersion as well as flammable, explosive and toxic effects.

Discharge

- Phast requires basic information about storage or process conditions and material properties in order to perform discharge calculations
- The software comes with an integrated material property database containing more than 1,600 pre-defined pure component chemicals
- Various discharge scenario options have been implemented to represent common process failures, and model their behavior. These include:
    - ❖ Leaks and line ruptures from long & short pipelines
    - ❖ Catastrophic ruptures
    - ❖ Relief valve and disc ruptures
    - ❖ Vent from vapour spaces
    - ❖ In building release effects

Dispersion

The dispersion models within Phast are able to model the following phenomena

- Dispersion of gas, liquid and two-phase releases
- Liquid droplet thermo dynamics calculations and liquid droplet rainout
- Pool spreading and vaporization
- Building wake dispersion effects for vapor releases

Flammable Effects

For releases of flammable material Phast calculates

- Radiation profiles and contours from a range of fire scenarios including pool fires, flash fires, jet fires and fire balls, including cross-wind effects on a jet fire
- Vapor Cloud Explosion modeling using industry standards models including the TNO Multi-energy, Baker Strehlow Tang and TNT Equivalence models
- Overpressure contours from Boiling Liquid Expanding Vapour Explosions

Toxic Effects

- Graphs of toxic concentration profile

- Indoor and outdoor toxic dose prediction
- Reporting of distance to specific dose and concentration
- Calculated exposure time and use as “averaging time” for passive dispersion effects

Phast Risk

Phast Risk allows you to combine the flammable and toxic consequences from each scenario in your QRA model with their likelihood to quantify the risk of fatalities. Phast Risk allows you to take account of local population distribution, sources of ignition, land usage and local prevailing weather conditions. It is designed to perform all the analysis, data handling and results presentation elements of a QRA within a structured framework.

Phast Risk allows you to quickly identify major risk contributors so that time and efforts can be directed to mitigating these highest risk activities. Based on effects calculations and population vulnerabilities, Phast Risk can integrate over all scenarios and weather conditions to estimate the total risk. The established individual and societal risk indicators are predicted by Phast Risk across your facility and surrounding area using the classical QRA methodology. Risk ranking reports can be produced at points of strategic importance to show the relative influence of the various failure scenarios and their contribution to both the individual and societal risk metrics.

A key benefit of Phast Risk is the ability to identify major risk contributors and differentiate these from incidents with worst case consequences which might otherwise dominate the safety reviews. Whilst medium scale incidents have lesser consequences, they may have a higher frequency, which, when combined with their hazardous effects, generate a higher level of risk. Time and effort directed to mitigating high consequence but often low frequency events may not be well spent. Phast Risk helps you direct this effort more effectively.

Phast Risk also provides facilities to help you manage large quantities of input data, including scenarios, parameters, wind roses, ignition and population, and combine these in

many ways. This is critical when looking at sensitivity analyses and assessing the merits of a range of risk reduction measures.

Benefits

- Facilitates cost reduction in terms of losses and insurance
- Allows optimization of plant and process design
- Assist in compliance with safety regulators
- Enables quicker response to hazardous incidents
- Improve engineer's understanding of potential hazards
- Regular software upgrades incorporate industry experience and expertise, and advances in consequence modeling technology

Financial Extension

The Financial Consequence extension is used to assess situations which present potential hazards not only to life but also to the environment, property and business and help quantifying their severity in financial terms. Phast Financial helps you to estimate the cost of a particular release of a given material under specified conditions. The Financial Risk extension helps you to calculate the broader financial risks associated with accidents and can be used to help manage your business risk and assess appropriate levels of insurance.

Blast Extension for Explosion Risk

The Blast extension permits more accurate explosion modeling and thus better risk predictions. It provides all the extra functionality required to assess overall risks taking account of protection provided by different types of structure and areas of congestion on your plant. Models supported include the Multi Energy and Baker Strehlow Tang explosion models and a number of industry standard vulnerability models

Multi-Component Extension

The multi-component extension to Phast provides greater accuracy for liquid or two-phase mixture releases compared to the standard pseudo-component approach. The composition

of each component of the mixture is calculated throughout the discharge and dispersion phases of the release.

10.9 SCENARIOS

TABLE – 10.3

POSSIBLE ACCIDENT SCENARIOS

Scenario	MCL Scenario	Quantity
1	Release of Sulphuric Acid	20 MT
2	Release of Nitrobenzne	20 MT
3	Unconfined Pool Fire Simulations for Drum Storage Area	10 MT

Consequence Analysis

Introduction

In this, the source terms for each defined failure cases are presented, including calculated release rate, release duration and total released mass of fluid. Subsequently consequence results from selected failure cases are also presented in order to give overview on the extent of impact from potential major accident scenarios. Five types of consequences are presented, i.e. jet fire, pool fire, flash fire, explosion and toxic impact.

CONSEQUENCE DISTANCES

Pool Fire, Fire ball, Flash Fire

The extent of the consequence of a Pool fire is represented by the thermal radiation envelope. Three levels of radiation are presented in this report, i.e.:

· 4 kW/m^2; this level is sufficient to cause personnel if unable to reach cover within 20s; however blistering of the skin (second degree burn) is likely; 0: lethality.

