RISK ASSESSMENT

ENVIRONMENTAL RISK ASSESSMENT

Environmental risk assessment is a systematic approach for identification, evaluation, mitigation and control of hazards that could occur as a result of failures in process, procedures, or equipment. Increasing industrial accidents, loss of life & property, public scrutiny, statutory requirements and intense industrial processes, all contribute to a growing need to ensure that risk management is conducted and implemented.

Industries have recognized the significance of Safe Working Environment and are progressively trying to prevent hazardous events, avoid production & manpower losses and other fallouts associated with industrial accidents by conducting risk assessment, onsite & off site management plan and adopting the safety measures. This also assists industries to enhance employee knowledge of operations, improve technical procedures, maintain accurate process safety information and increase overall productivity. This Chapter gives an outline of the associated environmental and other risks, their assessment and remedial measures. It also describes an approach for emergency planning to be adopted by the Plant management.

OBJECTIVES

The objectives of environmental risk assessment are governed by the following, which excludes natural calamities:

a) Identifying the potential hazardous areas so that adequate safety measures can be adopted to reduce the likelihood of accidental events.

b) Identifying the stakeholders and evaluating their risk along with proposing adequate control techniques.

c) Managing the emergency situation or a disastrous event, if any, during the plant operation.

ENVIRONMENTAL RISK EVALUATION

From environmental hazards point of view, risk analysis (RA) acts as a scrutinizing vehicle for establishing the priority in risk management that concerns human health, loss of productivity and

environmental quality in general. The proposed facility would have installations, such as, storage and handling of fuel oil and fuel gases which would be under the purview of Manufacture, Storage and Import of Hazardous Chemicals (MSIHC) Rules, 1989 and its amendments thereof.

Raw materials & consumable chemicals, and processing of the same in various production units, along with relative risk potential analysis is made on the following three factors using a P/I (Probability/ Impact) analysis methodology:

i) likelihood of occurrence
ii) likelihood of detection
iii) severity of consequence

Each of these factors is graded and compiled to determine the risk potential. The factors governing the determination of relative risk potentials are presented in Table 1.

TABLE 1 - DETERMINATION OF RISK POTENTIAL

(A) Likelihood of occurrence		(B) Likelihood of detection		(C) Severity of consequence	
Criteria	**Rank**	**Criteria**	**Rank**	**Criteria**	**Rank**
Very High	5	Very High	1	None	2
High	4	High	2	Minor	4
Moderate	3	Moderate	3	Low	6
Low	2	Low	4	Moderate	8
Very Low	1	Very Low	5	High	10

RISK POTENTIAL (RP) = (A + B) x C

Based on the above stated criteria for assessing the risk, each probable event has been evaluated by addressing several questions on the probability of event occurrence in view of the in-built design features, detection response, operational practice and its likely consequence. A summarised list of environmental risk potential for the likely events is presented in Table 2.

This assessment is based from the past experience in the operation of similar installations and best practicable designs for the proposed Project. The present risk potential evaluation is primarily based on human erro

rs or faulty operation or failure of the control systems.

TABLE 2 - ENVIRONMENTAL RISK POTENTIAL EVALUATION

Sl. No.	Event	Rank			Risk potential
		Likelihood of occurrence	Likelihood of detection	Severity of consequence	
i)	Fuel gas leaks from the pipe line/valves	High (4)	Low (4)	High (10)	80
ii)	Propane storage and handling	Moderate (3)	Low (4)	High (10)	70
iv)	Occurrence of static electricity/electric spark in the Mill Cellar Room	Very low (1)	Very low (5)	High (10)	60
v)	Leakage of acids/ alkalis	Low (2)	Very low (5)	Low (6)	42
vi)	Uncontrolled dust emissions/failure of emission control system	High (4)	Moderate (3)	Moderate (8)	56
vii)	Failure of Fume/Dust Extraction System	Moderate (3)	High (2)	High (10)	50
viii)	Unsafe disposal of oily wastes of Rolling Mills	Moderate (3)	Low (4)	Moderate (8)	56
ix)	Oil wastes/oil sludge handling	Low (2)	High (2)	Moderate (8)	32
x)	Collapsing of acid/ alkali storage tanks	Very low (1)	High (2)	High (10)	30
xii)	Splashing of liquid steel and slag	Low (2)	Very High (1)	High (10)	30
xiii)	Leakage of Ammonia gas	High (4)	High (2)	High (10)	60

From the Table 2, it appears that some events carry risk potential above 50. These would be considered as hazardous events, where effective safe-design for operation and maintenance is highly essential to reduce the risk.

