RISK ASSESSMENT

1. 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.

1.1 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.

1.2 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 coal, fuel oil, and fuel gases which would be under the purview of Manufacture, Storage and Import of Hazardous Chemicals (MSIHC) Rules, 2000 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 7-1.

TABLE ERROR! NO TEXT OF SPECIFIED STYLE IN DOCUMENT.**-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 7-2.

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 errors or faulty operation or failure of the control systems.

TABLE ERROR! NO TEXT OF SPECIFIED STYLE IN DOCUMENT.**-2 - ENVIRONMENTAL RISK POTENTIAL EVALUATION**

Sl. No.	Event	Rank: Likelihood of occurrence	Rank: Likelihood of detection	Rank: Severity of consequence	Risk potential
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)	Moderate (8)	56
vi)	Uncontrolled dust emissions/failure of emission control system	High (4)	Moderate (3)	Moderate (8)	56
vii)	Failure of Gas Cleaning Plant/Fume Extraction System	Moderate (3)	High (2)	High (10)	50
viii)	Wet scrubbers running dry	Low (2)	Moderate (3)	High (10)	50
ix)	Oil wastes/oil sludge handling	Low (2)	High (2)	Moderate (8)	32
x)	Fire at the coal stockyard	Very low (1)	High (2)	High (10)	30
xii)	Splashing of molten metal and slag	Low (2)	Very High (1)	High (10)	30
xiii)	Release of untreated wastewater	Low (2)	Very high (1)	High (10)	30
xiv)	Handling of Epoxy Resin & bitumen paint	Low (2)	Very high (1)	High (10)	30

From the Table 7-2, 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.

1.3 ON-SITE AND OFF-SITE DISASTER PREPAREDNESS EMERGENCY MANAGEMENT PLAN

TML has many high consequence scenarios which can create emergency situation when controls & barriers fail. Availability, readiness and responsiveness of the on-site emergency plan help to prevent losses and damages. Emergency plans are tested and rehearsed at predetermined intervals. The company has deployed on-site emergency and disaster recovery plan across the organization. Some of the high consequence potential scenarios identified are given below.

i) Fire and Explosion
ii) Heavy Leakage of Blast Furnace Gas (BFG)
iii) Heavy Spillage of Molten Metal
iv) Heavy spillage of Chemical

VP (O) are designated as Works Main Controller (WMC) in DI and PI Divisions respectively, who assume overall responsibility for implementation of emergency planning at the time of crisis on the site. They are assisted at next level by Works Incident Controller (WIC), which have been formed in each department to direct site teams and coordinate with CIC team for deployment and support of external agency, if required. Site teams are divided into three teams.

i)	**Response Team**	..	Headed by area In-Charges whose responsibility is to report and contain the situation by isolating energy source and stop the required equipment and process.
ii)	**Combat Team**	..	Headed by Safety officer with representation from Security and admin, whose responsibility is to mobilize and arrange equipment for

handling emergency e.g. Firefighting equipment.

iii) **Rescue team** .. Headed by Medical Officer and security officer responsible for organizing first aid facility and identify rescue needs based on head count.

The Emergency Preparedness and response plan system is shown in Fig 7-1

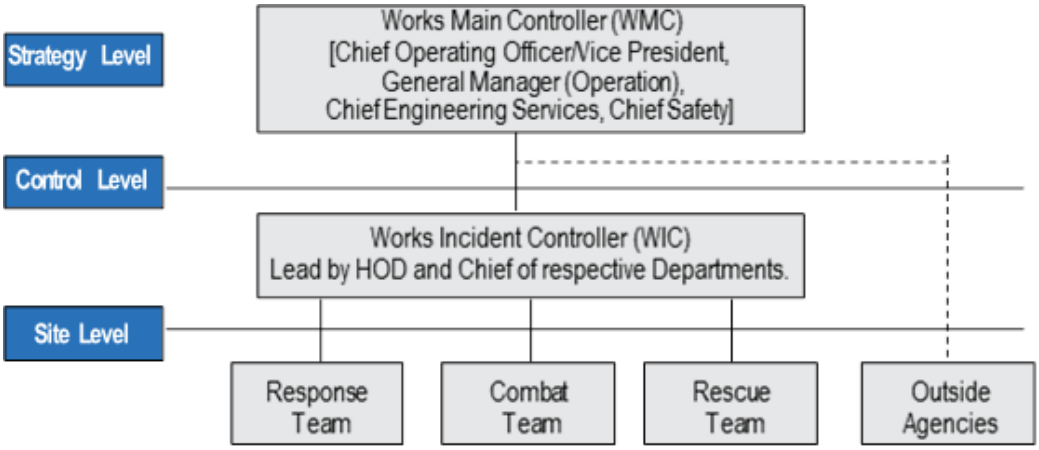

FIG. ERROR! NO TEXT OF SPECIFIED STYLE IN DOCUMENT.**-1 - EMERGENCY PREPAREDNESS AND RESPONSE PLAN SYSTEM**

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. Plant Head 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 civil defense, police, district collectors, 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 organisation.

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.

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. TML would adhere to the relevant rules regarding prevention of disasters, as stipulated by relevant local authorities.

1.4 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.

1.5 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.

1.6 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, mobilisation of equipment and overall co-ordination to face the crisis is in order or not.