· 12.5 kW/m^2; this level will cause extreme pain within 20 seconds and movement to a safer place is instinctive. This level indicates around 6% fatality for 20 seconds exposure.

· 37.5 kW/m^2; this level of radiation is assumed to give 100% fatality as outlined above.

10.9.1 DETAILED SUMMARY OF RESULTS:

Detailed Results of the consequence analysis of above-mentioned scenarios have been given below:

Scenario # 1: Release of Sulphuric Acid

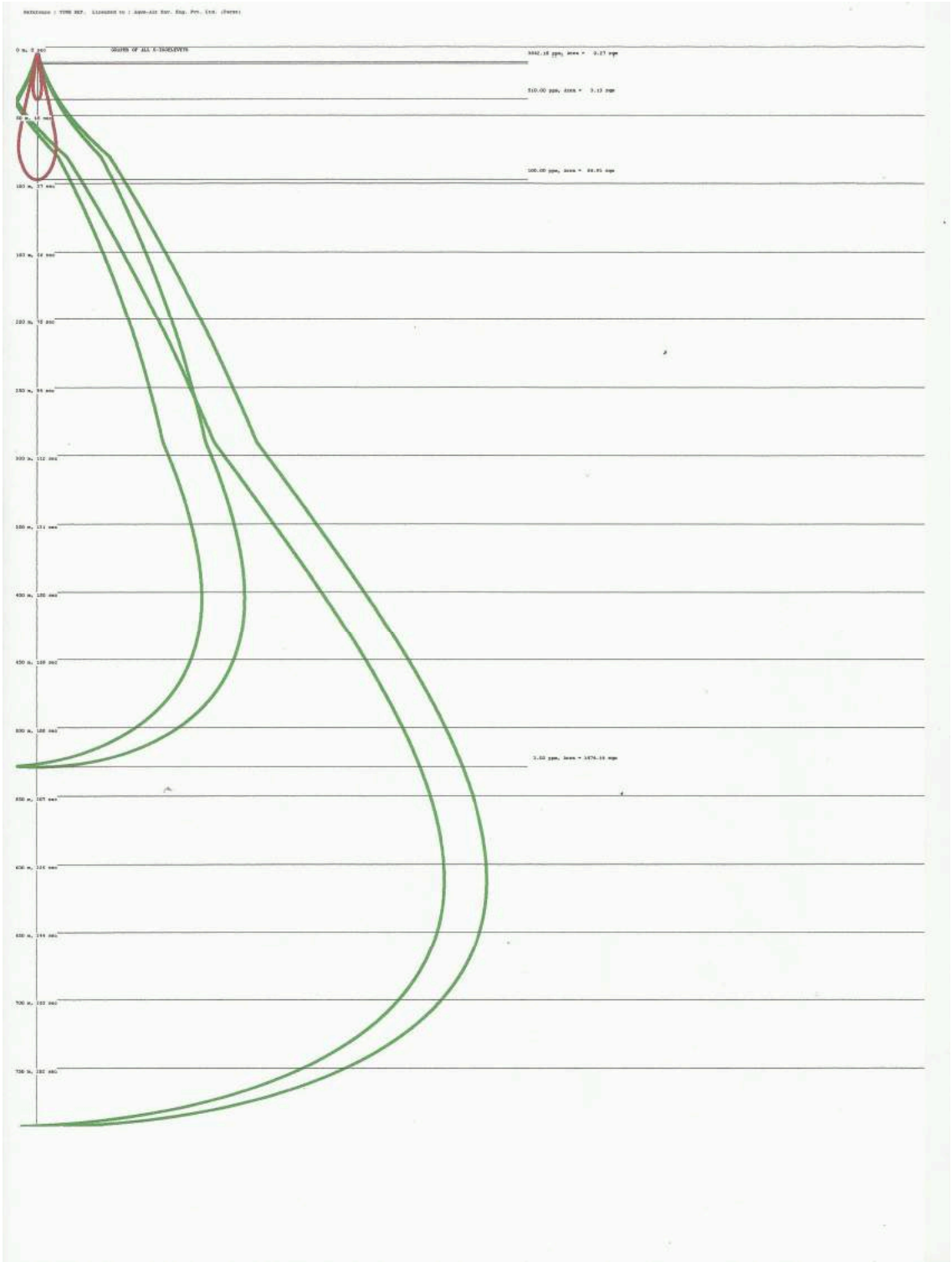
Spill pool evaporation module for Sulphuric Acid due to Catastrophic Rupture of 20 MT Storage Tank	
Input Data	
Stored quantity - 20 MT	
Molecular weight -98.08	
Failure Mode: Catastrophic failure of 4" bottom nozzle and loss of containment	
Density (Air) – 1840 kg/m^3	
Release rate: 1000 g/s	
Results indicate	
LC50 – 510 ppm	38.26 meter
IDLH – 3 ppm	528.56 meter
TLV –1 ppm	792.29 meter

Results:-

- LC50 HUMAN (510 ppm) area is up to 38.26 meter,
- IDLH (3 ppm) concentration area is up to 528.56 meter and
- TLV (1 ppm) area is up to 792.29 meter.

Therefore, 528.56 meter area in wind direction is considered as evacuation area.

