7 ADDITIONAL STUDIES

7.1 Public Consultation

As per TOR Letter dated 4th May 2016, the proposed project is exempted from Public Hearing as it is located within the Notified Industrial Estate.

7.2 Consequence Analysis & Risk Assessment

7.2.1 Background

Key issues in Risk Assessment (RA) of the unit (M/s Unnati Udhyog Pvt. Ltd.) i.e. Category 7(h) & 7(d) of the Schedule to the EIA Notification dated Sept. 14, 2006 (amended till date). The risk assessment process is intended to identify probable hazards in the work environment and all operations, to quantify the hazards and to assess the risk levels of those hazards in order to prioritize those that need an immediate attention.

In the unlikely event that an abnormal consequence has occurred, the disaster management kicks in. This includes prescribing the procedures pertaining to a number of issues such as communication, encounter, rescue, rehabilitation and further steps to prevent recurrence of such consequence in future. These issues are addressed in the disaster management plan.

Both, the RA and DMP are living documents and need to be updated whenever there are changes in operations, equipment or procedures.

7.2.2 Key Definitions

The terminologies used in this Risk Assessment (RA) study are defined below.

Consequence: Magnitude or size of the damage or loss. In terms of health and safety, it is the degree of harm that could be caused to the people exposed to hazard, the potential severity of injuries or ill health, and/or the number of people who could be potentially affected. Consequence of hazard need not only be in terms of human safety criteria, but could also be in terms of a financial loss due to production and incurred costs due to repairs/replacement, environmental impacts as well as public outrage.

Disaster: A catastrophic consequence of a major emergency/accident that leads to not only extensive damage to life and property, but also disrupts all normal human activity for a significant period of time and requires a major national and/or international effort for rescue and rehabilitation of those affected.

Emergency: A situation of process deviation that, if uncontrolled, may lead to a major accident/disaster with potential short term and/or long term risk damage consequence to life and property in and/or around the workplace.

Emergency Response Planning Guidelines1 (ERPG1): The maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour (without a respirator) without experiencing other than mild transient adverse health effects or without perceiving a clearly defined objectionable odour.

Emergency Response Planning Guidelines2 (ERPG2): The maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing or developing irreversible or other serious health effects or symptoms that could impair their abilities to take protective action.

Emergency Response Planning Guidelines3 (ERPG3): The maximum airborne concentration below which it is believed nearly all individuals could be exposed for up to 1 hour without experiencing or developing life-threatening health effects.

Hazard: Source of potential harm, injury or loss to man and machines.

Immediately Dangerous to life and health (IDLH): It represents the maximum concentration of a chemical from which, in the event of respiratory failure, one could escape within 30 minutes without a respirator and without experiencing any escape/impairing (e.g. severe irritation) or irreversible health effects.

Lethal Concentration Low (LCLo): It is the lowest concentration of a material in air, other than LC50, which has been reported to cause death in human or animals.

Risk: Combination of the likelihood of a specific unwanted event and the potential consequences, if it occurs.

Risk Assessment: A process that involves estimation and measurement of risk to determine priorities and to enable identification of appropriate level of risk treatment (used also to describe the overall process of risk management).

Risk Control: Implementation of strategies to prevent, control and minimize hazards.

Risk Management: Overall description of the steps taken to manage risk, by identifying hazards and implementing controls in the workplace.

Risk Rating: The category, level, or risk assigned following risk assessment (e.g. High, Medium, or Low).

Threshold Limit Value (TLV): it is the permitted level of exposure for a given period on a weighted average basis (usually 8 hrs for 5 days in a week)

Short Time Exposure Limit (STEL): it is the permitted short-term exposure limit usually for a 15 minutes exposure.

Toxic Concentration Low (TCLo): It is the lowest concentration of a material in air, to which humans or animals have been exposed for any given period of time that has produced a toxic effects in humans or produced carcinogenic, neoplastigenic or tetratogenic effect in humans or animals.

