

## Extension of Hope Town Wharf in Port Blair Harbour

### 7.0 Disaster Management Plan

#### 7.1 Risk Assessment and Emergency Preparedness Plan

The Wharf is now in operation for bulk unloading of LPG from vessels directly to the nearby Indane Bottling Plant through pipeline. **IOCL has undertaken a detailed Risk Assessment and has an Emergency Preparedness Plan in place.** There is **no significant change to the existing status is anticipated** after the Extension of Wharf and its utilization.

The salient features of **Emergency Preparedness Plan followed by IOCL** for its existing operations at the Wharf Area is appended for reference :

##### 7.1.1 Estimation of Risk

Risk is a combination of two factors, frequency of occurrence of the accident and the magnitude of the consequence of the accident. The risk levels associated with the facilities are in the following forms:

- ❖ Individual risk contours which show the geographical distribution of risk to an individual.
- ❖ Societal risk (=Likelihood x Consequences) - (FN) curves which show the cumulative frequency (F) distribution of accidents causing different numbers (N) of fatalities.

The FN curve therefore indicates whether the societal risk to the facility is dominated by relatively frequent accidents causing small numbers of fatalities or low frequency accidents causing many fatalities.

Based on the above, the major risk contributors to individual risk is only on LPG Feed line rupture-Flash Fire / VCE. The Individual Risk (IR) value for the facility is calculated to be 2.46E-6 per year which falls in '**As Low as Reasonably Practicable**' - **ALARP** (Tolerability) region of risk acceptance criteria. The Societal Risk for overall population also falls in the ALARP region. The **Maximum Credible Accident** (MCA) Analysis Results are given in **Table 7.1**.

**Table : 7.1 MCA Damage Distance**

Sl. No.	Scenario Description	Damage Distance (m)	
		50% Fatality	1% Fatality
1	Small leak in LPG Feed line - Flash Fire / VCE	-	294.97
2	Small leak in LPG Feed line jet Fire	23.08	25.90
3	LPG Feed line rupture-Flash Fire / VCE	-	294.97

#### 7.2 Disaster Management Plan

Disasters are off natural as well as man-made. Natural Disasters include Earthquakes, Floods, Cyclones, Tsunami, River Erosion, Landslides/, Forest Fires, etc. and the Man Made Disasters include Nuclear, Chemical, Mines, Biological, Cyber Terrorism, Environmental Disasters, etc.

The Andaman & Nicobar Islands Disaster Management Plan (DMP) has been prepared by the Administration which captures the measures undertaken and system established for disaster management in A&N Islands. In tune with the Disaster Management Act 2005, A&N Islands Union Territory Disaster Management Authority, A&N Union Territory Disaster Management Executive Committee and District Disaster Management Authorities are also constituted. The Disaster Management Practitioners utilize the DMP to promote collaborative efforts to reduce the disaster risk in the Islands. The **Wharf operations is also covered under already developed DMP** of the Islands.

**Earthquakes** : An earthquake is the result of a sudden release of energy in the Earth's crust that creates seismic waves. Earthquakes are measured using observations from seismometers. The moment magnitude is the most common scale on which earthquakes larger than approximately 5 are reported for the entire globe. The more numerous earthquakes smaller than magnitude 5 reported by national seismological observatories are measured mostly on the local magnitude scale, also referred to as the Richter scale. Magnitude 3 or lower earthquakes are mostly almost imperceptible or weak and magnitude 7 and over potentially cause serious damage over larger areas, depending on their depth.

**Tsunami** : A tsunami is a series of water waves caused by the displacement of a large volume of a body of water, generally an ocean or a large lake. Earthquakes, volcanic eruptions and other underwater explosions (including detonations of underwater nuclear devices), landslides, glacier calvings, meteorite impacts and other disturbances above or below water all have the potential to generate a tsunami. Tsunami waves do not resemble normal sea waves, because their wavelength is far longer.

**Volcanoes** : A volcano is an opening, or rupture, in a planet's surface or crust, which allows hot magma, volcanic ash and gases to escape from the magma chamber below the surface. Volcanoes are generally found where tectonic plates are diverging or converging. By contrast, volcanoes are not usually created where two tectonic plates slide past one another. Volcanoes can also form where there is stretching and thinning of the Earth's crust in the interiors of plates.

**Land Slides** : A landslide or landslip is a geological phenomenon which includes a wide range of ground movements, such as rock falls, deep failure of slopes and shallow debris flows, which can occur in offshore, coastal and onshore environments. Although the action of gravity is the primary driving force for a landslide to occur, there are other contributing factors affecting the original slope stability. Typically, pre-conditional factors build up specific sub-surface conditions that make the area/slope prone to failure, whereas the actual landslide often requires a trigger before being released.

**Cyclones** are caused by atmospheric disturbances around a low-pressure area distinguished by swift and often destructive air circulation. They are usually accompanied by violent storms and bad weather. The criteria below has been formulated by the Indian Meteorological Department (IMD), which classifies the low pressure systems in the Bay of Bengal and the Arabian Sea on the basis of the capacity to damage, which is adopted by the WMO.

