Report of investigation into the incident on the fatal injury of a crewmember on board the dumb steel lighter *"Millions Harvest No.2"* on 17 July 2006

The Hong Kong Special Administrative Region
Marine Department
Marine Accident Investigation Section

Purpose of Investigation

This incident is investigated, and published in accordance with the IMO Code for the Investigation of Marine Casualties and Incidents promulgated under IMO Assembly Resolution A.849(20). The purpose of this investigation conducted by the Marine Accident Investigation and Shipping Security Policy Branch (MAISSPB) of Marine Department is to determine the circumstances and the causes of the incident with the aim of improving the safety of life at sea and avoiding similar incident in future.

The conclusions drawn in this report aim to identify the different factors contributing to the incident. They are not intended to apportion blame or liability towards any particular organization or individual except so far as necessary to achieve the said purpose.

The MAISSPB has no involvement in any prosecution or disciplinary action that may be taken by the Marine Department resulting from this incident.

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1. Summary

1.1 An accident happened onboard the dumb steel lighter "*Millions Harvest No.2*" at Millions Harvest Wharf, Tsing Yi on 17 July 2006. While a crewmember of the coastal vessel *"Bo Yun 278"* was walking on the deck of the dumb steel lighter, a mooring rope snapped and hit the head of the crewmember. The crewmember suffered severe head injury and later died in the hospital.

1.2 The investigation revealed the following contributory factors leading to the accident:

a) Excessively worn mooring ropes in very poor physical condition were used;

b) Mooring arrangements have not been properly planned and rigged. Factors such as prevailing sea conditions, line orientation and rope strength were not properly taken into account; and

c) The crewmember was walking inside the "snap-back zone" of the mooring rope.

2. Description of *the Vessel*

2.1 *"Millions Harvest No.2"* (hereinafter referred as *the DSL*), is a locally licensed dumb steel lighter. It was engaged in transporting containers between wharfs and vessels within Hong Kong waters. *The DSL* was fitted with a derrick crane at its forward to facilitate cargo handling operations.

2.2 Particular of *"Millions Harvest No.2"*

Name of Vessel	:	*Millions Harvest No.2, ex. Kam Wah No. 2, ex. Foreach No. 2*
License No.	:	21474V
Type of Ship	:	Dumb steel lighter
Year of Built	:	1992
Built At	:	Kou An Shipyard, China
Owner of Vessel	:	Millions Harvest Assets Investment Ltd.
Length	:	44.51 metres
Breadth	:	19.20 metres
Depth	:	4.88 metres
Gross Tonnage	:	1,136
Net Tonnage	:	649
Engine Power	:	N.A.

Fig. 1: Dumb steel lighter*"Millions Harvest No.2"*

3. Sources of evidence

a) Lighterman of dumb steel lighter "*Millions Harvest No. 2*"

b) Chief Officer of coastal vessel "*Bo Yun 278*" (博運278)

c) Weather report from the Hong Kong Observatory

d) Autopsy report of the deceased

4. Outline of events

4.1 The dumb steel lighter "*Millions Harvest No. 2*" (*the DSL*) loaded with container cargoes was stationed alongside the Millions Harvest Wharf, Tsing Yi, New Territory awaiting the unloading of container cargoes to coastal vessels.

4.2 At about 1025 on 17 July 2006, a Chinese coastal vessel "*Bo Yun 278*" was moored to the *DSL* for loading containers. Two crewmembers including the Chief Officer and the Second Officer embarked the *DSL* from "*Bo Yun 278*". The Chief Officer went to the cargo hold of the *DSL* to locate and verify those containers that would be loaded to "*Bo Yun 278*". The Second Officer went to the wharf via the deck of the *DSL* to liaise with a person in charge of the cargo working area.

4.3 While the Second Officer was on the *DSL*, a mooring rope at the aft of *the DSL* suddenly snapped and sprang to his position.