TOXIC EFFECT (SULPHURIC ACID)



MITIGATION MEASURES FOR SULPHURIC ACID LEAKAGE:

- ✓ Isolate the source if possible without risk.
- ✓ If leakage is small, 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.
- ✓ 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 vapor drift.
- ✓ Use water spray to reduce vapors.
- ✓ Prevent entry into sewers, basements or confined areas.
- ✓ Neutralize the residue with a dilute solution of sodium carbonate.

PREVENTIVE MEASURES TO AVOID SULPHURIC ACID LEAKAGE:

- ✓ A dike will be provided to accommodate the full quantity in tank.
- ✓ Periodic testing of storage tank will be done by competent person.
- ✓ Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective TLVs. Storage tank vent is connected to scrubber system.
- ✓ Flange guard provided to prevent splash of material.
- ✓ Level interlock
- ✓ Keep container dry. Never add water to this product.
- ✓ In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label.
- ✓ Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, organic materials, metals, alkalis, moisture.
- ✓ Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.
- ✓ While handling always use face shield. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent.
- ✓ Ensure that eyewash stations and safety showers are proximal to the work-station location.

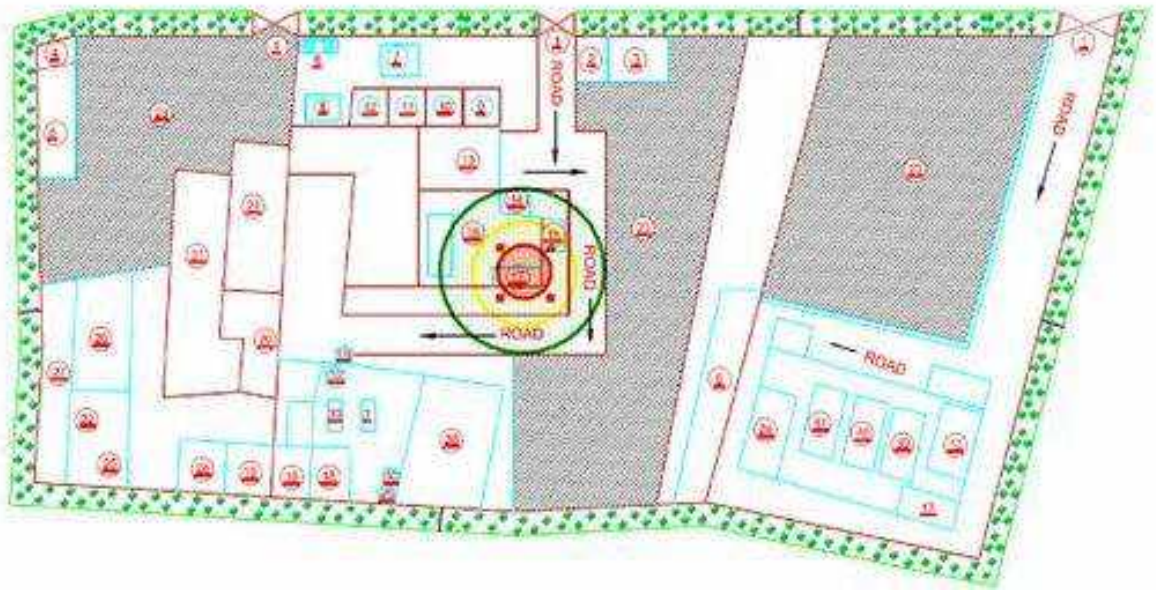
Scenario # 2: Release of Nitrobenzne

This scenario considers release of **Nitrobenzne** from Storage Tank:

Results indicate:

Catastrophic Rupture		
Input Data		
Stored quantity - 20 KL		
Molecular weight – 123.11		
Vapor Density (Air=1) – 4.25		
Results indicate		
Pool Fire Scenario		
Radiation Level (KW/m^2)	**Distance in meter**	**Effect if IHR at Height of simulation**
4	38.50	This level is sufficient to cause personnel if unable to reach cover within 20s; however blistering of the skin (second degree burn) is likely; 0: lethality
12.5	20.31	This level will cause extreme pain within 20 seconds and movement to a safer place is instinctive. This level indicates around 6% fatality for 20 seconds exposure.
37.5	10.60	This level of radiation is assumed to give 100% fatality as outlined above.

