Marine Safety Investigation Unit

Transport Malta

SIMPLIFIED SAFETY INVESTIGATION REPORT

201510/013 REPORT NO.: 19/2016 October 2016

MV *SOVEREIGN*

Serious injury to crew member during mooring operation
08 October 2015

Course of events

Sovereign, a Maltese registered passenger ship was on a Mediterranean cruise with 2733 passengers. She arrived at Livorno, Italy on 08 October 2015. The bridge was manned by the master, staff captain, chief mate, second mate, helmsman and a pilot.

It was day-time and the weather conditions were good. Upon arrival, *Sovereign* turned around for a port side berthing at 46/47 Alto Fondale Pier (Figure 1). At 0720 (LT), she was in position with her bow about 33 m past the corner of the pier. This was her assigned berth.

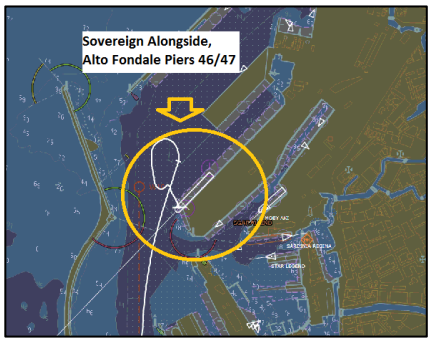

Figure 1: Alto Fondale Pier 46/47, Livorno

The mooring ropes fore and aft were run ashore. The chief mate was in charge of the aft mooring station. At 0721, the aft backspring was secured and held taut on winch W3. The crew then sent out stern lines from winch WW3 and W4 while the first mate monitored progress from the stern. At the forward mooring station, all lines from the bow were leading aft (Figure 2).

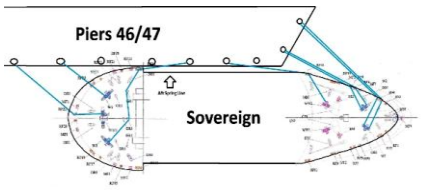

Figure 2: Arrangement of mooring at 0727

At 0723/30s, the master ordered 'finish with engine' and the pilot left the bridge. Two minutes later the stern started to yaw out and the assistant bosun heard the backspring stretch. He warned the chief mate as he walked clear of the snapback zones to check.

Moments later, at 0727/51s, the back-spring parted. The whiplash of the broken line hit a CO_2 bottle on the port side bulkhead and a steel stanchion before striking the first mate behind winch WW3. The staff captain, who was on the bridge, observed the vessel moving astern at 0.1 knot. He instructed the forward mooring station to slacken the head ropes, and requested power on the stern thruster. The two gangways set out for passengers and guests were immediately removed.

In time, the astern movement was controlled and at 0734 *Sovereign* was pulled alongside and safely moored. The arrangement of mooring lines at the time of the accident and approximate position of the first mate are shown in Figures 2 and 3.

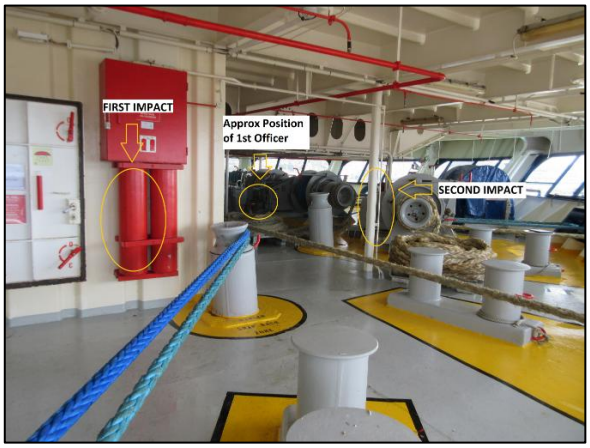

Figure 3: Approximate position of the chief mate, the CO_2 bottle and steel stanchion

Medical response, injuries and treatment

The ship's doctor and the medical team quickly attended the first mate and transferred him to the ship's hospital. He was found to have sustained serious internal injuries in the abdomen and required urgent medical and surgical intervention. He was transferred to a shore medical facility in Livorno where he underwent emergency invasive surgery.