7.2.3 Methodology for Risk Assessment

The methodology includes:

- Hazard identification;
- Selection of potential loss scenarios;
- Simulation of release source model on DNV's PHAST 7.1;
- Plotting the damage contour on site map;

These steps undertaken to carry out risk assessment for this project are described in following sections.

7.2.4 Hazard Identification

The project description, and other project related data provided by the client have been comprehensively reviewed to identify the hazardous operations. Also the information on the hazardous properties (MSDS) of all the chemicals handled at the site has been reviewed to identify the hazards associated with the same.

Hazardous waste from various member industries like chemical, pharmaceutical, dyes and dyes intermediates, agrochemicals and other allied industries will be received and handled. Hazard identification for these wastes will be done for toxicity, corrosivity, flammability, reactivity.

In the event of spillage, leakage or accidental release of these hazardous wastes, it will create localized effects on the land within the short distances mainly inside the project site. To attend any emergency due to handling, storage & disposal of hazardous wastes, as safety precautions, collection & handling facilities will be provided. It will also include post cleanup of the affected site. There is no usage of any toxic gas at the site. However release of toxic vapors from solid or liquid waste during handling & storage, fugitive emission would be a nuisance factor.

Use of Corrosive Wastes & Toxic wastes may create potential health emergency for workers continuously working in that environment

Hazardous activities at Site

During operation of the proposed CETP& Incineration Site, following activities can pose hazards and risk to human and surrounding environment:

- Storage of HSD (High Speed Diesel);
- Loading and unloading hazardous wastes on vehicle - mechanical movements;
- Contact with hazardous chemicals;
- Storage of Incinerable Waste:
  - Liquid Hazardous Waste: It may most contain residue of scrubber water discarded & domestic wastewater, which could be 30-40% of total storage of liquid hazardous waste& others could be mixed solvents;
  - Solid Hazardous Waste: It may contain Incinerator ash and CETP sludge etc. which could be 25-30% of total solid hazardous waste received.

Hazard Fire Events

Type of event causing fire, blast, heat wave, explosion due to storage & handling of hazardous wastes with explanation is described in ***Table 7-1***.

Table 7-1: Important Hazardous Events

Type of Event	Explanation
BLEVE	Boiling Liquid Evaporating Vapor Explosion; may happen due to catastrophic failure of refrigerated or pressurized gases or liquids stored above their boiling points, followed by early ignition of the same, typically leading to a fire ball
Deflagration	Is the same as detonation but with reaction occurring at less than sonic velocity and initiation of the reaction at lower energy levels
Detonation	A propagating chemical reaction of a substance in which the reaction front advances in the unreacted substance at or greater than sonic velocity in the unreacted material
Explosion	A release of large amount of energy that form a blast wave
Fire	Fire
Fireball	The burning of a flammable gas cloud on being immediately ignited at the edge before forming a flammable/explosive mixture.
Flash Fire	A flammable gas release gets ignited at the farthest edge resulting in flash-back fire
Jet Fire	A jet fire occurs when flammable gas releases from the pipeline (or hole) and the released gas ignites immediately. Damage distance depends on the operating pressure and the diameter of the hole or opening flow rate.
Pool Fire	Pool fire is a turbulent diffusion fire burning above a horizontal pool of vaporizing hydrocarbon fuel, where the fuel has zero or low initial momentum
Spill Release	'Loss of containment'. Release of fluid or gas to the surroundings from unit's own equipment / tanks causing (potential) pollution and / or risk of explosion and / or fire
Structural Damage	Breakage or fatigue failures (mostly failures caused by weather but not necessarily) of structural support and direct structural failures
Vapor Cloud Explosion	Explosion resulting from vapor clouds formed from flashing liquids or non-flashing liquids and gases

Hazard and Damage Assessment

Toxic, flammable and explosive substances released from sources of storage as a result of failures or catastrophes, can cause losses in the surrounding area in the form of:

- Toxic gas dispersion, resulting in toxic levels in ambient air;
- Fires, fireballs, and flash back fires, resulting in a heat wave (radiation), or
- Explosions (Vapors Cloud Explosions) resulting in blast waves (overpressure).