Scenario- Release of Nitrobenzene

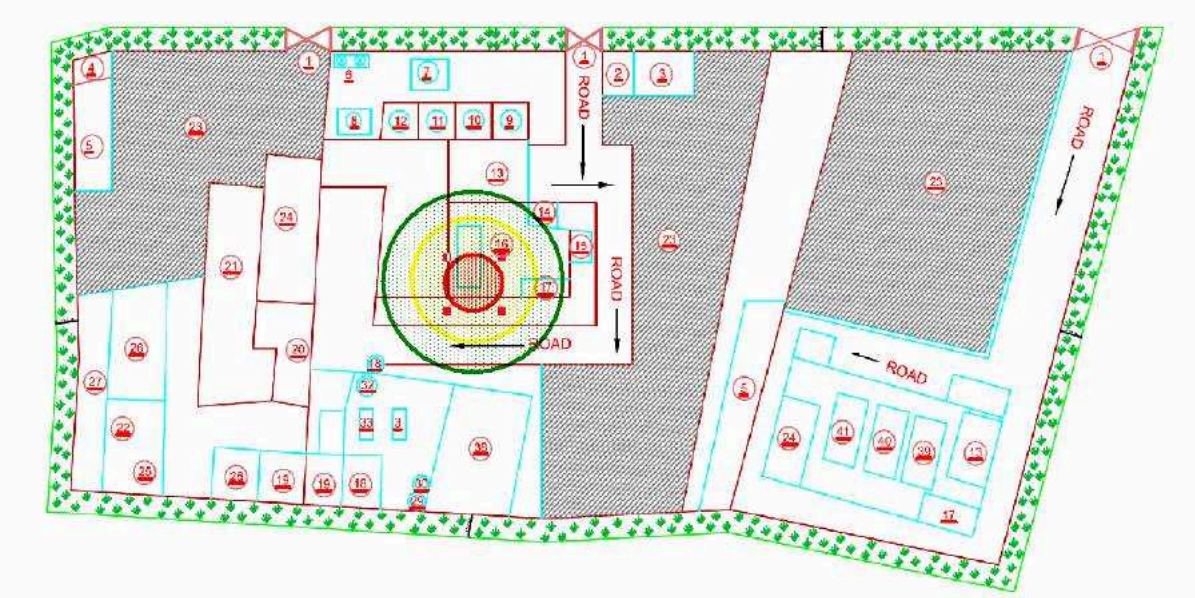


Scenario-3 Unconfined Pool Fire Simulations for Drum Storage Area

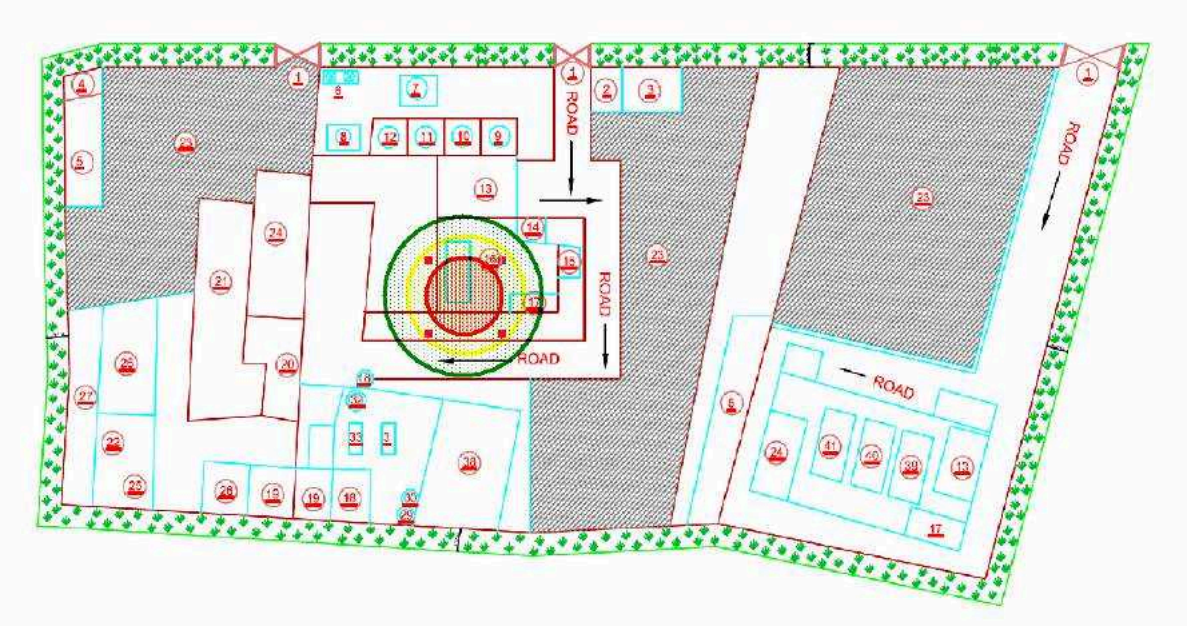
Catastrophic Rupture		
Input Data		
Stored quantity - 10 MT		
Density (Air) – 0.867 g/cm^3		
Results indicate		
Pool Fire Scenario		
Radiation Level (KW/m^2)	**Distance in meter**	**Effect if IHR at Height of simulation**
4	38.2	This level is sufficient to cause personnel if unable to reach cover within 20s; however blistering of the skin (second degree burn) is likely; 0: lethality
12.5	25.8	This level will cause extreme pain within 20 seconds and movement to a safer place is instinctive. This level indicates around 6% fatality for 20 seconds exposure.
37.5	10.40	This level of radiation is assumed to give 100% fatality as outlined above.
Fire Ball Scenario		

Radiation Level (KW/m^2)	**Distance in meter**	**Injury Type**
4	42.0	Pain after 20secs.
12.5	29.1	1st degree Burn
37.50	12.2	100% Fatal

Pool Fire Scenario:



Fire Ball Scenario:



10.9.2 Measures to control and mitigate Emergency of fire & explosion:

Measures to be taken to prevent such accident:

- Security person will check License, TREM CARD, Fire extinguisher condition, Antidote Kit, required PPEs as per SOP laid down.
- Store officer will take sample as per sampling SOP from sampling point.
- After approval of QC department unloading procedure will be allowed be started.

Following precautions will be adopted during unloading

- Wheel stopper will be provided to TL at unloading platform.
- Static earthing will be provided to road tanker.
- Tanker unloading procedure will be followed according to check list and implemented.
- Flexible SS hose connection will be done at TL outlet line.
- Finally earthing connection and wheel stopper will be removed.
- Only day time unloading will be permitted.