**Type of Disturbances**

Low Pressure

**Wind Speed in Km/h**

Less than 31

**Wind Speed in Knots**

Less than 17

<u>Type of Disturbances</u>	<u>Wind Speed in Km/h</u>	<u>Wind Speed in Knots</u>
Depression	31-49	17-27
Deep Depression	49-61	27-33
Cyclonic Storm	61-88	33-47
Severe Cyclonic Storm	88-117	47-63
Very Severe Cyclonic Storm	117-220	63-119
Super Cyclone	More than 221	More than 120

They are further divided into the following categories according to their damage capacity.

<u>Cyclone Category</u>	<u>Wind Speed in Km/h</u>	<u>Damage Capacity</u>
01	120-150	Minimal
02	150-180	Moderate
03	180-210	Extensive
04	210-250	Extreme
05	250 and above	Catastrophic

**Storm surge** : A storm surge is an offshore rise of water associated with a low pressure weather system, typically tropical cyclones and strong extratropical cyclones. Storm surges are caused primarily by high winds pushing on the ocean's surface. The wind causes the water to pile up higher than the ordinary sea level. It is this combined effect of low pressure and persistent wind over a shallow water body which is the most common cause of storm surge flooding problems. In areas where there is a significant difference between low tide and high tide, storm surges are particularly damaging when they occur at the time of a high tide.

**In the case of severely bad weather, the Administration restricts the Vessels/Boats movement in the Harbour.**

Arrival and Departure of Vessels/Ships/Boats may result in **Vessels Collision**. The hazard scenarios were risk ranked using the Risk Matrix (R) shown in **Table 7.1**. The criteria used to determine the Likelihood of Occurrence (L) and Potential Severity (S) are given in **Table 7.2** and **Table 7.3** respectively.

**Ranking of 2.5 and greater are considered significant/high risks.**

**Table : 7.1 Risk Matrix (R)**

		<b>Risk</b>			
		<b>Low (1)</b>	<b>Medium (2)</b>	<b>High (3)</b>	<b>Continuous (4)</b>
<b>Potential Severity</b>	<b>Major (4)</b>	2.5	3.0	3.5	4.0
	<b>Moderate (3)</b>	2.0	2.5	3.0	3.5
	<b>Minor (2)</b>	1.5	2.0	2.5	3.0
	<b>Negligible (1)</b>	1.0	1.5	2.0	2.5

**Table : 7.2 Likelihood of Occurrence (L)**

Likelihood of Occurrence	Description	Ranking
Continuous	Consequence likely to occur once in 1 yr	4
High	Consequence likely to occur once in 5 yrs	3
Medium	Consequence likely to occur once in 10 yrs	2
Low	Consequence likely to occur once in 20 yrs	1

**Table : 7.3 Potential Severity (S)**

Potential Severity	Description	Ranking
Major	More than one fatality	4
Moderate	One fatality	3
Minor	Loss Time Injury (LTI)	2
Negligible	Injury not resulting in loss time	1

The high risk scenario is identified for the Project operation (Table 7.4) as a result of Vessels Collision which may consequentially lead to severe damage to Vessels; potential for fire, personnel injury and environmental impact (spillage of material, fuel oil/diesel, etc.). The risk scenario as a result of Vessels collision; as a result of contamination by the discharge of oil polluted water, etc. Due to the nature of the operations, no likely scenarios could be identified for usage, generation, storage and transport; explosion hazards. **Safeguards needed to reduce the level of risk are identified for the scenario and all will be in place.**

**Table : 7.4 Risk Scenario : Arrival & Departure of Vessels/Ships/Boats**

Hazards	Material	Causes	Safeguards	S	L	R	Justification
Acceleration	Vessels	<p>1.0 Collision with other Boats (passenger carriers, cargo boats, etc.).</p> <p><b>Consequences:</b></p> <p>1.1. Severe damage to Vessels/Boats; potential for fire, personnel injury, environmental impact (spillage of material, fuel oil/diesel).</p>	<p>1. Speed restriction (&lt;2 knots) in approach/depart the Wharf area.</p> <p>2. Equipment for oil spill to water containment (Emergency Response and Safety Plan).</p>	4.0	1.0	2.5	<p>Severity: In the event of Vessels collision, factors such as travel speed; personnel onboard; flammable material used/stored etc. will determine the consequence level. The consequence was high due to the fact that collision in this instance could lead to multiple fatalities.</p> <p>Likelihood: Likelihood ranking is determined based on safeguards identified.</p> <p>Implementation of the 2 identified safeguards will aid in the prevention/reduction of the likelihood of such an event occurring.</p>
Fire	LPG & Misc.	<p>2.0 Ignition of misc. materials.</p> <p><b>Consequences:</b></p> <p>2.1. Severe damage to</p>	<p>1. All Vessels in compliant with IMO and flag state regulations (Fire-fighting equipment, medical officer and services).</p> <p>2. Communication with Coast Guard to compliment Fire Fighting operations.</p>	3.0	1.0	2.0	<p>Severity: Flammable materials can contribute to fires. The consequence ranking of 3 was based on the fact that in the event of such a fire, there may be one</p>

