



Mariners' Alerting and Reporting Scheme

MARS Report No. 236 June 2012

MARS 201228

Pilot ladder ropes parted – pilot fell overboard

➔ As the pilot was climbing the pilot ladder, the side ropes suddenly parted from near the main deck, causing the ladder and pilot to fall from the height of five metres into the sea. Fortunately, the pilot was uninjured and managed to remain afloat with the aid of his personal flotation device (life vest). He was able to swim away from the ship, which was making five knots through the water, and was quickly recovered by the pilot boat. Once onboard the pilot boat, instructions were given to the ship to rig another pilot ladder. The pilot re-boarded the ship and completed the berthing operation.

An investigation by the local port state control officer (PSCO) found no certification or evidence of periodic inspection and maintenance of the ship's pilot ladders. Repetitive rigging of the ladder at the same location and height had created a permanent weak spot on the ropes where the failure occurred. The crew was negligent in not visually inspecting the ladder before rigging and also failed to throw the mandatory lifebuoy (life ring) with line and light after the pilot had fallen in the sea.

It is very important that such glaring omissions in ship operation and crew training (in this case, poor maintenance of pilot ladder and crew's incorrect response to a man overboard emergency) are detected by ship's command, managers, auditors, surveyors and inspectors and corrective actions are effectively implemented.

MARS 201229

Arm fractured when rigging pilot ladder

➔ A large inbound vessel was approaching the pilot station in a gale and heavy rain and was instructed to prepare combination ladders on both sides. The C/O and deck crew held a toolbox meeting and prepared the port (weather) side combination ladder first. The gangway was rigged at deck level, and then lowered to the proper height. Next, a seaman wearing all appropriate PPE, including an inflatable life vest and safety harness with lifeline, descended to the bottom platform of the gangway to monitor the lowering of the pilot ladder. After confirming the pilot ladder was 1.5 metres above the water, he began to secure the pilot ladder to two sunken cleats in the hull with an 8mm rope lashing. When he inserted his right hand into the after sunken cleat to thread the rope through it, a wave caught the bottom of the pilot ladder and jerked it astern. The step in the way of the sunken cleat moved aft and hit the seaman's right wrist, whilst his hand was still inside the recess. Although in severe pain, he managed to return to the accommodation where first aid was given by the ship's medical officer. Immediately after berthing, the injured crew was sent ashore and the doctor diagnosed a bone fracture (right ulna), ligament injury and subcutaneous haematoma. The crewmember was certified unfit for duty and was disembarked.

Root cause/contributory factors

- 1 Although a proper risk assessment and toolbox meeting was conducted before work, it did not consider the possibility and consequences of the bottom steps of the ladder being hit by a swell wave;
- 2 A combination of wind direction, restricted sea room, traffic density and routing prevented a change of heading to provide sufficient lee for rigging the combination ladders;
- 3 Constraints of the working area – in order to secure the pilot ladder to the sunken cleats, the crewmember had to stand on the bottom step of the gangway and pass the lashing rope around both the pilot ladder's side ropes and twice around the far cleat before tying it off.

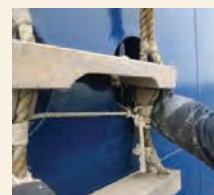
Corrective/preventative actions

Pilot combination ladder rigging procedures revised as follows:

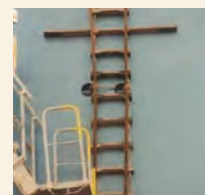
- 1 Gangway to be lowered to designed level ($\leq 55^\circ$ angle above horizontal);
- 2 Pilot ladder rope lashing changed from 8mm to 16mm since the larger rope requires only one turn around the ladder and cleat;
- 3 The fore side of the pilot ladder to be lashed first and then the aft side;
- 4 During rigging and unrigging operation, the pilot ladder's bottom steps shall be kept at least 4 metres above the sea level by means of the recovery line;
- 5 Pilot ladder marked to indicate at upper deck one, two and three metre clearances from ladder bottom to sea level for both ballast and laden conditions.