Following precautions will be adopted Storage of such chemicals

- Tanker unloading procedure will be prepared and implemented.
- Caution note and emergency handling procedure will be displayed at unloading area and trained all operators.
- NFPA label will be provided.
- Required PPEs like full body protection PVC apron, Hand gloves, gumboot, and Respiratory mask Breathing Appratus etc. will be provided to operator.
- Neutralizing agent will be kept ready for tackle any emergency spillage.
- Safety shower, eye wash with quenching unit will be provided in acid storage area.
- Material will be handled in close condition in pipe line.
- Double drain valve will provided.
- Safety permit for loading unloading of hazardous material will be prepared and implemented.

- TREM CARD will be provided to all transporters and will be trained for transportation Emergency of Hazardous chemicals.
- Fire hydrant system with jockey pump as per TAC norms will be installed.

Mitigation measures to control Emergency:

- Hydrant system & sprinkler system will be provided as per requirements.
- Emergency organization and team will be prepared as per On site-Off site emergency planning
- Solvent transportation safety SOP will be prepared and trained employees.
- Emergency siren and wind sock will be provided.
- Scenario base Off Site emergency Plan will be prepared.
- Tele Communication system and mobile phone will be used in case of emergency situations for communication.
- First Aid Boxes and Occupational health centre will be made at site.
- Full body protection suite and other PPEs will be kept ready in ECC at site.
- Emergency team will be prepared and trained for scenario base emergency. Like Toxic control team, Fire control team, First aid team, Communication and general administration team, Medical team etc.

EMERGENCY RESPONSE

DO NOT EXTINGUISH A LEAKING GAS FIRE UNLESS LEAK CAN BE STOPPED.

Small Fire

Dry chemical or CO2.

Large Fire

Water spray or fog.

Move containers from fire area if you can do it without risk.

Fire involving Tanks

· Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.

· Cool containers with flooding quantities of water until well after fire is out.

· Do not direct water at source of leak or safety devices; icing may occur.

· Withdraw immediately in case of rising sound from venting safety devices or discoloration

of tank.

· ALWAYS stay away from tanks engulfed in fire.

· For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

SPILL OR LEAK

· ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).

· All equipment used when handling the product must be grounded.

· Do not touch or walk through spilled material.

· Stop leak if you can do it without risk.

· If possible, turn leaking containers so that gas escapes rather than liquid.

· Use water spray to reduce vapors or divert vapor cloud drift. Avoid allowing water runoff to contact spilled material.

· Do not direct water at spill or source of leak.

· Prevent spreading of vapors through sewers, ventilation systems and confined areas.

· Isolate area until gas has dispersed.

10.10 HAZARDOUS MATERIALS TRANSPORTATION SAFETY GUIDELINES

Introduction

Transportation typically involves carrying of small amounts of materials over short distances transportation does, however, pose significant risks from the frequency of the activity and the lack of observance of prescribed regulations. The hazardous materials should be packaged, based on the composition in a manner suitable for handling, storage and transport. Labelling and packaging is required to be easily visible and be able to withstand physical conditions and climatic factors. These guidelines are issued to facilitate safe transportation of the hazardous material in compliance of the regulations. In view of the stringent product quality requirement, various complex processes are introduced involving the handling of hazardous chemicals. These chemicals pose various types of hazards like flammability, toxicity, explosives, corrosives etc. Inadequate awareness about the hazardous properties of these chemicals may lead to serious accidents which will affect the men at work and the environment.

Scope

This document applies to the vehicular transportation, within geographically contiguous, of hazardous materials, substances, and wastes. Hazardous materials include chemical materials, substances or wastes. Transportation shall be performed in a manner which minimizes risk to the health and safety of employees, the public and the environment.

Guidelines for Transportation

General

It will be ensured that during the transportation contents are not spilled, packaging is not damaged and personnel are properly trained to generate, transport and receive such materials. In general, the traffic control program at M/s. Unity Organics Pvt. Ltd. requires that an onsite driver possess a valid driver's license. The maximum speed limit is 12 KMPH. TREM (Transport Emergency) cards are to be provided to the drivers.

Packing

The containers must be able to withstand normal handling and retain integrity for a minimum period of six months. In general, packaging for hazardous substances must meet the following requirements:

- All packaging materials including containers shall be of such strength, construction and type as not to break open or become defective during transportation.
- All packaging materials including containers shall be so packaged and sealed those spillages of hazardous materials / substances are prevented during transportation due to jerks and vibrations caused by uneven road surface.
- Re-packaging materials including that used for fastening must not be affected by the contents or form a dangerous combination with them.
- Packaging material should be such that there will be no significant chemical or galvanic action among any of the material in the package.
- Ensure that any cushioning or absorbent material used for packaging is also compatible with the hazardous material.