Consequences of Fire/Heat Wave

The effect of thermal radiation on people is mainly a function of intensity of radiation and exposure time. The effect is expressed in term of the probability of death and different degree of burn. The consequence effects studied to assess the impact of the events on the receptors are provided in ***Table 7-2***.

Table 7-2: Damage due to Radiation Intensity

Radiation (kW/m^2)	Damage to Equipment	Damage to People
4.0	-	Causes pain if duration is longer than 20 sec. But blistering is unlikely.
12.5	Minimum energy to ignite wood with a flame; melts plastic tubing.	1% lethality in one minute. First degree burns in 10 sec.
37.5	Severe damage to plant	100% lethality in 1 min. 50% lethality in 20 sec. 1% lethality in 10 sec.

Consequences of Overpressure

The effects of the shock wave vary depending on the characteristics of the material, the quantity involved and the degree of confinement of the vapor cloud. The peak pressures in an explosion therefore vary between a slight over-pressure and a few hundred kilopascals kPa). Whereas dwelling are demolished and windows and doors broken at overpressures as low as 0.03- 0.1 bar. Direct injury to people occurs at greater pressures. The pressure of the shock wave decreases rapidly with the increase in distance from the source of the explosion. The overpressure damage is shown in ***Table 7-3.***

Table 7-3: Overpressure Damage

Overpressure (bar)	Damage
0.02068	Limited minor structural damage
0.21	Frameless, self -framing steel panel building demolished; rupture of oil storage tanks
1.00	Fatality

Source: CCPS Consequence Analysis of Chemical Release

Consequences of Toxic Release

The effect of exposure to toxic substance depends upon the duration of exposure and the concentration of the toxic substance.

Short-term exposures to high concentration give Acute Effects while long term exposures to low concentrations result in Chronic Effects.

Only acute effects are considered under hazard analysis, since they are likely credible scenarios. These effects are:

- Irritation (respiratory system, skin, eyes)
- Narcosis (nervous system)
- Asphyxiation (oxygen deficiency)
- System damage (blood organs)

7.2.5 Selection of Maximum Credible Loss Scenarios (MCLs')

Following important points are considered for the selection of release scenarios:

- Flammability and the flash point of the material;
- Phase of material i.e. liquid or gas;
- Threshold quantity of the chemicals as prescribed in MSIHC Rule;
- Operating temperature and pressure of the material;
- Total inventory of the material.

On the basis of study of chemical properties of the chemical and as discussed over failures sceneries given in publications like World Bank Technical Paper 55 and TNO Purple Book, MCLs' which may take place are presented in ***Table 7-4***.

Table 7-4: Scenarios Selected for Simulation

Sr. No.	Name of the Chemical	Storage Capacity (m^3)	State	Hazard involved	Operating Condition		Types of Failure Possible	Consequences Studied
					Temperature	Pressure		
1	HSD	1	Liquid	Flammable	25 °C	Atmospheric	25 mm dia. Hole leak in storage tank	Jet Fire & Pool Fire
							Catastrophic Rupture of storage tank	Flsh Fire

7.2.6 Simulation of Release and Development of Contours for HSD

The consequence analysis results along with their contours are presented in the following sections.:

Consequence analysis for HSD

Radiation level and effect distance due to the release of HSD are presented in ***Table 7-5***, whereas the Flash Fire effect distance due to the release of HSD are presented in ***Table 7-6***.

Table 7-5: Radiation Level and Effect Distance Due to Release of HSD

Chemical (Storage Tank)	Failure Scenario	Consequence	Met Data	Effective Distance in meter to Radiation Level		
				4 kW/m²	12.5 kW/m²	37.5 kW/m²
HSD	25 mm leak	Jet fire	2/B	NR	NR	NR
			3.0/E	NR	NR	NR
			4.0/D	NR	NR	NR
		Late pool fire	2/B	37	21	12
			3.0/E	38	23	12
			4.0/D	38	24	12
	Catastrophic Rupture	Late pool fire	2/B	34	18	9
			3.0/E	35	20	9
			4.0/D	35	21	9

