



SIMPLIFIED SAFETY INVESTIGATION REPORT

201603/039

REPORT NO.: 05/2017

March 2017

The Merchant Shipping (Accident and Incident Safety Investigation) Regulations, 2011 prescribe that the sole objective of marine safety investigations carried out in accordance with the regulations, including analysis, conclusions, and recommendations, which either result from them or are part of the process thereof, shall be the prevention of future marine accidents and incidents through the ascertainment of causes, contributing factors and circumstances.

Moreover, it is not the purpose of marine safety investigations carried out in accordance with these regulations to apportion blame or determine civil and criminal liabilities.

NOTE

This report is not written with litigation in mind and pursuant to Regulation 13(7) of the Merchant Shipping (Accident and Incident Safety Investigation) Regulations, 2011, shall be inadmissible in any judicial proceedings whose purpose or one of whose purposes is to attribute or apportion liability or blame, unless, under prescribed conditions, a Court determines otherwise.

The report may therefore be misleading if used for purposes other than the promulgation of safety lessons.

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MV CIELO DI TOCOPILLA **Serious injury during mooring operations** **In the Port of Ilo, Peru** **27 March 2016**

Course of events

Cielo di Tocopilla, a Maltese registered bulk carrier was loading steel products in the port of Ilo, Peru. On 27 March 2016, the master was instructed to leave berth due to worsening weather conditions.

Ilo is a small commercial port. It has two breakwaters extending westward on which cargo operations are carried out (Figure 1). The ships are berthed on the North and South pier of the breakwaters; however, the pier remains potentially exposed to inclement weather.

Cielo di Tocopilla was moored port side on the South pier of the port's South breakwater with starboard anchor and stern lines fast to a conventional mooring buoy (Figure 2). Additionally, she had four headlines, three backspring forward and four backspring aft secured on the pier.

Prior to departure from Ilo, a tool-box meeting was held by the master, where unmooring operations and related risks were discussed with the relevant crew members.

At the time of departure, the bridge was manned by the master, an OOW, an AB and the deck cadet. At 2142 (LT), a local pilot boarded the vessel and two tugs were made fast fore and aft. At the time, moderate to near gale was blowing from the South southwest. The sea was rough.

The forward mooring station was manned by the chief mate, the bosun and two able seamen. A plan of the mooring equipment and mooring layout on the forecandle deck is shown in Figure 3.

By 2220, the starboard anchor was up and only one forward backspring remained ashore.