The containers when used for packaging of the hazardous Material shall meet the following requirements:

- Modes of packaging, like collection in 200-litre plastic drums, cardboard cartons, PP and HDPE/LDPE containers etc., also work for variety of materials. However, all such container should be amenable to mechanical handling.
- It should be leak proof.
- Use drums that are in good condition and free of rust and major dents.
- Ensure that drums are not leaking or overfilled before transporting them.
- Ensure that drum bungs are tight.
- Carefully inspect pallets before they are loaded.
- Do not use pallets with cracked or broken slats.
- Use a drum dolly to place drums on pallets.
- Secure all drums to the pallet with appropriate strapping material.
- In general, the containers for liquid HM should be completely closed, in fact sealed. There should be no gas generation due to any chemical reaction within the container, and, hence, there should not be any need for air vents; expansion due to increase /decrease in temperature normally does not need air vents.
- Container should be covered with a solid lid or a canvas to avoid emissions of any sort including spillage, dust etc. and to minimize odour generation both at the point of loading as well as during transportation.
- Container used for transportation of Material should be able to withstand the shock loads due to vibration effect/undulations of pavements etc.
- Container should be easy to handle during transportation and emptying.
- As far as possible, manual handling of containers should be minimized. Appropriate material handling equipment is to be used to load, transport and unload containers. This equipment includes drum, dollies, and forklifts, drum handling equipment, lift gates and pallets. Drums should not be rolled on or off vehicles.
- Where two-tier or three-tier storage is envisaged, the frame should have adequate strength to hold the containers.

- One-way containers are also allowed. The multi-use containers should be re-usable provided it should be cleaned and free from deterioration or defects.
- Loads are to be properly placed on vehicles. HM containers are not to overhang, perch, lean or be placed in other unstable base. Load should be secured with straps, clamps, braces or other measures to prevent movement and loss. Design of the container should be such that it can be safely accommodated on the transport vehicle.
- Dissimilar materials shall not be transported in the same container.

Labelling

There are two types of labeling requirements:

i. Labeling of individual transport containers [ranging from a pint-size to a tank], and

ii. Labeling of transport vehicles.

- All hazardous Material containers must be clearly marked with current contents. The markings must be waterproof and firmly attached so that they cannot be removed. Previous content labels shall be obliterated when the contents are different. Proper marking of containers is essential.
- Color code is to be provided to the tanker to indicate the type of material present in that.
- Containers that contain HM shall be labeled with the words "HAZARDOUS MATERIAL" in Vernacular language, Hindi / English. The information on the label must include the code number of the Material, the Material type, the origin (name, address, telephone number of the supplier and receiver), hazardous property (e.g. flammable, corrosive), and the symbol for the hazardous property.
- The label must withstand the effects of rain and sun. Labeling of containers is important.

The following are the requirements for labeling:

Emergency contact phone numbers shall be prominently displayed viz. the phone number of concerned Regional Officer of the SPCB, Fire Station, Police Station and other agencies concerned.

Unloading of Drums / Containers

- Manual handling of drums / containers should be minimized. It is preferable fork-lifters and suitable cradles are used to handle drums.
- Carboys containing hazardous chemicals should not be subjected to impact.
- Suitable protective clothing should be used while handling drums / containers and the operators should position him such that he is in the upwind direction so that even in case of accidental release of chemical, he is safe.

10.11 RECOMMENDATIONS

The following actions are particularly recommended to be implemented in order to ensure **ALARP (As Low As reasonably practical)** performance in the operation: Maintain and ensure effectiveness of all the safety measures, among others through the following actions:

Raw Material Storage Area (Ware House I&II)

- The raw material storage area, i.e. ware house, should be declared as a prohibited area and should be provided having at least two exits, “No Smoking” and “Prohibited Area” display boards, as applicable should be provided at site.
- Regular inspection of drums containing raw material to be done to take care.
- Periodic site inspection should be carried out to ensure that there is no leakage from any of the drums in the ware house.
- Fire hydrant system needs to be provided in ware house area as per TAC standards.
- Smoke detector and fire alarm systems need to be provided.
- Provision of fire doors in ware house area.

The following features are also important for the project by taking the layout into consideration:-

- Hinged doors swing outward in an explosion.
- Window panes (if installed) are shatterproof or plastic in frame.
- Floors, walls and ceilings are designed and installed to limit the generation and accumulation of static electricity.
- All doors must be fire resistant. Floors, walls and ceilings are designed for at least 2 h of fire resistance.
- Walls or partitions are continuous from floor to ceiling, and securely anchored.
- Integrity of the wall should be ensured i.e. blast wall not to be broken or drilled as that can leads to weak spots.
- The building is constructed of non-combustible materials, on a substantial frame.
- Restrained deflagration vent panels are present.
- There is adequate ventilation, and any heating in rooms is limited to steam, hot water, or other indirect means.

Electrical Safety for Whole Facility

- Electrical Safety: All cables and electric fittings shall be constructed, installed, protected, operated and maintained in such a manner so as to prevent risk of open sparking.

10.12 DISASTER MANAGEMENT PLAN - ON-SITE /OFF-SITE EMERGENCY PLAN

Unity Organics Pvt. Ltd. has prepared the Disaster Management Plan to minimize human, property and economic losses.

The purpose of this plan is to provide M/s. Unity Organics Pvt. Ltd. with the means to effectively utilize all the resources at its disposal for the protection of life, environment and property. The same DMP shall be updated after installation of plants or facilities. The details of the same are discussed in the following sections.