NR: Not Reached

Table 7-6: Flash Fire Effect Distance

Chemical (Storage Tank)	Failure Scenario	Consequence	Met Data	Effective Distance in meter	
				0.5 LFL	LFL
HSD	25 mm leak	Flash Fire	2/B	4	4
			3.0/E	4	4
			4.0/D	4	4
		Flash Fire	2/B	2	2

Chemical (Storage Tank)	Failure Scenario	Consequence	Met Data	Effective Distance in meter	
				0.5 LFL	LFL
	Catastrophic Rupture		3.0/E	2	2
			4.0/D	2	2

It can be seen that HSD storage, with failure scenario of 25 mm leak will have high radiation level of 37.5 kw/m^2 in early late pool fire within 7 to 9 m. While in a catastrophic rupture it will have radiation level within 7 m.

The effect contours generated for the release and catastrophic rupture of HSD storage are presented in ***Figure 7-1*** to ***Figure 7-2.***

Figure 7-1: Late Pool Fire effect distance contour due to 25mm leak in HSD storage at weather condition 4.0/D

Figure 7-2: Late Pool Fire effect distance contour due to Catastrophic Rupture of HSD storage at weather condition 4.0/D

Conclusion

Chemical	Scenario	Effect Distance in Meters			Consequence Zone
		At Radiation level 4 Kw/m^2	At Flash Fire 0.5 LFL	At Overpressure 0.02 bar	
HSD	Normal Condition (25 mm Leak)	38 @ 4/D	4 @ 4/D	-	within the site
	Worst case (Catastrophic Rupture)	35 @ 4/D	2 @ 4/D	-	within the site

7.3 Treatment and Control

After examining the high priority risks, a prime consideration is given to the potential to reduce or eliminate the risk by using the hierarchy of controls. This assists in establishing methods to reduce risk. The desirability of control plans (with reducing effectiveness) is as follows;

- Elimination: Take step to eliminate the hazard completely,
- Substitution: Replace with less hazardous material, substance or process,
- Separation: Isolate hazard from person by guarding, space,
- Administrative: Adjusting the time or conditions of risk exposures,
- Training: Increasing awareness, improving skills and making tasks less hazardous to persons involved,
- Personal protective equipment: Use appropriately designed and properly fitted PPE.

Control measures can reduce either the likelihood or consequence of the event or both. Depending on the level of reduction of the hazard, there could still be a residual risk that needs to be monitored so that a secondary prevention process can be initiated when trigger points are reached.

The control measures and action will be adopted by M/s Unnati to minimize the risk present in the facility for the hazardous event are summarized in ***Table 7-7.***

Table 7-7: Event Consequences, Treatment and Control

Hazardous Event	Possible Consequences	Treatment and Control
Loss of containment Rupture / leak in storage tanks	Fire, explosion and toxic hazards	Gas detectors, Dyke wall provision, Level indicator, Earthing, flame arrestor & visual observation, Ready availability of fire extinguishers and fire hydrant system

7.3.1 Precautions to be taken during Transportation

Following are some precautions will be taken during the loading and unloading of material in plant premises.

- Before the tanker enters the industry premises, the tanker is to be inspected for authorized entry and safe & sound condition of the tanker, its contents and that of the prime mover. Flammable material carrying tankers entering plant are to be fitted with spark arresters on their exhaust.
- Static charge neutralizing
- The quality of the chemical in the tanker should be ascertained before unloading to avoid contamination of chemical already at storage.
- Coupling used for connecting hose to tanker must be leak proof.
- For flammable chemicals, the tanker and the hose are to be properly earthed before starting unloading operation.
- Unloading should be done under personal supervision of responsible staff authorized by the management.
- Provision of sample quantity of water / neutralizing medium to take care of leakage / spillage must be made. Also steam and inert gas hose stations must be available at unloading point.
- Fire alarm and firefighting facility commensurate with the chemical should be provided at the unloading point.