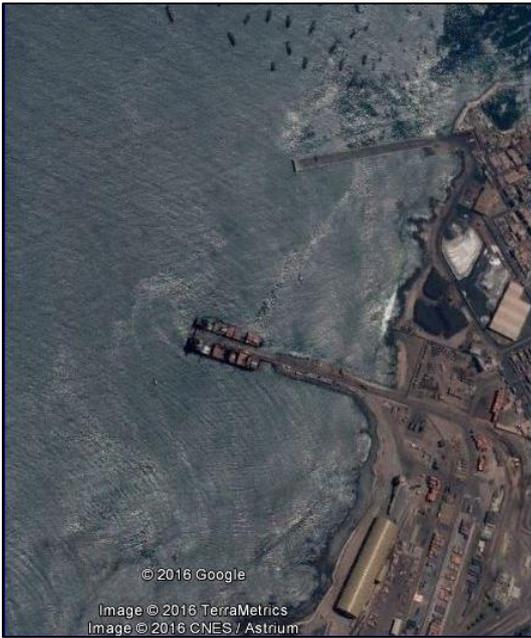


Figure 1: Port of Ilo, Peru

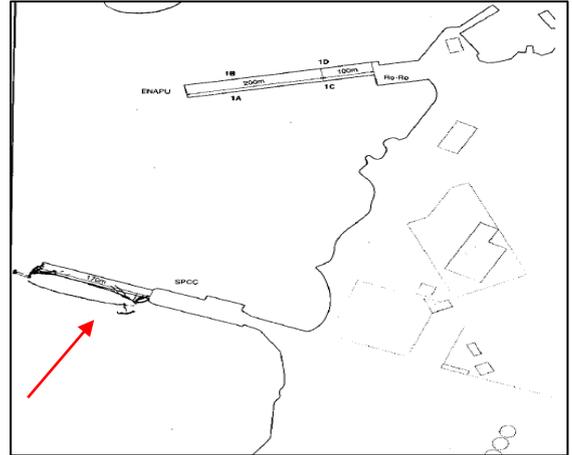


Figure 2: Sketch showing *Cielo di Tocopilla* on the South breakwater pier

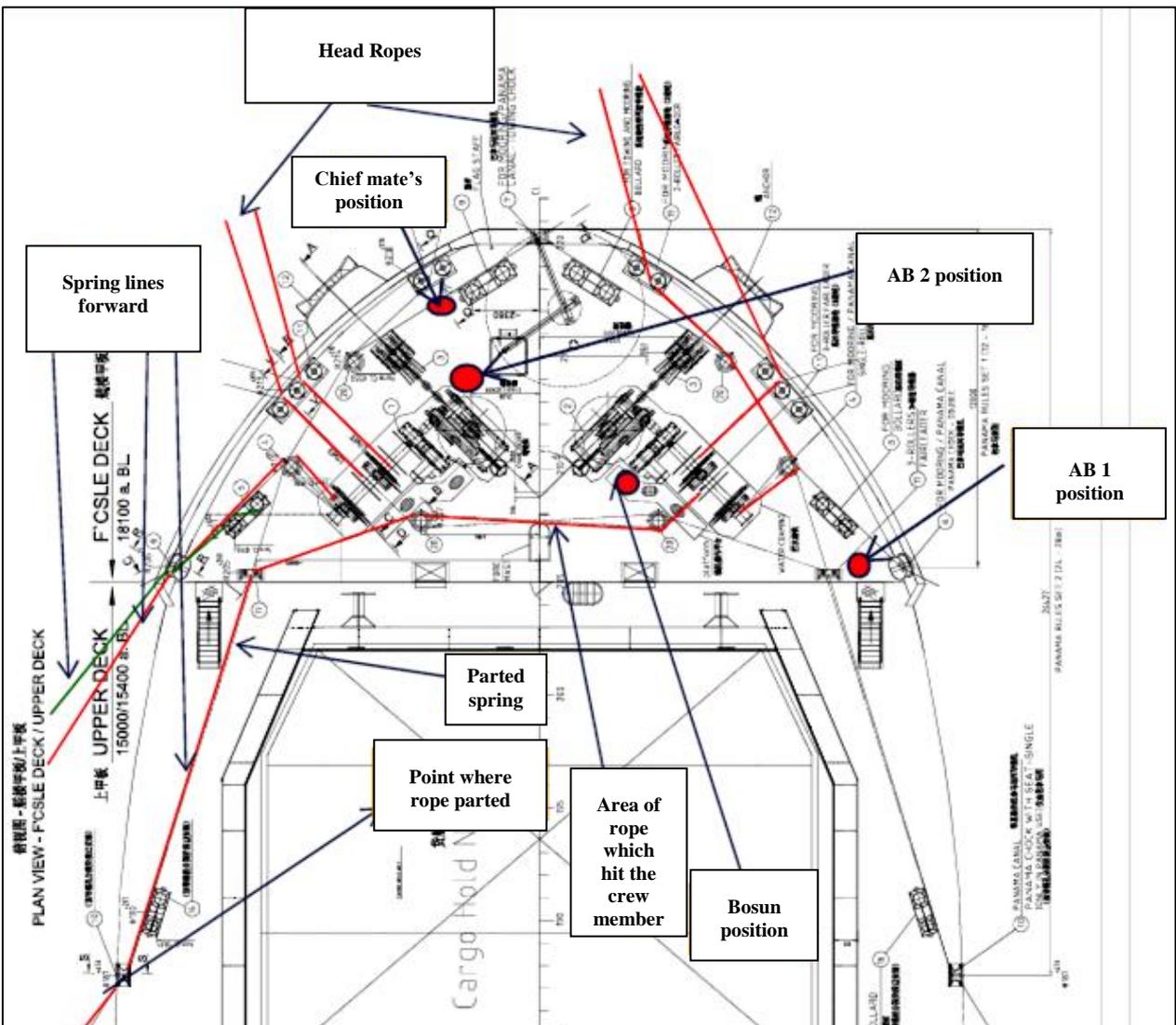


Figure 3: Arrangement of mooring lines and position of mooring crew on forecandle deck

The remaining backspring was led from the starboard winch through a series of pedestal rollers abaft of the winch to the port shoulder fairlead, abreast of cargo hold no. 1. From there, about 60 m of the line was run to the shore bollard. The chief mate standing near the vessel's stem had an outward view of the mooring lines. The bosun was operating the starboard windlass/winch (Figure 3 and 4).



Figure 4: Starboard mooring windlass/winch showing approximate position of the bosun

During the un-berthing operation, *Cielo di Tocopilla* ranged up and down the breakwater. The chief mate thus directed the bosun to adjust the tension on the backspring. The main engine was also momentarily put astern to arrest her forward motion. However, at about 2224, *Cielo di Tocopilla* was pounded by heavy swell causing her to surge and heave. The sudden load brought on by the wave caused the backspring to part. The whiplash of the mooring rope section remaining on board struck the bosun on his right leg.

Extent of injuries

It was reported that the bosun had sustained light cracking of the skin on the right calf. Although it was stated that the crew member was working during the days following the accident and was feeling fine, the master eventually requested a visit to a medical doctor ashore to ascertain himself of the medical condition. On 31 March, a medical examination was carried out in Valparaiso, Chile and diagnosed hematoma of the right

thigh. The crew member was declared unfit to work for six months and advised physiotherapy and evaluation by traumatology. The crew member was eventually signed off and repatriated¹.

Mooring equipment