4.4 The broken rope hit the head of the Second Officer. He sustained serious head injury. The crewmembers of *"Bo Yun 278"* and workers of *the DSL* proceeded to the scene and found that the Second Officer was in an unconscious state. He was sent to the Princess Margaret Hospital for rescue. The Second Officer was certified dead in the hospital on the next day.

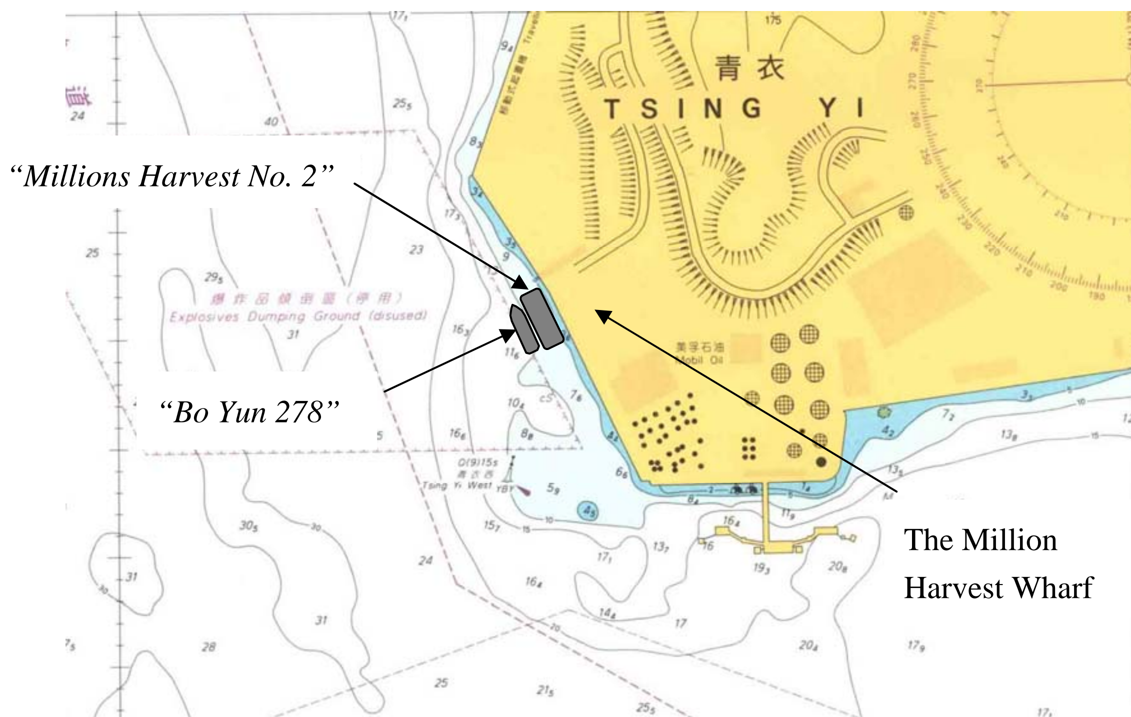

Fig. 2: The position of the vessels at the time of the accident

5. Analysis of evidence

Experience of the deceased

5.1 The deceased was a holder of a River Trade Certificate of Competency as Second Mate issued by the Maritime Safety Administration, PRC China. He had been serving on board different coastal vessels for about six years. He had been working on board *"Bo Yun 278"* as Second Officer for about three months.

The environment

5.2 The accident occurred in the morning with adequate daylight. According to the information provided by the Hong Kong Observatory, strong monsoon signal was hoisted between 2245 on 14 July and 0915 on 17 July, i.e. the signal was lowered about one hour prior to the time of the incident. Strong breeze and large wave were still prevailing in the vicinity. The *DSL* would be subjected to rolling and heaving movements which would put the mooring ropes under high tension stress.