A HAZOP Study for the selected units/areas needs to be undertaken at the 'design-freeze' stage, when P&I diagrams, shop layout drawings, control logic diagrams, technical specifications etc are made ready. For these areas, 'Fault Tree Analysis' of the failure of equipment/valve component or due to human error can be carried out to assess more realistically the risk involved and draw up final management measures. It is also suggested to conduct HAZOP Study for the fuel gas distribution network to incorporate last minute corrections in the design of the system from fail-safe angle, prior to commissioning.

ON-SITE AND OFF-SITE EMERGENCY MANAGEMENT PLAN

Emergency planning is an integral part of the overall loss control program and is important for effective management of an accident to minimize the losses to the people and property, both in and around the facility.

JSL has in place an On-site Emergency plan approved by Director (Factories and Boiler), Bhubaneswar. The objectives of this On-site Emergency Plan are:

i) Rapid control and containment of possible hazardous situations.

ii) Minimizing the risk and the impact of accident.

iii) Effective rehabilitation of affected persons.

Executive Director (ED)-Works is designated as Works Main Controller (WMC) who assumes overall responsibility for implementation of emergency planning at the time of crisis on the site. He is assisted at next level by Head EHS/Head SMS who acts as Site Incident Controller (SIC), who coordinates with Combat Team Leader (CTL), Rescue Team Leader (RTL) and Auxiliary Team Leader (ATL) to mitigate the emergency situation. The Emergency command structure of the plant is shown in Fig 1.

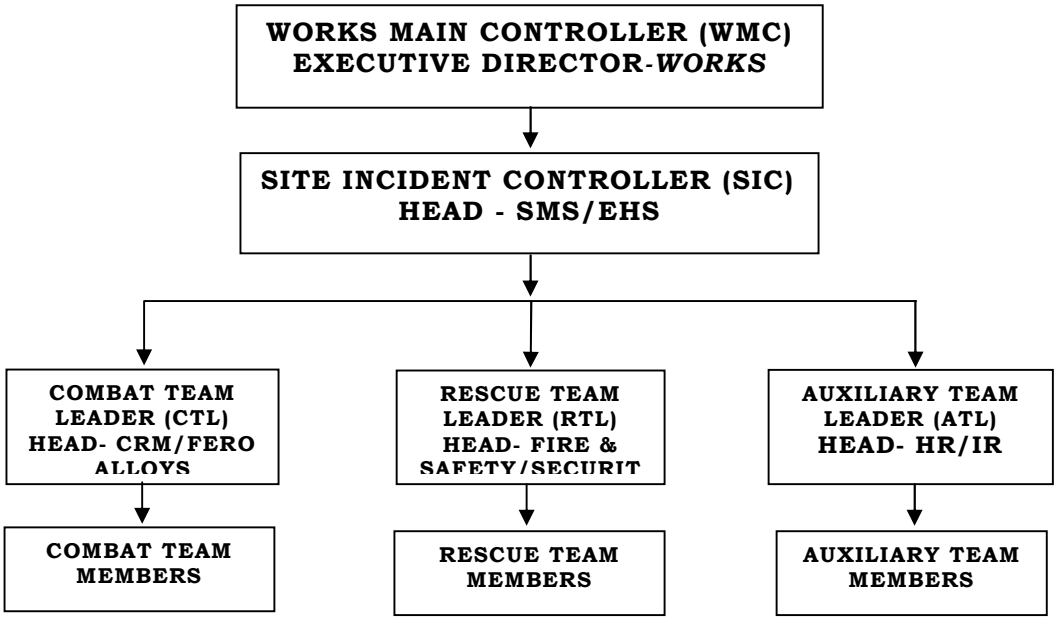

FIG. 1 - EMERGENCY COMMAND STRUCTURE

The action plan for on -site emergency plan is presented below in Table 3.