Hazards	Material	Causes	Safeguards	S	L	R	Justification
		Boats; potential for fire, personnel injury, environmental impact (spillage of transfer material, fuel oil/diesel).					fatality at most. Likelihood: Likelihood ranking is determined by safeguards identified. Implementation of the two (2) identified safeguards will aid in the prevention/reduction of the likelihood of such an event occurring.
Leakage	LPG, Fuel Oil and diesel, sewerage	3.0 Piping leaks/rupture, corrosion, human error.  <b>Consequences:</b>  3.1. Potential for fire, personnel injury, Environmental Impact.	1. All Vessels in compliant with IMO and flag state regulations. (Fire-fighting equipment, medical officer and services).  2. Equipment for oil spill to water containment (Emergency Response and Safety Plan).  3. Leakage of LPG, if any, will be immediately attended.	2.0	1.0	1.5	Severity: In the event of leakage of fuel oil and diesel, the greatest consequence will be lost time Injury if vessel personnel were exposed. It was determined that if a fire occurred as a result of leakage, it would be localised and more manageable thus a consequence ranking of 2 was given. Likelihood: Likelihood ranking is determined based on safeguards identified. Implementation of the 3 identified safeguards will aid in the prevention/reduction of the likelihood of such an event occurring.
Contami-nation	Discharge of oil contami-nated water, bilge water.	4.0 Inefficient separation of oil and water on Boat.  <b>Consequences:</b>  4.1. Environmental impact.	1. Oil separation equipment installed on Vessels/Boats.  2. Boats restricted from discharging oily water while at the Wharf (as per MARPOL).  3. All overboard valves to be sealed close.				
Contami-nation	Discharge of washings.	5.0 Water from washing of Vessels/Boats.  <b>Consequences:</b>  5.1. Environmental impact.	1. Boats restricted from discharging bilge water while at port (as per MARPOL).  2. All overboard valves to be sealed close.				

## 7.3 Do's and Dont's

### Tsunami

- ❖ Turn on your radio to learn if there is a Tsunami warning if an earthquake occurs and you are in a coastal area.
- ❖ Be alert for Early Warnings.
- ❖ Learn to understand and notice the sea. If there is noticeable recession in water away from the shoreline become cautious and move away immediately.
- ❖ Move inland to higher ground immediately and stay there.
- ❖ Stay away from the beach.
- ❖ Stay away from flooded and damaged areas until officials say it is safe to return.
- ❖ Stay Away from debris in the water; it may pose a safety hazard to boats and people.
- ❖ Save yourself not your possessions.
- ❖ Never go down to the beach to watch tsunami come in. If you can see the wave you too close to escape it.

### Cyclone

- ❖ Insured.
- ❖ Turn off gas and electric supply.
- ❖ Secure door & windows during cyclone warning.
- ❖ Trim branches hanging over your roof.
- ❖ Don't take Shelter near tree & electric line.
- ❖ Don't go for sightseeing.

### Earthquake

- ❖ Read and learn about Disaster Management.
- ❖ Earthquakes resistant house.
- ❖ Attend disaster awareness classes.
- ❖ Keep your exit route unblocked.
- ❖ Practise escape plan.
- ❖ Stay away from hanging object.
- ❖ Assist disabled to escape.
- ❖ Stay away from tall buildings and electrical wires.
- ❖ Duck cover and hold.
- ❖ Don't take shelter near windows or cupboards.
- ❖ To exit don't run, walk fast.
- ❖ Don't use lift, use staircase to exit.

### Fire

- ❖ Repair defecting wiring.
- ❖ Get a fire extinguisher now.
- ❖ Cover yourself with blanket when exposed to flame.
- ❖ On being trapped stuff side gap of the door with cloth.
- ❖ Keep a first aid kit ready.
- ❖ Help wire victims.
- ❖ To extinguish fire, use sand, dust, loose earth or fire extinguisher.
- ❖ Call 101 for Fire Brigade.
- ❖ In a smoke filled room, don't walk, crawl.
- ❖ Don't throw water on electrical appliance.

- ❖ Don't play with fire.
- ❖ Stop drop drill.

**Emergency Contact Numbers**

- ❖ State Control Room: 1077 / 234287
- ❖ Directorate of Disaster Management: 242697 / 233311
- ❖ District Control Room: 238881 / 1070

**Other Phone Nos. :**

Fire	101
Ambulance	102
Women Care	1091
Child Care	1098
Coast Guard (MRCC)	1093
Doordarshan	233766
All India Radio	230360 / 232540
Govt. Press	229217 / 227201

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