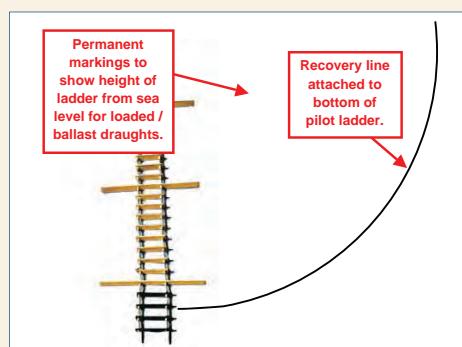
Seaman securing pilot ladder to sunken cleats



Reconstruction of incident showing how the step impacted on seaman's arm



View of combination ladder arrangement



Corrective action No 5 implemented

Editor's note: If the pilot transfer craft has sufficient freeboard, under rough sea conditions and with the pilot's agreement, it would be safer to keep the bottom of the ladder higher than 1.5 metres above the water. Instead of rope lashings that need to be passed around the ropes and cleats and tied off, 'karabiner' type quick-release hooks or shackles with a short rope grommet or sling will be more practical, allowing the crew to simply wrap the rope around the ladder and clip the hook either on to its own rope or on to the sunken cleat.

For safety reasons, some pilotage authorities do not permit the use of recovery or tripping lines at the bottom of pilot ladders. Where permitted, the ship's crew must ensure that this line is led well clear of the ladder and away from the gangway section of a combination arrangement, and kept under adequate tension so that it does not snag or foul the hull of the pilot boat or launch.

MARS 2012230

Unsafe operations at offshore tanker loading berth

→ Our crude oil tanker arrived at her offshore loading terminal but due to prevailing severe gale conditions, the vessel remained at anchorage, waiting for the weather to improve. Two days later, an attempt to berth was aborted halfway through as the wind suddenly increased, and the vessel re-anchored. On the morning of the fourth day, the weather improved with a moderate westerly wind. The vessel approached the single point mooring (SPM) to pick up the chafing chain from the buoy and secure it to her bow chain stopper. At that time, the Mooring Master informed the Master that the SPM had been lying unused for nearly a year.

The mooring equipment of the SPM consisted of a chafing chain (76 mm diameter) joined to a polypropylene hawser (80 mm diameter). This connection included a one metre-long weak link comprising of a large oval master link, a Baldt hinged link and a pear link. The weak link had a 'D' shackle at each end, one passing through the eye of the hawser and the other passing through the first link of the chafe chain. The purpose of the weak link is to reduce the risk of the hawser parting when picking up/casting off the chain, which has an attendant hazard of whiplash.

During the mooring operation, the Master was attending on the bridge, assisted by the 3/O and one helmsman, while the C/O, the Bosun and two ABs, coordinated by the Mooring Master, were at the forward mooring station. The vessel's bow had two mooring chain stoppers: one port and one starboard. Both required the hauling line to be led sharply around a pedestal fairlead roller to the winch drum.

No tugs were available for assistance, and on the final approach heading, the vessel started rolling heavily due to the sea and swell on her beam. While the mooring operation was in progress forward, the remaining deck crew swung out the deck crane and began hoisting the cargo hose clamps from the mooring boat. However, due to the beam swell, the crane hook began to swing wildly as no steadying lines had been attached to it. The suspended equipment, including the heavy steel clamps, repeatedly banged on the shell plating. Once clear of the upper deck railings, the load on the crane hook continued to swing dangerously and was impacting heavily on fittings around the manifold area, endangering the vessel and the attending personnel.

After almost a day's loading, the sea state deteriorated and for safety, the Mooring Master advised the vessel to disconnect the chafe chain and evacuate the berth. Accordingly, cargo loading was suspended and the cargo hoses were disconnected from the manifolds. In order to avoid possible fouling of the propeller by the floating hoses, the Mooring Master instructed the ship's crew to keep them temporarily suspended from the crane hook until the chafe chain was released and he had manoeuvred the vessel sideways to clear the SPM.

With the chief mate still busy with the cargo calculations in the cargo office, the emergency unmooring operation was commenced by the Bosun and two ABs in a 25-knot wind. The 3rd mate was on the bridge, assisting the Master and the pumpman was stationed at the manifold, monitoring the cargo hoses still attached to the deck crane hook. The 2nd mate was taking his due rest.

The chafe chain was under high tension and was being held in position by the chain stopper, which was secured with the locking pin. Due to the very short length of the mooring string, the SPM was very close to the bow. To avoid contact with it, the Mooring Master insisted that instead of using a short kick ahead on the engine, the chafe chain be released by heaving in some slack. Because of the excessive tension caused by the wind, the winch was getting overloaded but the crew did manage to heave in a few centimetres and lift the tongue bar clear.