TABLE 3 - ACTION PLAN FOR ON-SITE EMERGENCY

Step No.	Initiator	Responsibilities
1	The person noticing the emergency	• Inform Security Gate, CTL & the concerned Shift-in–charge immediately.
2	CTL	• Inform SIC and rush to spot and organize his team. • Take charge of the situation, arrange for fire fighting and medical first-aid available at site. • To start combating, shut-down equipments, arrest the leakage of gas/fire.
3	SIC	• Inform WMC and rush to emergency site. • Discuss with CTL, assesses the situation and call the RTL & ATL • Organize the Rescue Team and Auxiliary Team and send the rescue Team to site. • Arrange to evacuate the unwanted persons and call for additional help. • Pass information to the WMC periodically about the position at site.
4	WMC	• Rush to emergency site and observe the ongoing activities. • Take stock of the situation in consultation with the SIC. • Move to Emergency Control Room. • Take decision on declaration of emergency. • Advise ATL to inform the statutory authorities and seek help of mutual aid from partners as required. • Decide on declaration of cessation of emergency. • Ensure that the emergency operations are recorded chronologically.
5	RTL	• Consult with SIC and organize his team with amenities to arrest fire fighting and medical treatment. • Rush to Emergency Site through safe route along with the team members. • Arrange to set off the fire by fire fighting equipments and hydrant points to arrest the fire or to evacuate the area. • Shift the injured persons to hospital by ambulance after providing necessary first aid. • To inform the ATL for necessary help from mutual aid Partners.
6	ATL	• On being directed by WMC, inform about the emergency to statutory authorities. • Seek help of Mutual Aid partners and Coordinate with Mutual Aid partners to render their services. • Arrange to inform the relatives of casualties. • Take care of visit of the authorities to the Emergency site.
7	Team members	• Each of the team members to follow the instruction of concerned team leader to mitigate the emergency.

The existing On-site emergency plan would be modified in view of the proposed expansion with respect to the additional units, change in the layout and requirement of team members to cater to the emergency situation.

The off-site emergency plan is also an integral part of any major hazard control system. This particular plan relates to only those accidental events, which could affect people and the environment outside the plant boundary. Incidents, which would have very severe consequences, yet have a small probability of occurrence, would be in this category.

The implementing authority of the off-site plan is the local authority and not the plant authority. ED in consultation with the Safety, Admin & other concerned department will be coordinating with the district administration/ local authority for safeguarding nearby settlements during off-site emergency situation. Probability of such occurrence is though remote, but still there remains a probability.

The basic structure of the off-site emergency procedure will cover the following:

i) Identification of local authorities like police, district collector's office, their names, addresses and communication links.

ii) Details of availability and location of heavy duty equipment like bull dozers, fire-fighting equipment etc.

iii) Details of specialist agencies, firms and people upon whom it may be necessary to call.

iv) Details of voluntary organisations.

v) Meteorological information.

vi) Humanitarian arrangements like transport, evacuation centres, first aid, ambulance, community kitchen etc.

vii) Public information through media, informing relatives, public address system etc.

DISASTER MANAGEMENT PLAN (DMP)

A disaster is a catastrophic event that causes serious injuries, loss of life & extensive damage to Plant & its surroundings. The types of possible disaster would be due to i) Disaster due to emergencies on account of fire, spillages, etc. ii) Disaster due to natural calamity on account of flood, earthquake, cyclone, storm, cloud burst, lightning and iii) Disaster due to external factors on account of food poisoning, sabotage etc.