The mooring arrangements

5.3 The *DSL* was berthed at the wharf with portside alongside. The forward and aft bollards of the *DSL* were secured to two shore bollards with two mooring ropes (see figure 3). The *DSL* was fully laden with a deadweight of about 3000 tons. The deck surface of the *DSL* was at about 2 metres lower than the land surface. Therefore the mooring ropes were led vertically downward at a large angle to the horizontal level (see remarks in figure 3). Load on the both mooring ropes was high. Movements of the *DSL* due to sea and wind effects would cause damage to the mooring ropes by rubbing the lines against the edge of the berth. Such arrangement is highly undesirable and should be avoided.

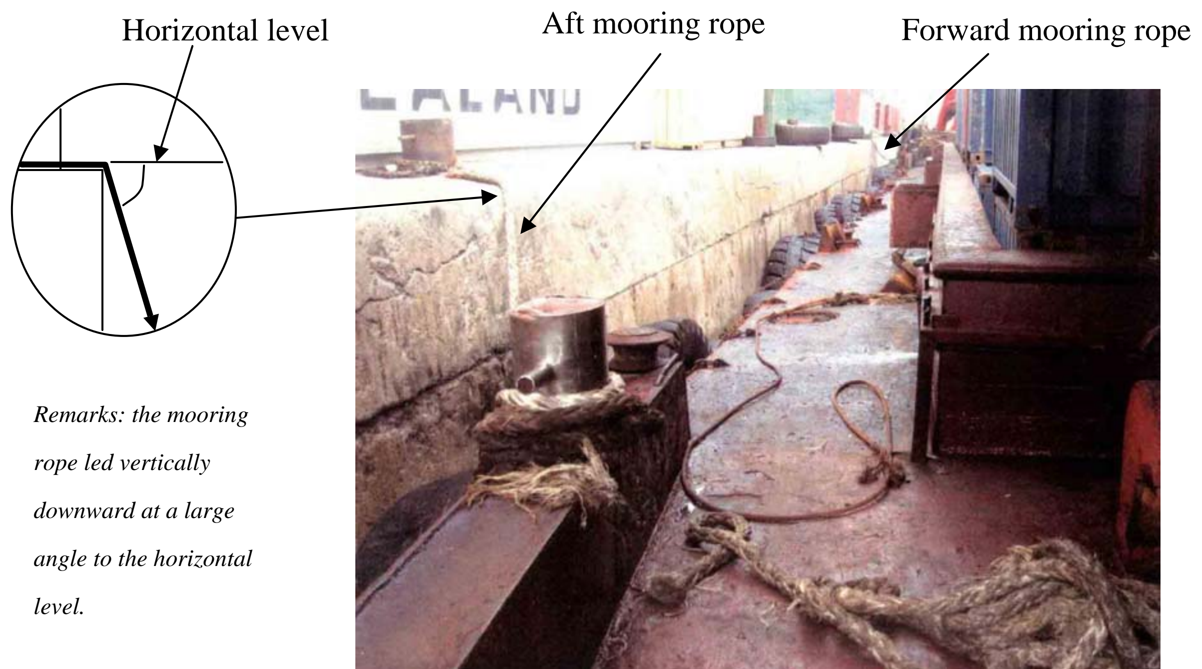

Fig. 3: The berth and the *DSL*

The mooring rope

5.4 The damaged mooring rope (see fig. 4) was a multifilament synthetic rope with following particulars:

a)	Diameter	:	64mm
b)	Material	:	Polypropylene
c)	Lay of rope	:	8-straind plaited
d)	Breaking load	:	49,000 kg (about 48 tons force)
e)	Place of Manufacturer	:	Korea
f)	Classification Society	:	Lloyd's Register

