

DISASTER MANAGEMENT PLAN

6.1 CONCEPT OF RISK ASSESSMENT

The concept of risk assessment and its engineering application has been well acclaimed since more than a decade. A variety of major accidents have focused attention on the dangers of risk exposure for human health and environment.

Risk analysis provides numerical measures of the risk that a particular facility poses to the public. It begins with identification of potential risk involving events and determination of the impact of each event. The consequences of each event are then calculated for numerous combinations of weather conditions and wind directions these consequence predictions are combined to provide numerical measure of the risk for the entire facility.

Risk for a particular facility is based on the following variables:

- Multiple accident outcomes
- Population disturbance
- Site-specific meteorological data

“Risk analysis is a tool which helps to translate hindsight (accidents) into foresight (planning), showing ways and means (improved engineering, procedure and supervision) to prevent the calculated accident from happening.

Visualize failure scenarios for the structures, handling equipment and estimate distances safe from damage.

6.2 LEAKS AND SPILLAGES

It will be of prime importance to protect the marine and terrestrial ecosystem during the operations of crafts. The various possibilities of leakages and spillages of the fuel includes following probabilities

Spillages of fuel during re-fueling
Leakages of fuel during navigation
Leakage or spillage during ship washing process

6.2.1 Spillages of Fuel during Re- Fueling

The crafts will require fueling its operation depending upon its trips two end fro. There will be a possibility of spillage of fuel during re-fueling process. This may lead to disturbance in the shore ecosystem in a temporary manner. The spillage portion will be although small one, it may affect the natural marine life to save extent. To avoid such accidental spillage, following measures shall be adopted.

- Proper routine checks shall be performed on the pipeline used for re-fueling, various pumps, motor valves etc.
- Safety audit shall be performed yearly to account for the performance of the re- fueling system.
- Chemical foam system shall be kept accessible to spray on the spillage.
- Oil-water separator shall be installed.
- Area of spillage will be contented using HDP or PE pipes.
- Oil Spill Contingency Plan will be followed.

In case of such a spillage oil-water separator shall be immensely used to recover the oil spread on the surface of seawater. In case, of major spillage, containment technique shall be employed immediately and oil shall be recovered without further spreading it on the sandy shore. Therefore, the major methods to be adopted for the oil spill closed to the shore shall be;

- i) Containment technique
- ii) Scavenging
- iii) Mechanical removal
- iv) Dispersion technique
- v) Use of absorbing material

Incase Oil spill accident, the below given mitigative measures shall be taken in order to preserve the mangroves from damage due to oil spill:

- Booming and skimming of oil on the water surface in mangrove creeks
- Pumping of bulk oil from the sediment surface, depressions and channels
- Water flushing of free oil from sediment surface and mangroves into areas where it may be collected
- Use of absorbent materials, with subsequent collection and disposal.

6.2.2 Leakages of Fuel during Navigation

There is a possibility of fuel being leaked from engine room because of various reasons. It may even happen during a collision and fuel/oil may spread on larger area in the sea. To prevent such accidental leakages, proper mechanical maintenance shall be carried out during the routine surveys as mentioned above. In case of such an event the craft shall be very well equipped with recovery system. These leakages can lead to water pollution leading to damage to mangroves, fishes, spawning problems, distraction of marine eco-culture, odor problem, and effect on marine bio-diversity.

Various mitigation measures will be enforced depending upon type of oil, quantity of spread, distance from the shore, etc. such as:

- Burning of the oil
- Scheming the surface with a suction device
- Absorbent technique
- Gelling method
- Sillking method
- Emulsification / dispersion

Leakage or spillage during ship washing process

Since the proposed terminal shall provide the berthing and parking facility of ships. There will be as such no major impact of oil spillage on the environment. However, there is a possibility of spillage during the ship washing process from the ship parking facility. These Spills can further contaminate the land as well as water, if it is not properly channelized. However, proper mitigative measures are taken in order to avoid any such spillage/ leakage during the workshop processes.

The intercepting drains passing from the area are installed with oil & grease trap to entrap the oil spills, the remaining water will then be sent to sedimentation tank where it will be further treated for oil spills and pollutants. The treated water will be reused within the plant.

Awareness amongst the workers regarding safe handling techniques and safety measures will be made through various workshops and seminars.