The forecastle deck on *Cielo di Tocopilla* was fitted with port and starboard windlass/winches with a design load of 672.5 kN. Each windlass/winch had storage, tension and warping drum. Abaft the winches, a platform approximately 20 cm above the deck was mounted to give the winch operator a clear view. A number of bitts, pedestal rollers and fairleads were mounted to give a range of mooring configurations. Snap-back zones had been painted yellow (Figure 4) and information about them was available in the ship's safety management system.

The backspring

The two year old mooring rope, which was constructed of 40% polyester and 60% polypropylene, had 24 strands (Figure 5). The inner and outer strands were intact and had neither any abrasion marks nor kinks. The rope had a certified minimum breaking load of 496 kN.



Figure 5: Photo of on-board section of the backspring on storage drum

¹ During the course of the safety investigation, the MSIU was provided with two (conflicting) medical diagnosis. Following repatriation from Chile, it was reported that the injured crew member visited yet another medical profession in India on or about 04 April 2016. Following the medical examination, it was declared that he had fully recovered and was fit for work, with no fresh complaint or swelling.

The mooring rope had severed at the port shoulder fairlead when it came under load from the surge wave.

Safety management system (SMS) and risk assessment

According to the SMS, mooring operations must be conducted in accordance with statutory and industry guidelines. The master and deck officers at the mooring stations were responsible for safe mooring practice. On 23 March 2016, the Company had conducted a formal risk assessment and documented controlling measures to lessen the risks.

At the time of the accident, these controlling measures were effectively in force. Moreover, the SMS contained instructions to the master to discuss with the pilot and apprise the crew of the mooring layout, and likely snap-back of the planned mooring configuration. In adverse weather at berth or anchorage, the master had to document and file the risk assessment.

While the master stated that he had conducted a tool-box talk prior to leaving Ilo in deteriorating weather, no documentary evidence of on-board risk assessment was submitted to the MSIU. In fact, the MSIU doubts whether the master actually had enough time to organise and carry out a risk assessment.