7.4 DISASTER MANAGEMENT PLAN

M/s. UNNATI will develop emergency management system to tackle any emergency situation for proposed facilities. The disaster management plan (DMP) provides for a framework of actions to handle various emergency situations. It also provides for on-site resources and appropriate outside assistance in case of any incident at the facility.

The primary objectives of the DMP are:

- Minimization of the risks to lives and safety of proposed Site operators on-site and of the neighboring community;

- Containing and minimizing environmental damage, to surroundings, and to site property, and equipment, which could occur from emergency or accidental situations beyond the normal operations;
- Coordinating appropriate and effective actions with outside regulatory agencies during and after their involvement in on-site emergencies;
- Maintaining effective trained personnel capable of performing the established emergency response procedures when it is required.

7.4.1 Nature of Emergency

An Emergency can be defined as an "Occurrence of such magnitude so as to create a situation in which normal pattern of life within a facility is suddenly disrupted, adversely affecting not only the personnel and property within the facility, but also in its vicinity". Such an occurrence may result in on Site implication.

7.4.2 Potential Emergency Situation

- Maximum credible accident scenarios may occur in a proposed site due to slope failure of landfill, water accumulation at landfill due to heavy rain, road accident during transportation of Hazardous waste etc.;
- The capping activity will be also carried out immediate once the hazardous waste filling is completed. After completion of capping of landfill site there should not be chances of increase moisture content of filled waste, so there should not be any chances of failure of top slop;
- To prevent the failure of slop during the operation, compacting will be done with dozer and roller. Temporary bund wall will also be constructed to prevent any sliding of waste during operation.
  In the event of a landfill instability such as a slop failure the first concern is always safety, safety of site personal, safety of site entrance, and safety of general public;
- The situation will need to be assessed concisely and necessary emergency procedures and precautions implemented as quickly as possible.

7.4.3 Classification of Emergencies

Emergency is a general term implying hazardous situation both inside and outside the plant/installation premises. Thus, the emergencies termed "on-site" when it confines itself within the plant/installation even though it may require external UNNATI and "offsite" when emergency extends beyond its premises. It is to be understood here, that if an emergency occurs inside the proposed facilities and could not be controlled properly and timely, it may lead to an "off-site" emergency.
The emergencies at the proposed Site can be broadly classified into three levels:

1. The incident at proposed Site is confined to a small area and does not pose an immediate threat to life or property. Spillage of liquid or solid hazardous wastes, small fire in flammable hazardous wastes, etc. can come under this category.
2. An incident at the proposed Site involving a greater hazard or larger area which poses a potential threat to life or property. Filling of water in disposal pit due to heavy rain, etc. can come under this category.
3. An incident at proposed Site involving a severe hazard or a large area which poses an extreme threat to life or property. Breakage in slop and liner system due to de-settlement/earth quake, subsequently contamination of soil and ground water.

7.4.4 Priority in Emergency Handling

The general order of priority for involving measures during the course of emergency would be as follows:

- Safeguard life
- Safeguard environment
- Safeguard property

7.4.5 Onsite and Offsite Emergency plan during Chemical Disaster

On-site Emergency: If an accident/incident takes place in a factory, its effects is confined to the factory premises, involving only the persons working in the factory and the property inside the factory it is called as On-site Emergency.
Off-site Emergency: If the accident is such that its affects inside the factory are uncontrollable and it may spread outside the factory premises, it is called as Off-site Emergency. It is then Handled by District Collector.

The main objectives of an emergency plan are

- To control and contain the incident/accident and if possible, eliminate it; and
- To minimize the effects of the incident on persons, property and environment.

Each factory or industrial unit should prepare an emergency plan incorporating details of action to be taken in case of any major accident/disaster occurring inside the factory. The plan should cover all
types of major accident/occurrences and identify the risk involved in the plant. Mock drills on the plant should be carried out periodically to make the plan foolproof and persons are made fully prepared to fight against any incident in the plant.