10.12.1 DEFINING THE NATURE/LEVEL OF EMERGENCY

THE LEVEL OF EMERGENCY CAN BE CLASSIFIED IN THREE CATEGORIES:

LEVEL - 1:

The leakage or emergency, which is confinable within the plant/area. It may be due to:

a) Small pipe/valve rupture or similar leakages that do not affect outside premises

b) Release of toxic chemicals for short duration.

c) Small fire in the plant

LEVEL - 2:

The emergency, which is confinable within the factory premises. It may arise due to -

a) Medium scale leakage of toxic chemicals for long duration

b) Medium scale explosion confined to the factory premises.

c) Medium scale fire inside the factory premises.

LEVEL - 3:

The emergency, which is not confinable within the factory premises and general public in the vicinity likely to be affected. It may arise due to -

a) Heavy / Profuse leakage of toxic / flammable gases for a long duration

b) Explosion of high magnitude affecting the adjacent area

c) Major fire inside the factory premises.

10.12.2 STRUCTURE OF EMERGENCY MANAGEMENT SYSTEM

Unity Organics Pvt. Ltd. will develop an emergency management team. The management structure includes the

Following personnel's;

- Site Main Controllers
- Incident Controllers and Deputy Incident Controllers
- Key Personnel's
- Essential Workers

The other elements of Disaster Management Plan are:

- Assembly points
- Emergency control center
- Fire control arrangements

- Medical arrangements
- Other arrangements

10.12.2.1 SITE MAIN CONTROLLER

Plant head will be the Site Main Controller. In absence of Plant Head, Safety in Charge will act as a SMC. His task will be to co-ordinate all internal and external activities from the Emergency Control Centre at Main Security Gate from where all operations will be directed. He shall…

- Immediately on being informed of the emergency and its location, will arrive at the site, review the situation and control further actions.
- Direct all Emergency Operations within the approved area with the following priorities:
  a) Personnel Safety,
  b) Plant, Property and Environment Safety and
  c) Minimum loss of production.
- Co-ordinate to avail services from external agencies like fire brigade, hospitals etc, if called for, following the declaration of major emergency. If necessary, major installations in the vicinity may also be informed of the situation.
- Exercise direct operational control of the unaffected section of the plant.
- In consultation with the advisory team, expedite the shutting down of loading / unloading operations of tankers and if necessary, instruct the supervisor / security personnel to evacuate tankers.
- Ensure that all employees are evacuated from the affected area and the casualties, if any, are given necessary medical attention. Instruct P & A Assistant / Security for rushing casualties to hospitals if required.
- Liaise with fire and police officials, pollution control board officials and other statutory bodies and advise them of all possible consequence effects outside the premises.
- Arrange for relief of personnel when emergency is prolonged.
- Issue authorized statement or press release to the news – media.
- Ensure preservation of evidence for enquiries to be conducted by statutory authorities.

- Authorize the sounding of “All Clear” and “Evacuation Siren”.
- Arrange for obtaining the head – count of all personnel within the premises and cross-checking with the data from records available for no. of persons within the premises.
- Nominate a person from advisory team, to maintain chronological log of event during the entire period of emergency.

10.12.2.2 ROLE OF INCIDENT CONTROLLER AND DEPUTY INCIDENT CONTROLLER

His primary duties are to take charge at the scene of the incident. In the initial stage he may be required to take decisions involving the operation of the other plants or to stop or continue any process and to take technical decisions to control the incident. The deputy incident controller should take the charge of incident controller, if he is not available due to any reason. As unit will be running 24 hrs, so each plant shift in charge are being nominated as I.C (after 'G' Shift) and they will be always available in the shift and can take charge till the arrival of IC.

Responsibilities/Duties of Incident Controller and Deputy Incident Controller:

- Head of the concern department will act as incident controller.
- He shall take charge at the scene of incident.
- He shall immediately assess the gravity of risk and alert panel and field operators to start controlling their respective section.
- He will work under the direction of the SMC, but till his arrival he may have to execute following responsibilities.
- Ensure that all the Key Personnel are called.
- Direct for evacuation of plant and areas likely to be affected by the emergency.
- He shall communicate to the SMC the type of outside help needed.
- He shall direct all emergency operations within the affected area with the following priorities.
- Personnel safety, including of surrounding community.
- Minimum damage to Plant, Property and Environment.
- Appropriate actions to minimize loss of Production and Material.

- Give information to the head of fire fighting and rescue team and other emergency services.
- Depending on the incident, instruct partial or total shut down, isolations, depressurization, Nitrogen purging, fire fighting, rescue operations.
- Instruct upstream/downstream units to take emergency shutdown /cutting off supply and other appropriate actions and emergency evacuation help etc.
- Direct for search of casualties.
- Evacuate non-essential workers/visitors/contractors to safe assembly points.
- Brief site main controller and keep him informed about the developments.
- Preserve evidences. This will be necessary for investigation for cause and concluding preventive measures.

10.12.2.3 KEY PERSONNELS

Key Personnel are required to provide and to implement the decisions made by the SMC, in the light of information received on the developing situation, at the time of emergency. As necessary, they will decide the actions needed to shutdown plants, evacuate personnel, carryout emergency engineering work, arrange for supplies of equipments, utilities, carryout environment monitoring, provide catering facilities, liaise with police, fire brigade and other local authorities, relative of casualties, hospital, press & neighboring industries. All the key personnel and other called in so to assist shall report to the ECC. They shall be available at any time on duty or on call or on oil duty or holiday. A task force of essential trained workers will be available to get the work done by the incident Controller and the site Main Controller.