In case of any accidental spill, all processes will be brought to halt.

6.3 RISK ANALYSIS STUDY

- Identification of potential physical hazards which could trigger loss causing events such as fire and explosion, leakage of flammable materials etc. from the proposed facility.
- Identifying the Maximum Credible Loss Scenarios (MCLS) for the vulnerable areas in the storage areas in the facility for assessing the magnitude and severity of the impact of various failure scenarios in terms of damage to property and injury to personnel.
- Recommendations for risk reduction shall be made on the basis of the above for minimizing, if not eliminating various hazards and providing information on improvement of safety systems, where necessary.
- The major risk is envisaged from the storage yards, fueling of cargos. The leakage in piping, pumps and electrical fault can lead to hazardous event.
- A complete Risk Assessment will be done and the mitigative measures as well as safety measures will be proposed for the same.

6.4 ONSITE EMERGENCY PLAN

Assessing the adequacy of available resources to take care of emergencies as identified in the risk analysis study. Providing recommendations on the infrastructure, communication system and other facilities such as first aid, security, fire fighting etc. in view of effective handling of the emergencies identified. Specifying the roles and relationship amongst personnel from the facility and outside agencies for effective handling of the emergencies. Identification of assembly points and escapes routes

for evacuation. Preparation of an Onsite Emergency Response Plan Document is envisaged. The stages of On-site Emergency Plan include:

- Outline Emergency Response Team.
- Designated person in charge.
- Key responsibility of each individual.
- Telephone numbers for key people.

Risk Evaluation on preliminary hazards

Details regarding

- Location of Key-personals.
- Emergency Control room, if provided.
- Emergency Telephone numbers.
- First-aid Kit and Fire Extinguisher locations.
- Warning alarm, safety and security.
- Precautions during design and Engineering.
- Continuous surveillance.
- Details of Hospital and Fire-brigade facility.
- Procedures for notifying family members of injured employees.
- Procedure for reporting emergencies.

Awareness amongst workers for

- Use of fire-fighting equipment and first-aid.
- Mock-drill for Disasters.
- Use of personal protective equipment.
- Procedure for reporting emergency.
- Knowledge of alarm systems.
- Manuals for each Operating system.

Control Plans

Emergency Control plans.

- Safe time to resume work after an emergency.
- Control measures for any spillage, leakage, explosion, etc.

6.5 LIFE SAVING APPLIANCES AND ARRANGEMENTS

It is one of the important aspects towards the mitigative measures to be adopted on the craft. It is also recommended to have safety appliances and arrangements even at ship terminal facility, in case of emergency for the craft during its navigation. Various life saving arrangements/appliances shall be made available for such eventualities. The major issues to be tackled for the life saving or rescue operations will be during any eventualities arising out of collision or submergence of the craft. In case of such eventualities various life saving appliances such as embarkation ladder, float free launching pads, spaces for laundry emersion suit inflammable appliances shall be made available on the craft. In addition to this life saving appliances an effective ladder communication system shall be made available on the crafts.

In the event of noting such as event at the marine terminal control room to allowing life saving appliances kept ready.

- Rescue boat, which is design to rescue person in distress and to marshal survival craft.
- Retrieval rescue team for the safe recovery of the survivors and evacuation.
- Retro reflective material for detection of damaged craft in poor tight conditions
- Embarkation ladder to permit safe access at the survival craft.
- Live saving appliances such as thermal, protective aid emersion suit radio life saving appliances radiotelegraph installations in lifeboats shall be made available.
- Life buoys compiling with the requirement and regulation shall be kept ready and accessible during emergency life jackets etc shall be accessible
- Trained personnel with experience of rescue operation shall be provided on board on rescue boat.
- In case of addition to the rescue boat craft with all novel life saving appliances it is recommended that to take help of Coast Guards and also naval helicopters to search the exact site of accident.

6.6 OCCUPATIONAL HEALTH AND SAFETY

Specific occupational health and safety issues relevant to proposed project primarily include the following:

- Physical hazards
- Confined Spaces
- Exposure to Noise

The main sources of physical hazards at ports are associated with cargo handling and use of associated machinery and vehicles. However this shall be taken care of by applying all the terminal related norms and standards. The workers and vehicles passageway shall be kept separate. Avoiding entry of workers as far as possible in the area of ship loading and unloading activity and areas where grab is operational.