Cause of the accident[1]

Forces applied on mooring ropes at one station have significant impact on vessels and on moorings at the other station. Therefore, the readily available ship propulsion and communication to control and coordinate mooring activities are vital to conclude mooring operations safely.

Sovereign was manoeuvred in position by means of her thrusters and engines. However, the 'finished with engines' and the pilot's departure had effectively terminated the berthing operations during the course of the vessel's mooring. With no propulsion power and loss of bridge control, heaving of the head ropes[2] to hold her bow alongside pivoted the vessel and triggered the momentum. The vessel started to move astern and stern out from the pier. The combined force of the vessel's movement and yaw tensed and snapped the aft back-spring.

During the course of the safety investigation, it was noticed that there was ample berthing space behind the vessel (Figure 4), which if used would have significantly improved the direction of the head ropes and probably altered the course of events. However, no explanation was found in the submitted evidence as to why this space was left unoccupied by *Sovereign*.

[1] The purpose of a marine safety investigation is to determine the circumstances and safety factors of the accident as a basis for making recommendations, and to prevent further marine casualties and incidents from occurring in the future.

[2] Head ropes were leading aft and effectively operating as back-spring.

Figure 4: Unoccupied berth space behind *Sovereign*

The parted mooring rope

The aft backspring had parted in the vicinity of universal roller fairleads in the port bulwark. Its tensile strength (when new) was not known to the MSIU as no documentary records on the type, size, inspections or when it was brought in service were maintained on board. The parted mooring was described as a 12 strand polypropylene rope, 88 mm diameter and appeared slightly worn. This information was based on photographs taken before the rope was removed[3] (Figure 5).

Figure 5: Section of parted mooring rope

Therefore, the MSIU was unable to conduct destructive (and non-destructive) tests to establish the mooring rope characteristics and its residual breaking strength. It was also reported that the vessel had recently put in service four 88 mm diameter *Dyneema*[4] ropes. As a general rule, use of different types of rope is avoided due to varying characteristics and tensile strength which result in uneven load on mooring ropes.

Maintenance of mooring equipment

As part of the planned maintenance, mooring winches and fittings are checked and maintained in good working order. Documents submitted to the safety investigation showed that during the inspection in August 2015, six fairleads on the aft mooring deck were found practically seized and not turning freely (Figure 6). Two of the six fairleads mentioned were used with the backspring. It is probable that the seized fairleads may have increased friction and the likelihood of an eventual mooring rope breaking under load.

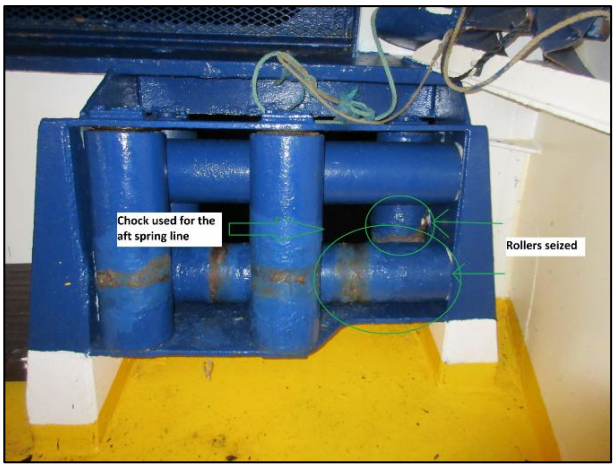

Figure 6: Seized universal roller fairlead

Snapback zones

The snapback zones were marked and painted yellow. The snapback zones suggested a mooring configuration on which they are generally founded. It followed that any deviation from this configuration would possibly render the painted areas ineffective as safe zones.