The availability, organization and utilization of resources and facilities for emergencies

In order to maintain an emergency response capability, certain facilities will be kept in a state of readiness and sufficient supplies and equipment must be available. In some cases, it may be impossible to maintain all of the equipment necessary for all possible emergencies. In these cases, agreements have to be made with neighboring facilities to provide additional support as and when necessary.
Where the local police or private agencies may be called upon, such as volunteer fire companies and ambulance associations, agreements have to be developed ahead of time. Emergency hardware can be classified according to its use during the response operations.

Typical examples are:

- Communication equipment;
- Emergency operation centers;
- Alarm system;
- Personal protection equipment;
- Fire-fighting facilities, equipment and supplies;
- Spill and vapor release control equipment and supplies;
- Medical facilities, equipment and supplies;
- Monitoring systems;
- A media Center;
- Transportation system;
- Security and access control equipment.

Some of these resources will also be available in the local municipalities. It is the responsibility of the plant management to ensure that the appropriate equipments and materials are available to respond to their very hazard-specific emergencies at the facilities, independently from external resources.

These resources can be extremely valuable, but should be used mainly in support of the main response actions that the facility personnel will have to implement in case of a serious emergency.
In any case, the availability of resources within the community must be determined beforehand, so that these resources can be mobilized, if the time comes to do so.

Actuation of the Plan
Any emergency starts as a small incident that may become a major accident if not controlled in time. At the initial stages, the fire organization chart (would be prepared separately for each facility) shall need to be put into action.

If the incident goes beyond control, the Main Incident Controller will need to actuate the on-site plan at the appropriate stage as considered necessary.

During idle shift/ holidays, the security personnel will combat the incident as mandatory and at the same time inform various emergency controllers for guidance and control the situation. An emergency organization chart is prepared by appointing key personnel and defining their specific duties that will be handy in emergency, details of the chart is provided in the next section.

7.4.6 Response Organization Structure

To set up a response organization structure necessary for chain of commands during emergency situation, which may arise in the premises is one of the most important objectives of emergency plan, which is briefly described hereunder,

Functions and Responsibilities

The main key person of the emergency plan is Site main controller Coordinator (Plant Head). He shall be assisted by,

1. Incident controller
2. Deputy incident controller
3. Essential workers

Site main controller

He shall be responsible for

- Essential communications;
- Public relation & Transportation;
- Investigation and reports;
- Alert the hospital authorities.

Incident controller

- His main duty is to take charge at the scene of incident;
- Rush to the site of emergency on receipt of information;
- Direct plant operation/shut-down operations as needed to control situation;
- Guide the Shift Production Officer and members of the Emergency Squad in fire-fighting/rescue operations;
- Arrange for any additional firefighting/safety equipment, which may be required at the site;
- Keep in constant touch with the site main controller and pass on all relevant and necessary information to him so as to enable him keep in touch with concerned authorities;
- Keep in touch with the other coordinators for requirement of any services like external UNNATI, communication, transportation, etc.;
- Arrange for replacement/refilling of used up firefighting equipment's or gas masks/canisters so as to make these available at the site at the earliest;
- Carry out investigation of the accident and assist in filling of statutory reports as required;
- Carry out preliminary investigation into the accident with the UNNATI of concerned personnel;
- Preserve records/evidence that may be required for investigation;
- Search for casualties;
- Evacuate non-essential workers to the assembly points. Deputy incident controller;
- Rush to the site of emergency;
- Keep the stores open for emergency issue of any items that may be required for control of emergency;
- In case some material is not available, arrange for its emergency purchase;
- Keep contact with other coordinators to assess any requirements in terms of material;
- Arrange for any trucks/trolleys, which may be required for transportation of materials;
- Keep in constant touch with the site main controller;

- Assess the situation in consultation with the Site main controller and other coordinators;
- Arrange to get maintenance mechanics along with their toolboxes to provide UNNATI in any isolation/repair work as may be required;
- Arrange for requisite number of contractor workmen in case any additional UNNATI is required;
- Arrange for the Shift Electrician and get power supply to the affected area isolated, if required;
- Make arrangements for temporary lighting/emergency lighting at the affected area, as required;
- In case of a power failure, ensure the running of the DG sets and uninterrupted power supply to emergency facilities.