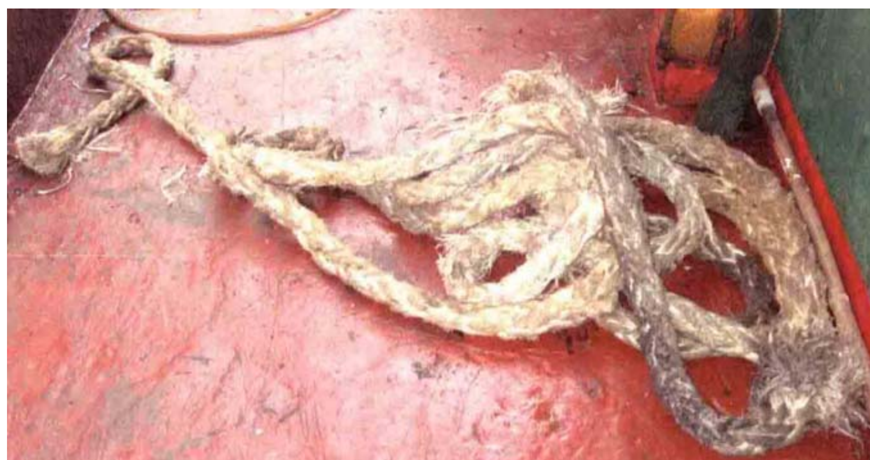

Fig. 4: The broken mooring rope

The condition of the parted mooring rope

5.5 The length of the broken mooring rope was about 6 metres, an eye splice formed at one end of the rope and attached to the bollard of the berth. The other end of the rope was secured to the aft bollard of the *DSL*. The condition of the parted rope was poor, signs of excessive wear were found along the length and the eye of the rope. The rope failed at the midway of the eye (see figure 5).

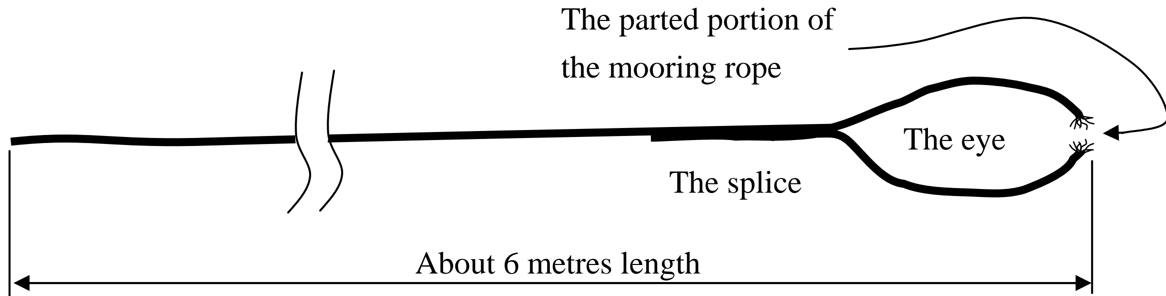

Fig. 5: Sketch of the broken mooring rope

The parted portion

5.6 The parted portion was part of the eye which was attached to a wharf bollard. The surface of the wharf bollard was rough, the eye was subjected to severe rubbing on the bollard due to the motion of *the DSL*. Heat generated due to the rubbing would melt and damage the rope fibres. Strength of the rope was reduced significantly.

Fig. 6: Excessive wears at the eye of the other mooring rope.

5.7 Other mooring ropes of *the DSL* were inspected. Signs of excessive wear due to abrasion were also found at the eye of one of the ropes (see figure 6). The strength of the eye of the rope was seriously weakened and it would be unsafe to use the mooring rope with such excessive wear.

The snap-back zones

5.8 Synthetic ropes are elastic in nature, they would break without warning when under strain. All personnel should avoid remain in snap-back zones on board vessels. While the Second Officer was on his way to the shore, the mooring rope broke and sprang back to the snap-back zone (see fig. 7) in which he was passing by.