OTHER ELEMENTS OF DMP:

10.12.2.4 ASSEMBLY POINT

In affected & vulnerable plants, all nonessential workers (who are not assigned any emergency duty) will be evacuated from the area & they shall report to specified Assembly Points. Assembly Point will be located at a safe place, well away from area of risk and least affected by the down wind direction. To ensure that workers do not have to approach the affected area to reach the Assembly Point, proper identification board have been marked at

Assembly Point. Each Assembly Point is manned by a nominated person to record the names and dept. At each Assembly Point duties of Assembly Point In-charge has been also displayed in brief. Before reaching an Assembly Point or subsequently, if it is required to pass through an affected area or due to presence of toxic substances. Suitable PPE's including respirators, helmet etc., are issued & made available with workers.

10.12.2.5 EMERGENCY CONTROL CENTER

The Emergency Control Center is the place or room from where the operations to handle the emergency are directed and coordinated.

Main Control Room shall be earmarked/identified as the Emergency Control Room.

Fire Control Room shall be earmarked/identified as the alternative Emergency Control Room to be operated in case of unfavorable wind direction.

Adequate Telecommunication System will make available in the Emergency Control Room.

The ECC center has been equipped with the following facilities.

1. Internal and external telephone including STD facility
2. Telephone directory
3. Telephone nos. of mutual aid centers
4. Factory layout plan
5. Map of the area
6. Employee blood group and their address
7. Messengers / Runners for sending messages
8. Adequate numbers of PPE'S

10.12.2.6 FIRE CONTROL ARRANGEMENTS (FIRE FIGHTING, GAS LEAK CONTROL AND RESCUE PERATION)

A) Role of Manager (Fire and Safety) / Shift In-Charge (Fire & Safety)

1. Incident Controller will be the only person to direct the fire fighting and Emergency operation.

His duties include…

2. Keep the constant touch with the SMC / Incharge - EHS.
3. Direct the crew members to the scene of emergency and arrange replenishment of Manpower / equipment / extinguishing media etc.

B) Role of EHS Representative:

1. On being notified about the location of fire/ gas leakage immediately proceed to the help.
2. Decide his line of action in consultation with Incident controller and take appropriate measures to handle the emergency.
3. Assessing the severity of the incident immediately report to emergency controller about the gravity of the situation.
4. He will assess the extra requirement required if any from the neighboring industry.

C) Fire crew members

1. On hearing fire alarm, emergency siren they shall immediately report to control room and proceed to the scene of emergency and work under the direction of IC/ Dy IC.
2. The personal availability at the scene of incident to be made optimize.

D) Emergency Squad Members

1. On hearing Emergency Siren, they shall immediately report to site main controller, safety in charge or incident controller.
2. They shall combat the emergency situation as per the direction of site main controller, safety in charge or incident controller.
3. They shall help for safe evacuation.

10.12.2.7 MEDICAL SERVICES

The roles of Medical officers are as follows;

(a) He will report immediately to the SMC/IC.

(b) He will render necessary treatment, at Occupational Health Center.

(c) He will arrange for Hospitalization and Treatment at outside hospitals, if required.

(d) He will mobilize in getting the services of External medical agencies, other Para –medical services etc. and transportation services etc.

(e) He will arrange for extra medical assistance/antidotes, from out, if required.

(f) He will arrange for first-aid trained volunteers for necessary help.

(g) He will liaise with the Government Health Authorities for treatment of the affected persons nearby.

10.12.2.8 ROLE OF SECURITY IN-CHARGE (SECURITY OFFICER)

- On hearing the emergency siren, he shall find out the location of the incident (fire / gas leak /spill / explosion) and inform the location of the same to the key personnel coming to the plant.
- He will depute the security guards for managing gates and traffic control at the incident site,& send remaining guards to the site of incident.
- He will prevent unauthorized entry in to the site
- He will render assistance as demanded by the safety in-charge.
- He will mobilize additional security force for help, if required.
- He will direct ambulance(s) and emergency vehicle(s) to the scene of incident.
- He will help evacuate persons within the scene of incident.
- As directed by the site main controller, he may be required to address the public of surrounding villages for warning / evacuation.

10.12.2.9 ROLE OF MUTUAL-AID MEMBERS

- On receiving the call they shall proceed immediately with fire squad & fire tenders.
- They will be guided to the place of the incident by the main gate security guard.
- The fire squad in-charge will report to the safety in charge of the unit in which the incident has occurred.

10.12.3 COMMUNICATION SYSTEM

After the assessment of risk & their possible environmental impact and after making an organization for the preparedness to control the emergency, the next most essential step is to make us ready for Communication at the time of emergency. Communication System is a Crucial Factor while handling emergency. Company have quick & effective Communication System through which, any situation, which can lead to emergency, can be informed or known to…

i. All persons working inside the plant.

ii. Key Personnel outside during normal working hours & during off-duty hours.

iii. Outside emergency services, Statutory and Local Authorities and

iv. Neighboring facilities and public leaving in vicinity.

Each and every section, Plant & Department of the Factory is connected by internal telephones. External Phone at Office and Residence and Mobile are also available with Key Personnel and top executive of the factory. The Communication System begins with raising the alarm declaring the emergency, Telephone messages and Procedure to communicate the emergency to other persons & General Public.