Mooring layout and snap-back hazard

The port of Ilo had developed a mooring layout not normally found in sheltered ports. *Cielo di Tocopilla* was berthed with a number of head ropes and backspring, starboard anchor and stern lines. The need for such mooring arrangement had formed an unfamiliar mooring pattern on the forecastle deck. One of the backspring (and the last one to cast off) was led from the starboard mooring drum to the port shoulder fairlead on main deck (Figure 3).

In between, the line was led through a number of pedestal rollers and fairleads.

Each lead had thus created a new direction and snap-back hazard, which had no relevance to the snap-back zones painted on deck. As the outboard section of the backspring came under high dynamic load, it stretched and parted. The recoil from the sudden release of energy was transmitted through the onboard section of the rope. The energy, albeit somewhat weakened, was powerful enough to whip up the penultimate section of the backspring across the working platform.

In this instance, the marked snap-back zones afforded no security to the bosun operating the winch. This was so because the lead and direction of the backspring had introduced divergent snap-back hazard, which could neither be documented nor addressed in the tool-box meeting with the crew.

Previous investigated accidents involving mooring ropes

Three serious injury accidents following mooring rope failures were investigated by the MSIU in the past two years:

- *Hopa*² – one of the crew members was seriously injured in both legs and his left arm after the starboard headline jumped off the bitts when under strain while he was trying to fix a stopper;
- *Manon*³ – shortly after releasing the tugs, the aft spring came under load and parted. The whiplash action of the parted rope seriously injured the second mate; and
- *Merito*⁴ – while inspecting mooring lines ashore in bad weather, a rope parted which resulted in one fatality.

² Vide Safety Investigation Report No. [07/2014](#).

³ Vide Safety Investigation Report No. [25/2014](#).

⁴ Vide Safety Investigation Report No. [32/2015](#).

SAFETY ACTIONS TAKEN DURING THE COURSE OF THE SAFETY INVESTIGATION⁵

Following the accident, the Company requested an on board extraordinary safety meeting to discuss the shipboard safety management manual section addressing mooring and unmooring operations. The safety meeting also addressed specific risk factors, including adverse weather and sea conditions.

The Company has also required that extraordinary safety meetings are held on board prior to every visit to exposed ports, mooring ropes are adequate and suitable for the intended purposes, which encompasses also their inspection, maintenance and eventual replacement.

RECOMMENDATIONS

On the basis of the safety actions taken by the Company, no safety recommendations have been made.

⁵ **Safety actions shall not create a presumption of blame and / or liability.**

SHIP PARTICULARS

Vessel Name:	<i>Cielo di Tocopilla</i>
Flag:	Malta
Classification Society:	RINA
IMO Number:	9638159
Type:	Bulk carrier
Registered Owner:	D'Amico Dry Limited
Managers:	D'Amico Societa di Navigazione SPA, Italy
Construction:	Steel
Length Overall:	179.99 m
Registered Length:	176.65 m
Gross Tonnage:	25303
Minimum Safe Manning:	14
Authorised Cargo:	Dry bulk

VOYAGE PARTICULARS

Port of Departure:	Ilo, Peru
Port of Arrival:	Valparaiso, Chile
Type of Voyage:	International
Cargo Information:	25517 mt of steel products
Manning:	20

MARINE OCCURRENCE INFORMATION

Date and Time:	27 March 2016 at 2224 (LT)
Classification of Occurrence:	Serious Marine Casualty
Location of Occurrence:	Ilo, Peru
Place on Board	Forecastle deck
Injuries / Fatalities:	One serious injury
Damage / Environmental Impact:	None reported
Ship Operation:	Alongside / Loading
Voyage Segment:	Departure
External & Internal Environment:	The wind was South-southwest Beaufort Force 6 to 7. The sea was rough and the swell was about 2.0 m. The air temperature was 23 °C.
Persons on board:	20