Noise pollution can cause due to one of the various activities at the terminal or parking facility. However, proper mitigative measures are out-lined for control of noise at the Facility. Onsite medical facility will be provided in case of any hazard or casualty during the operational phase. Fire safety measures shall be incorporated and implemented. Periodic health check-up of all the workers shall be carried out.

6.7 DISASTER MANAGEMENT PLAN (DMP)

a) Objectives

The emergency DMP for onsite and offsite location will be inter-related. The overall objectives are

- To identify type of major disasters which may occur
- To localize the emergency and if possible eliminate
- To minimize the effect of accidents

Elimination of hazard will require equipment like fire fighting equipments, water sprays, emergency shutoff valves and purposeful construction. Minimizing the effect will be prompt action by operating and emergency staff, rescue, first aid, evacuation, rehabilitation and giving information promptly to people living / working nearby.

b) Types of Possible Emergencies

- Fire on berth / approach trestle / storage / buildings
- Spillage while bunkering by vessel
- Spillage due to collision in channel
- Natural calamities like cyclone / rough weather / earthquake/ Tsunami
- War situation/ Air strike.

c) Functions of Disaster Management

Controlling spread of accidental effects with minimum damage to men, material, machine and structures.

- To inform relevant agencies and request for help.
- To rescue victims and provide succor.
- To protect other and safely evacuate.
- To inform nearby inhabitations.
- To identify the affected persons and inform their relatives.
- To provide authentic information to news media and other.
- To preserve relevant records and equipment needed as evidence in any subsequent inquiry.
- To rehabilitate the affected areas and allot specific assignment to available manpower.

d) Classification of Accident

- Level I : Operator Level
- Level II : Local / Community Level
- Level III : Regional level
- Level IV : International level

e) Critical Targets

Disaster Management Plan is prepared after identifying the objects likely to be affected in the event of emergency. The target of fire includes personnel if emergency occurs at service platform during discharging of vessel and tank farm on shore.

f) Control Room (CR)

A control room will be established at a location away from likely spots of accidents and shall be easily accessible. Better location will be near the room from where all unloading operation are conducted and controlled.

6.8 EMERGENCY PLAN FOR BERTHS AND VESSEL

Terminal Emergency Plan

This plan will be drawn up in consultation with authority, fire brigade, coast guard and police etc. The plan will include:

- Specific initial action to be taken by those at the location of emergency (to notify time, position source and cause of spill) to control room and Coast guard.
- Immediate action to combat Oil –pollution.
- Evaluations of situation by on scene controller regarding threat posed by spill and identify threatened resources.
- Details of Communication system available siren code.
- An inventory including location details of emergency equipment.
- Sound alarm-terminal fire fighting staff to fight fire.
- Mobilize fire-fighting equipment.
- Electric power to switch off - emergency lighting to switch on.
- The ships calling at terminal will be advised of the terminal's emergency plan particularly the alarm signals and procedures to summon assistance in the event of an emergency, on board.

Rough Weather

The rough weather operations will be controlled in three stages

- Green Status - the operations of loading / unloading will be carried out as planned.
- Yellow status - This is an alert stage indicating possibility of rough weather, still operations can be continued with all emergency precautions.
- Red Status - Emergency situation or rough weather; operation will be suspended - Activities controlled by In charge of emergency operations. The vessel / tanker is to be unearthed to safe anchorage or will be advised to proceed to sea.

First Aid & Fire Fighting Services

The proposed project will have full-fledged medical facilities as well as fire fighting facilities available in the area.

6.9 IDENTIFICATION OF MAJOR HAZARDS

The hazards occurring at Proposed Project can be broadly classified as natural and man-made hazards. Some of the hazards existing at site are as follows:

- Earthquakes
- Fire
- Tsunamis

Earth Quake

An earthquake is a sudden, rapid shaking of the Earth caused by the breaking and shifting of rock beneath the Earth's surface. This shaking can cause buildings, dams and bridges to collapse; disrupt gas, electric, and phone service; and sometimes trigger landslides, flash floods and fires; all these are possible scenarios at Proposed Project. Buildings with foundations resting on unstable soil and slopes are most at risk.