Essential workers

- Rush to the site of emergency;
- Assess the situation in consultation with Emergency Plant Coordinator to provide help as may be required;
- Keep in constant touch with the Site main controller;
- Assess the situation in consultation with Site main controller;

Attend to all emergencies related communications at the Security Gate.

- Emergency engineering work i.e. isolating of equipment, process, safe transfer of material,electrical work, etc.;
- To help the fire brigade and mutual aid teams, if so required;
- Shutting down plant and making it safe;
- Moving transportation as per requirement;
- Any special help required;
- Monitor closely all movements at the gate keeping passage clear for movement of emergency vehicles;
- No visitors should be allowed to come inside the premises during the period of emergency;
- Arrange to keep the emergency vehicles and ambulance ready with their drivers for any movement of personnel/material;
- Arrange for canteen services for the personnel on duty and in the affected area;
- In case of any injuries, provide necessary first aid and arrange for shifting of the injured personnel to the ESI or other hospitals as the case may be;
- Attend to any external calls/telephones relating to information about emergency.

Emergency Control Center

The place identified as Emergency Control Center will be considered as the Security Gate Office.
The location of Emergency Response Center may change in future as per convenience. The facilities available at the Emergency Response Center shall include:

- Internal Telephone;
- External Telephone;
- Manual Fire/Emergency Siren;
- Siren Actuation Switch;
- Important Address and Telephone Numbers;
- Emergency Vehicles;
- Confined Space Entry Procedure;
- List of antidote/actions to be taken in case of exposure to hazardous Chemicals/ materials;
- Material Safety Data Sheets of chemicals;
- A copy of On-Site Disaster Management Plan ;
- All communications after General Shift working hours and on Sundays / Holidays are to be routed through the Security Gate Office.

General Rules

- Follow sense of discipline and do not panic
- Do not rush and endanger your personal safety;
- Use personnel protective equipment according to the situation;
- Do not block any passages which may hinder the movement of emergency Vehicles;
- In case you have to shut down your plant operations, do it in an orderly Manner as per standard operating procedures;
- In situation when you have to leave your work and evacuate to identify places out of operating areas, do it in an orderly manner;
- Follow instructions of the Emergency Coordinators;

Understand the disaster management plan well and take interest in practice drills.

Assembly Point

In affected & vulnerable area, all nonessential workers (who are not assigned any emergency duty) are evacuating the area & report to a specified Assembly Points. Each assembly Point will be clearly marked by a Conspicuous notices & provided with an identification numbers e.g. Assembly Point No. 1, 2 and so on. Assembly Points are 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 location and numbers have been marked at Assembly Points. Each Assembly Point in manned by a nominated person to record the names and dept.

Further telephone to communicated Site Main Controller has been provided at each assembly Points. 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.

Fire Squad

There is a group of personnel (5-10 in number) who will be identified to handle any emergency situation. These personnel including officers /workers shall be taken from various operating areas and will be imparted extensive training in firefighting, material safety data for hazardous chemicals, rescue operations, decontamination procedures, confined space entry procedures, first aid and other related functions. The members will be so chosen that at any given time, at least 2–3 members of Fire Squad will be available in the premises.

Communication System

Intercom telephone points shall be provided at all critical areas of operations. An Emergency Telephone shall be available at the Emergency Response Center. In addition, telephone connections shall be provided at the residence of all critical personnel to ensure immediate contact.

Medical Function

The Manger- Occupational Health will look after medical function. He will perform the following:

- To arrange for the First Aid team to treat the affected personnel;
- To arrange for treatment in the hospital;
- To liaise with the local medical authorities and hospitals, if the casualties are more and the situation demands treatment at more/other medical centers;
- To liaise with the transport coordinator for transporting the victims to various hospitals;
- To arrange for ambulances;
- The Medical Coordinator should ensure the upkeep of agreed medical supplies, antidotes and equipment that should always be kept in stock for treating victims of burns;

- To liaise with the Media coordinator for release of news to the press..

Transport Function

The Waste Transportation Manger will work as Transport Function. He shall perform the following duties:

Arrange for transport of victims to hospital/dispensaries.