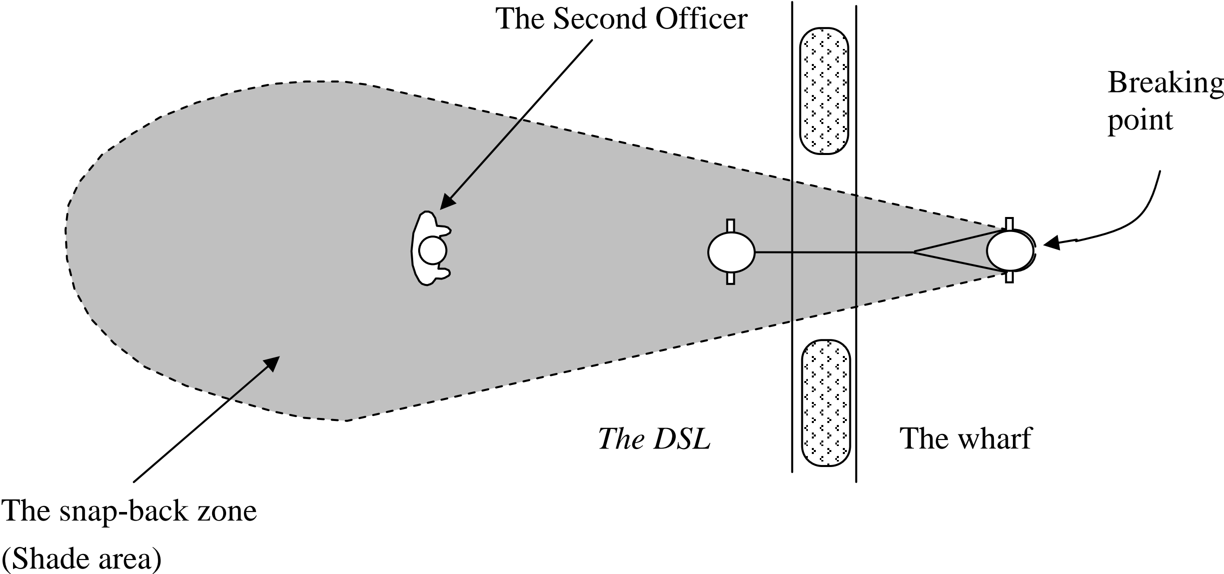

Fig. 7: The snap-back zone of the mooring rope

The autopsy report

5.9 The cause of death of the Second Officer as shown by the autopsy report was "severe head injury". The report is consistent with the findings in the investigation.

6. Conclusions

6.1 An accident happened onboard the dumb steel lighter "*Millions Harvest No.2*" at Millions Harvest Wharf, Tsing Yi on 17 July 2006. While a crewmember of the coastal vessel *"Bo Yun 278"* was walking on the deck of the dumb steel lighter, a mooring rope snapped and hit the head of the crewmember. The crewmember suffered severe head injury and later died in the hospital.

6.2 The investigation revealed the following contributory factors leading to the accident:

a) Excessively worn mooring ropes in very poor physical condition were used;

b) Mooring arrangements have not been properly planned and rigged. Factors such as prevailing sea conditions, line orientation and rope strength were not properly taken into account; and

c) The crewmember was walking inside the "snap-back zone" of the mooring rope.

7. Recommendations

7.1 A copy of this report should be sent to the concerned parties such as the operator of the dumb steel lighter "*Millions Harvest No.2*" and the Master of the coastal vessel "*Bo Yun 278"* advising them the findings of the of this incident. In order to prevent the recurrence of the similar accident, they should observe the following safety guidelines:

a) Mooring ropes should be properly maintained and frequently examined while in service. Excessively worn mooring rope should be replaced and discarded;

b) Mooring arrangements should be planned and rigged in a safe manner; and

c) Crewmembers should avoid to remain inside the snap-back zone of the mooring rope.

7.2 A Marine Department Notice (MDN) should be issued to draw the attentions to all concerned parties the lessons learnt in the incident.

8. Submissions

8.1 In the event that the conduct of any person or organization is criticized in a casualty investigation report, it is the policy of the Hong Kong Marine Department that a copy of the draft report is given to that person or organization so that they have the opportunity to rebut the criticism or offer evidence not previously available to the investigating officer.

8.2 The draft report (without recommendations) was sent to the operators of the dumb steel lighter "Millions Harvest No.2" and the coastal vessel "*Bo Yun 278*", no submission was received from them.