The greatest danger for people in an earthquake exists directly outside buildings, at exits, and alongside exterior walls. Ground movement during an earthquake is seldom the direct cause of death or injury. Most earthquake-related casualties result from collapsing walls, flying glass, and falling objects.

Fire

Fire is the most probable emergency scenario at proposed project. Fire can be caused in buildings and installations as electrical fire, fire in buildings. To handle this scenario an onsite emergency plan has been developed by the security team and is currently operational.

Tsunamis

Tsunamis are generated by large and rapid displacements of water, mainly from sudden and large scale changes in the configuration of the sea floor associated with fault displacement or gigantic underwater landslides, which could be mainly due to earthquakes.

Earthquakes generate tsunamis by vertical movement of the sea floor as in normal faulting or thrust faulting. If the sea floor movement is horizontal, tsunamis are not generated as in strike slip earthquake. Sometimes they are triggered by marine landslides into or under the water surface, also generated by volcanic activity and meteorite impacts, but such events are extremely rare. Tsunami hazard along a coastline is therefore a combination of all the potential sources of tsunamis that lie in the neighboring sea or ocean. Tsunami waves travel at a speed of approximately 700 km/ hr in 4000 m of water. In 10 m of water the velocity drops to about 36 km/hr.

6.10 EMERGENCY RESPONSE MEASURES FOR NATURAL HAZARDS

Natural Hazards cannot be prevented. However with mitigation measures the effects/damages could be reduced.

6.10.1 Response in case of Earthquake

Response procedures for worker

If indoors:

Take cover under a piece of heavy furniture or against an inside wall and hold on.

If indoors:

Stop the process and move away from machinery, equipment, etc.

Avoid moving around until the shaking stops.

If outdoors:

Move into the open, away from process area, office building and utility wires.

Gather at the Evacuation point mentioned during the safety drill and await instructions.

If in a moving vehicle:

Stop quickly and stay in the vehicle.

Once the shaking has stopped, proceed with caution.

After be prepared for aftershocks.

Although smaller than the main shock, aftershocks cause additional damage and may bring weakened structures down. Aftershocks can occur in the first hours, days, weeks, or even months after the quake.

Help injured or trapped co-workers.

Give first aid where appropriate. Do not move seriously injured persons unless they are in immediate danger of further injury. Call for help. Use Emergency numbers.

Stay out of damaged buildings, machinery, equipments.

Get your entire process area checked with Safety officers

Use the telephone only for emergency calls.

Emergency Response Procedure

- Initiate the Quick Response Team and First aid team for earthquake response
- Give a long siren for earthquake warning
- Inform the necessary authorities for aid
- Ensure no personnel or residents are stuck beneath any debris
- Ensure that all residents and personnel standing outside near the buildings are taken to open areas.
- Close the entry gate to restrict any incoming traffic
- Inform Electrical department to shut off the utilities.
- Ensure that the first aid ambulance and fire tender vehicles are mobilized
- Ensure that emergency telephone number is only used for this purpose
- Check the utilities and storage tanks for any damage.
- Inform structural engineers to check for any damage to the Dam structure

6.10.2 Response in case of Fire

On sighting a fire the first person should immediately inform the control room.

- If the fire is small engage in extinguishing the fire using the nearest fire extinguisher or retrieve the property that may be damaged.
- Guide staff to the emergency assembly point.
- The control room will immediately inform the first aid centre and the quick response team, which has trained fire-fighting personnel. Mobilize the fire tender.
- The Quick Response team will immediately move to the point of fire and take all necessary steps to stop the fire. If the fire is not controllable and spreads to the other area then immediately inform the security post who would in turn inform the district authorities and call for external help.
- First aid team will provide immediate relief to the injured personnel at the scene of incidence. The patients would then be evacuated on priority to the dispensary or hospital based on their condition.

Instructions for an Individual in case of fire

- Get out of buildings as quickly and as safely as possible. If outdoors stop all processes and inform the control room using emergency alarm system and Emergency numbers.
- Use the stairs to escape. When evacuating, stay low to the ground. Evacuate and assemble at the assembly point decided previously.
- If possible, cover mouth with a cloth to avoid inhaling smoke and gases.
- Close doors in each room after escaping to delay the spread of the fire.
- If in a room with a closed door.
- If smoke is pouring in around the bottom of the door or it feels hot, keep the door closed.
- Open a window to escape or for fresh air while awaiting rescue.
- If there is no smoke at the bottom or top and the door is not hot, then open the door slowly.
- If there is too much smoke or fire in the hall, slam the door shut.
- Call the security from the nearest phone
- Inform security gate if there are any persons trapped in the house or injured.
- Stay out of damaged buildings.
- Check that all wiring and utilities are safe.