- Mobilize all available vehicles available at the proposed Site for emergency use, along-with the drivers;
- Arrange for the duty rotation of the drivers to meet with the emergency situation;
- To direct refueling of vehicles, if not topped up;
- To arrange for vehicles from other sources;
- To liaise with theChief Emergency Controller (CEC) for evacuation of personnel and transportation of victims.

Training

- Training sessions need to be provided in which personnel are briefed on their specific duties in an emergency;
- To provide training to all emergency responders. The concerned personnel are shown how to wear and properly use personal protective clothing and devices;
- Periodic drills to be conducted to test the overall efficiency and effectiveness of the emergency response plan and emergency response capabilities;
- The types of training required for emergency response personnel with responsibilities in any or all phases of the response is based upon the types of incidents most likely to occur and the related response and planning activities.

Responsibility, Frequency and Procedure for Evaluation

- The CEC is responsible for evaluating the effectiveness of the onsite emergency plan. Emergency mock drill will be conducted at an interval of six months. Experts will be invited to observe the mock drill in order to know their response and opinion. The recommendations following the discussions will help to identify the loopholes in the plan and response capability of the organization;
- Such periodic recommendations of the mock drill will be kept in order to update the plan. The CEC will be responsible to update their on-site emergency plan regularly. A regular review of the plan at least once in a year should be carried out to replace outdated information or to incorporate the results of mock drill.

Post Emergency – Recovery

When an emergency is over, a detailed analysis of the causes of accidents to evaluate the influence of various factors involved and to propose methods to eliminate or minimize them in future will be carried out. Simultaneously, the adequacy of the disaster preparedness plan will be evaluated and any shortcomings will be rectified.

Accident Investigation

- As soon as possible after the emergency is over and plant operation has become normal, the investigation will be carried out to determine the cause of the event;
- Representatives from various disciplines will be members of the investigating team;
- The area of the event will be sealed off so that tampering or alteration of the physical evidence will not occur;
- Key components will be photographed and logged with time, place, direction, etc.;

Statements will be taken from those who were involved with the operation or who witnessed the event.

Damage Assessment

- This phase of recovery establishes the quantum of replacement machinery considered necessary for bringing back the plant to normal operation, property and personnel losses, and culminates in a list of necessary repair, replacement and reconstruction work;
- Insurance companies will be informed of the damage and requested to pay the compensation as per claim.

Cleanup and Restoration

- This phase will only begin after the investigation is complete;
- Reporting documentation will be prepared and forwarded to appropriate authorities;
- Repairs, restoration and cleanup will begin;
- Insurance claims will be prepared and submitted.

7.4.7 List of Names of Functionaries

List of name of various functionaries with designation and telephone numbers are given in following format:

- Type of Coordinator
- Name Designation
- Telephone Numbers
- Office Residential
- Crisis Coordinator
- Chief Emergency Controller (CEC)
- Site Incident
- Controller
- Fire & Safety
- Media
- Communication
- Hospital
- Transportation

7.4.8 Fire Fighting and Life Saving Equipment

Fire Alarm System

Fire Alarm System such as Beam Detector, smoke detector, hooter etc. will be provided.

Fire Extinguisher

Fire bucket and fire extinguisher will be provided for firefighting.

7.4.9 Emergency Organization Chart

No plan will succeed without effective emergency organization. Emergency organization is a part and parcel of a good onsite and offsite emergency plan, without which all resources, facilities etc. even available with us, cannot be put into services as the right time is the key factor for management of an emergency. It is not possible to envisage and detail every action which should be taken in emergency and to harness the basic elements of emergency preparedness such as gravity of the emergency, communications of information, onsite action for process and emergency controls, mobilization of internal and external resources for fire and toxic release control, warning people at right time, evacuation, medical preparedness, pollution control etc. Emergency organization is set up specifying duties and responsibilities of all to make best use of all resources to avoid confusion while tackling the emergency. Map7-1below provided detailed information on emergency organization chart.

Map7-1: Emergency Organization Chart