In this position, the weak link lay exactly on the roller of the pedestal fairlead. Due to the sharp nip around it and the resulting high stress, the inboard pear link parted without warning and the chafe chain together with the outboard end of the broken weak link violently flew out through the chain stopper and fell into the sea. Fortunately, no serious injury resulted among the dangerously exposed crew, except for a small piece of rust that embedded itself in the Bosun's face, just above the left eye. The bridge was informed and while the other crew attended to the wound and removed the rust particle, the vessel now started slowly moving astern, away from the SPM.

Meanwhile, the disconnected cargo hoses were still suspended from the deck crane hook and were temporarily lashed to the hose saddles at the side railings. The sudden astern movement caused these lashings to part and the bights of the hoses fell into the sea. Reacting quickly, the Master gave a short kick ahead on the engine, and the cargo hoses were unhooked from the crane and safely lowered into the sea.

Root cause/contributory factors

- 1 System deficiency – the company did not have detailed procedures for conducting SPM operations, particularly specifying operating environment and tug assistance criteria;
- 2 Exposed location of SPM;
- 3 Possible inappropriate heading on final approach;
- 4 Lack of steadying lines on crane hook;
- 5 Unplanned and hasty disconnection of mooring in strong wind;
- 6 Insufficient manpower on bow and manifold area;
- 7 Poor communications between Mooring Master, ship's Master and deck teams;
- 8 Absence of tug assistance;
- 9 Ineffective maintenance of terminal's mooring system – excessive wear on small pear link of the weak link which was not noticed or rectified by the terminal operator;
- 10 Sharp nip in the hauling part of the chafe chain at the deck pedestal roller;
- 11 Failure to lower the cargo hoses into the water before releasing mooring;
- 12 Failure to use engine to ease tension on chafe chain.

Corrective/preventative actions

- 1 Company procedures amended to include a new risk assessment before commencing SPM operations. The risk assessment requires the Master to ensure:
 - Evidence of Mooring Master's competence/experience and certificate of test and periodic maintenance of the SPM equipment related to the mooring assembly (hawser-chafe chain- weak link);
 - If the Mooring Master is not able to provide any of the above documents, the Master must carry out an assessment of the real status and condition of the mooring equipment before

commencing mooring operation. Company DPA to be informed accordingly;

- Personnel attending at the bow station must be properly briefed before the operation and must be familiar with the hazards and limits of snap back zones;
- An experienced and responsible deck officer shall be in charge of the forward station when connecting/disconnecting chafe chain;
- Ship's Master shall not entirely depend on the Mooring Master's skill and shall actively take over the con in order to ensure safety of personnel, equipment and vessel;



Weak link with excessively worn pear link

After re-mooring, the SPM mooring string's weak link was temporarily removed, inspected and also found to be worn beyond safe limit



Illustration of mooring arrangement before commencing heaving on the hawser – note the sharp nip around the pedestal roller



Illustration of mooring arrangement after the hawser was heaved in with the weak link sharply nipped on the pedestal roller. The pear link parted at this point.

- 2 A fleet circular was sent to the fleet describing the incident and lessons learned;
- 3 A report of the incident was forwarded to INTERTANKO with the recommendation that the terminal operator ensure the proper integrity and operational condition of the SPM equipment;
- 4 Incident shared with the industry to avoid similar recurrence;
- 5 All fleet Masters instructed to closely monitor the condition of every SPM and associated mooring equipment and submit reports to the office on the real status of the SPM equipment at offshore terminals.

Editor's note: Appendix E.4 of OCIMF's publication Recommendations for Equipment Employed in the Bow Mooring of Conventional Tankers at Single Point Moorings (4th Edition, 2007) recommends that ships delivered before 2009 should be equipped to safely handle pick-up ropes taking into consideration safety and protection from risk of whiplash injury to mooring personnel. Additionally, on ships delivered after 2009, it is recommended that pedestal roller(s), if fitted, shall not exceed two in number and should be correctly positioned to enable a direct lead from the centre of the bow fairlead to the centre of the bow chain stopper. The angle of change of direction of the pick-up rope lead should be minimal. On this tanker, it would appear that the change in lead angle around the pedestal roller was excessive.

Additionally, managers must ensure that the latest local marine weather synopsis, isobaric charts and forecasts are available to the vessel, especially in regions where weather conditions may be prone to rapid changes or the SafetyNet service coverage may be less than optimum. In this incident, such data would have assisted the ship's command in better decision-making and could have potentially averted the aborted and hazardous mooring and unmooring operations.