The objective of the DMP is to make use of the combined resources of the plant and the outside services to achieve the following:

i) Effective rescue and medical treatment of casualties
ii) Safeguard other people
iii) Minimize damage to property and the environment
iv) Initially contain and ultimately bring the incident under control
v) Identify any dead
vi) Provide for the needs of relatives
vii) Provide authoritative information to the news media
viii) Secure the safe rehabilitation of affected area
ix) Preserve relevant records and equipment for the subsequent inquiry into the cause and circumstances of the emergency.

In effect, DMP helps to optimize operational efficiency to rescue rehabilitation and render medical help and to restore normalcy.

Few elementary disaster management measures undertaken to prevent disaster due to the above mentioned hazards are as follows:

i) Design, manufacture, operation and maintenance of all plant machineries/structures as per applicable national and international standards as laid down by statutory authority

ii) Preparation of layout to provide 'Assembly Point' and safe access way for personnel in case of a hazardous event/disaster, as can be inferred from Risk & Consequence modeling

iii) Adherance to emergency (both on site & off-site) preparedness plan, emergency response team, emergency communication, emergency responsibilities, emergency facilities, and emergency actions

iv) Proper Alarm system and training the personnel for appropriate response during disastrous situation.

v) Complete fire protection coverage for the entire plant as per regulatory stipulations

vi) Creation and maintenance of Disaster Control Room (DCR) with adequately trained personnel who can handle all sorts of emergency situation

vii) Provision of funds for prevention of disaster, mitigation, capacity-building and preparedness.

During contingency, an officer will be manning the DCR having links with all plant control rooms. On getting information about any accident, the officer will verify from the affected plant control room and inform the Disaster Controller (DC) and/or other co-ordinators immediately.

The responsible officers of Disaster Control Group will assemble in the DCR and formulate control procedures as per the contingency plans and execute their responsibilities as per the plan. The functions of the various officers of the Disaster Control Group will be as follows:

Disaster Controller

i) To declare "Disaster Emergency" after consulting senior officers available and inform Fire Station Control Room to sound the sirens accordingly and arrange to convey the message in public address system

ii) To report to DCR immediately

iii) To receive messages from the communication centre

iv) To take decisions in consultation with the Commanding Officers of different services and convey them to the disaster point

v) To be responsible for planning and provisions of assistance from township and from local authorities

vi) To keep higher authorities informed about the situation

Officer In-charge

Disaster Controller will nominate an officer whose functions will be as follows:

i) To be responsible for the operation of DCR and for the dispatch of messages

ii) To keep liaison with all activities and give up to date and accurate appreciation of the situation

iii) To be responsible for the efficient organisation of the DCR

The Commanding Officers of various services are designated Coordinator (services), Coordinator (Operation) and Coordinator (external services). The following are their functions:

i) To report to the Control Post immediately on hearing "Disaster Siren"

ii) To keep Disaster Controller posted with the up-to-date information regarding manpower and material available concerning their respective services

iii) To assist Disaster Controller for provision of material and man power concerning his service

iv) To convey message to his service teams through communication centre after consulting Disaster Controller

At present, the plant already has a firm DMP in place to deal with disasters, if any. There have not been any incidents to date. However, the existing DMP would be subjected to subsequent improvements as and when required for safe and efficient operation of the plan.

The WMC would be in communication with the District Disaster management Authority (DDMA) regarding pre-disaster activities in alignment with the overall plan developed by the DDMA or the Collector. JSL would adhere to the relevant rules regarding prevention of disasters, as stipulated by relevant local authorities.

ACCIDENT STATISTICS

Safety department also record the events of both minor and major accidents, listing all the details such as place, date & time, duration,

probable cause, extent of damage, personnel affected, man-hours lost, medical assistance provided etc so as to analyse these data for drawing up necessary corrective measures.

SAFETY INSPECTIONS

Monthly safety inspection is carried out by concerned officials as well as Safety department. Additionally, Safety Audit is performed including all aspects of Occupational Health & Safety for all the areas.

TESTING OF EMERGENCY PLAN

The plant authority conducts periodic testing the efficacy of on-site emergency plan by conducting mock drills. One essential component of this mock drill is to see that whether procedures related to communication, mobilization of equipment and overall co-ordination to face the crisis is in order or not.