[3] Two sections of the mooring rope were removed by the Italian authorities as part of their accident investigation.

[4] *Dyneema* is a brand name for HMPE ropes and have considerably higher MBL than the polypropylene of similar size.

Although, crew members were periodically familiarised with safety aspects of mooring operations described in the ship's 'Job Safety Analysis Form', no guidance was given on the mooring layout. The absence of this specific detail may have compelled the crew members to develop different ways of running mooring lines.

A lead chosen for backspring from the universal roller fairlead on the port side necessitated the passing of the line over two pedestal fairleads. With this layout, the backspring changed direction three times before reaching the winch on the starboard side (Figure 7). Thus, each change of direction increased the number and size of snapback zones.

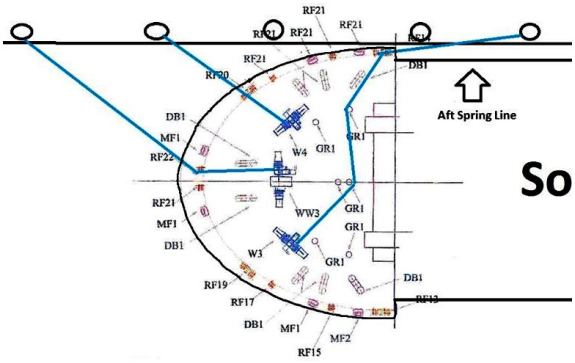

Figure 7: Lead of the aft-back spring

Safety Management System

Chapter 3 of the Company's SMS Manual on 'Mooring & Safe Mooring Process' stated:

> *Prior to arrival, the master is to review the available dock information and the mooring requirements shall be followed…*
>
> *It is the responsibility of the Master to ensure that all mooring operations are conducted in a safe and professional manner…*
>
> *The Master is ultimately responsible in ensuring that the vessel is safely moored prior to clearance for guest and crew members.*

It has to be noted that although the SMS Manual puts the onus of the mooring procedure management on the master, the safety investigation found no evidence of tools provided to the master to assist him in the prior review of berthing position, make formal assessment of the risks or perceived risks and / or discuss the berthing plan, mooring constraints and personnel safety during tool-box meetings with the relevant crew members.

RECOMMENDATIONS

Pullman Cruises Ship Management Ltd. is recommended to:

19/2016_R1 Ensure regular maintenance of mooring equipment and fittings and keep records of mooring ropes in use and results of periodical inspections;

19/2016_R2 Review current berthing procedures with respect to the 'finished with engines' during mooring operations and before the vessel is fast fore and aft;

19/2016_R3 Ensure that the master is adequately supported in his responsibilities, with respect to safe mooring and the mitigation of risk related to these operations.

SHIP PARTICULARS

Vessel Name:	*Sovereign*
Flag:	Malta
Classification Society:	DNV GL
IMO Number:	8512281
Type:	Passenger
Registered Owner:	Pullman Cruises Sovereign Ltd.
Managers:	Pullman Cruises Ship Management Ltd.
Construction:	Steel
Length Overall:	268.30 m
Registered Length:	230.58 m
Gross Tonnage:	73529
Minimum Safe Manning:	20
Authorised Cargo:	NA

VOYAGE PARTICULARS

Port of Departure:	Civitavecchia, Italy
Port of Arrival:	Livorno, Italy
Type of Voyage:	Short International
Cargo Information:	NA
Manning:	778

MARINE OCCURRENCE INFORMATION

Date and Time:	08 October 2015 at 0727 (LT)
Classification of Occurrence:	Serious Marine Casualty
Location of Occurrence:	Livorno, Italy
Place on Board	Poop Deck
Injuries / Fatalities:	One serious injury
Damage / Environmental Impact:	None reported
Ship Operation:	Mooring
Voyage Segment:	Arrival
External & Internal Environment:	There was light to gentle breeze. The visibility was good. The air temperature was 20 ºC.
Persons on board:	3511