MARS 201231

Radiation hazards onboard ship

(Edited from NEPIA Signals Edn 84)

→ Our daily exposure to radiation is something we only tend to consider when a major nuclear incident reminds us of its dangers. But what is a 'safe' level? The most sensible answer is probably none, but the effects vary enormously from person to person.

There are two different measurements of radiation commonly used: the millirem (mrem) and the microsievert (μ Sv), with 1mrem equalling 10 μ Sv. While radiation cannot be seen or felt, it is all around us and a part of our natural universe. The average annual dose per person from all sources is about 360 mrem, but it is not uncommon to receive far more in a given year, often due to medical procedures. There are standards that limit the dosage that employees may be exposed to. For example, EU Council Directive 96/29/Euratom requires an employee's exposure to be limited to 10,000 mrem in any period of five successive years, but subject to a maximum dose of 5,000 mrem in any single year.

Typical sources of radiation

To assess our individual exposure accurately is practically impossible, but there are a number of factors we can consider.

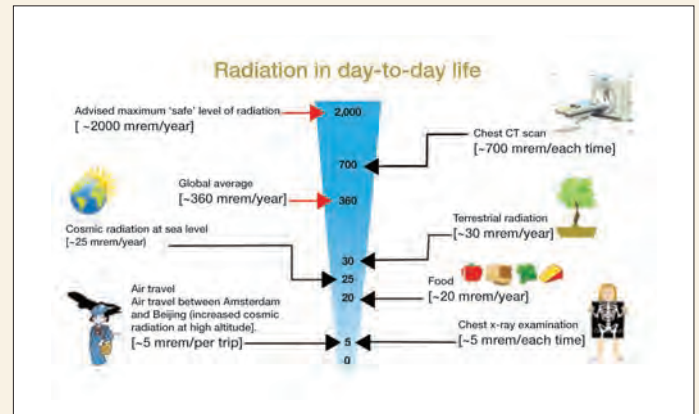
- **Cosmic radiation:** This is radiation from outer space and is partly blocked by the earth's atmosphere. At higher altitude the levels are higher, varying from around 25 mrem at sea level, to double that at an altitude of 1.6 km. A typical dose of radiation when flying is about 0.5 mrem per hour, due to the high altitudes involved.
- **Terrestrial radiation:** This is due to radioactive materials naturally found in the soil such as uranium and thorium. An average value is around 30 mrem a year, but in some places it can be as high as 1,000 mrem a year.
- **Radiation in food:** Foods naturally contain some radioactive elements such as potassium, resulting in an average dose of 20 mrem a year.

- **Other sources:** Watching television is about 1 mrem annually, a chest x-ray is about 5 mrem each time, but a computed tomography (CT) scan can be as high as 700 mrem.

Increased risk of cancer

It has been estimated that the likelihood of dying from cancer increases by 10% if a total of 250,000 mrem has been accumulated (an exposure of over 3000 mrem every year for over 80 years). There is much disagreement over how radiation measurements are calculated, what they mean in reality, what can be considered 'safe' and the level to which we should protect ourselves in our day-to-day lives. There is natural concern about radiation levels following a serious nuclear incident, but it should always be remembered that our world is naturally radioactive and our exposure can never be completely eliminated.

Editor's note: The hazards of exposure to electric and magnetic fields from high voltage power lines are well known ashore. With increasing application of high voltage power generation, distribution and propulsion systems onboard merchant ships, ships' crews risk prolonged exposure to energy emissions when working at very close proximity to such equipment. It is suggested that more scientific studies



are commissioned on this issue and ILO's system of certification of working and living spaces be expanded to include the independent measurement and evaluation of radiation from all shipboard sources (including communication system antennas), so that equipment makers and shipbuilders take all necessary measures to effectively protect ships' crews from harm.

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You can save a life, prevent injury and contribute to a more effective shipping community.

Everyone makes mistakes or has – or sees – near misses. By contributing reports to MARS, you can help others learn from your experiences. Reports concerning navigation, cargo, engineering, ISM management, mooring, leadership, design, training or any other aspect of operations are welcome, as are alerts and reports even when there has been no incident. The freely accessible database (<http://www.nautinst.org/mars/>) is fully searchable and can be used by the entire shipping community as a very effective risk assessment, loss prevention and work planning tool and also as a training aid.

Reports will be carefully edited to preserve confidentiality or will remain unpublished if this is not possible.

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