6.10.3 Response in case of Tsunamis/Storm Surges

a) Structural measures:

Construction of cyclone shelters

- Plantation of mangroves and coastal forests along the coast line acting as Bioshields
- Development of a network of local knowledge centers (rural/urban) along the coast lines to provide necessary training and emergency communication during crisis time
- Construction of location specific sea walls and coral reefs in consultation with experts
- Development of well designed break waters along the coast to provide necessary cushion against cyclone and tsunami hazards
- Development of tsunami detection, forecasting and warning dissemination centres
- Development of a “Bio-Shield” - a narrow strip of land along coastline. Permanent structures, if any in this zone with strict implementation of suggested norms. Bio-Shield can be developed as coastal zone disaster management sanctuary, which must have thick plantation and public spaces for public awareness, dissemination and demonstration.
- Increasing the river dike height, increasing the height of the coast by filling up of coastal sand of the same place.
- Identification of vulnerable structures and appropriate retrofitting for tsunami/cyclone resistance of all such buildings as well as appropriate planning, designing, construction of new facilities like
- Critical infrastructures e.g. power stations, warehouses, oil and other storage tanks etc. located along the coastline.
- All other infrastructure facilities located in the coastal areas.
- Public buildings and private houses.
- All marine structures.
- Construction and maintenance of national and state highways and other coastal roads.

b) Non-Structural Measures

- Coastal regulations Zone Act – Strict implementation.
- Aggressive capacity building requirements for the local people and the administration for facing the disasters in wake of tsunami and cyclone, 'based on cutting edge level'
- Developing tools and techniques for risk transfer in highly vulnerable areas
- Conserving and developing Natural Bioshields (Mangroves) and shelterbelt plantations (Casuarina)
- Maintaining natural sand dunes.
- Maintaining and promoting beach development.
- Having diverse livelihood options.
- Launching a series of public awareness campaign throughout the coastal area by various means.
- Training of local administration in forecasting warning dissemination and evacuation techniques
- Awareness generation and training among the fishermen, coast guards, officials from fisheries department and port authorities and local district officials etc., in connection with evacuation and post tsunami storm surge management activities. Regular drills should be conducted to test the efficacy of the DM plans.

6.11 IDENTIFICATION AND ASSESSMENT OF HAZARDS

Storms, Floods and fires are potential disasters for such Projects. Their likelihood of occurrence and the resulting risk of damage should be incorporated into the design analysis of each project facility.

Table 1 - Summary of the Disasters Preparedness Plans

DISASTER	DESCRIPTION	RESPONSE PLAN	STAGES
Hurricanes and storms	Depending on the magnitude storms can damage the infrastructure of the project area to varying extent, thereby	Hurricane Preparedness Plan Secure insurance coverage.	Alert, Response Recovery

	affecting its operation		
Earthquake	The proposed site is not in an earthquake prone area. Thus less chances of earthquake are envisaged.	Building and construction shall adhere to the earthquake efficiency norms.	Planning, Response, Damage Assessment and Recovery.
Fire	Fire outbreaks also vary in size and location and cause irreparable damage to the infrastructure.	Fire Prevention and Preparedness Plan Install fire fighting equipments Electrical work will be done by certified electrician. Provide proper Insurance coverage.	Response, Planning Fire Drills, Damage Assessment.
Oil Spills and leaks	Oil or fuel spill due to accidents or leakages pose a serious impact to the sensitive environment.	Spill Contingency Plan All petroleum products stored in bunded areas.	Report and Response, Recovery
Climate change	This natural occurring phenomena can pose a risk to the project if not adapted in time.	Contingency Plan	Alert, Response
Medical	Medical emergencies can occur at any moment and therefore requires a quick and coordinated effort to respond to the need.	Medical Emergency Plan First aid equipment and staff trained in CPR.	Response, Recovery

