Marine Safety Investigation Unit

Transport Malta

SAFETY INVESTIGATION REPORT

202005/018 REPORT NO.: 13/2021 May 2021

MV *APL CALIFORNIA*
Serious injury to a crew member while letting go the towline at the port of Ningbo, China 14 May 2020

SUMMARY

After completing cargo operations, *APL California* took a pilot on board and engaged two tugs to assist in the departure manoeuvre. The forward tug was made fast on the starboard side of the upper deck, abreast of Bay 15.

Shortly after all lines were cast off, the forward tug was also ordered to cast off. The forward mooring party proceeded to the upper deck to release the tug's line. The bosun took turns of the pick-up gear of the tug's line around the capstan, to release the line from the mooring bitts.

While the tug's line was being cast off, the bosun realized that the vessel's messenger line was still attached to the pick-up gear. In a bid to intervene and disconnect the messenger line, the bosun's left leg was caught between the taut pick-up gear and the mooring bitts. Consequently, he sustained grievous injuries to his leg.

The MSIU has issued one recommendation to the Company to address the vessel's manning in exceptional circumstances.

MV *APL California*

FACTUAL INFORMATION

The vessel

APL California was a 72,704 gt, Maltese-registered container vessel built at Koyo Dockyard Co. Ltd in Japan, in 2009. The vessel had a length overall of 293.18 m, moulded breadth of 40.00 m and a moulded depth of 24.30 m. She had a summer deadweight of 72,912 metric tonnes (mt), corresponding to a summer draught of 14.02 m. *APL California* was owned by Argosy Private Ltd., managed by Synergy Maritime Pvt. Ltd., and classed with Nippon Kaiji Kyokai (Class NK). At the time of occurrence, *APL California* was carrying 36,719.7 mt of containerised cargo.

Propulsive power was provided by an 11-cylinder, MITSUI MAN B&W 11K98MC, slow speed, direct drive diesel engine, producing 62,920 kW at 94 rpm. This drove a right-handed, fixed-pitch propeller, to reach a service speed of 25.5 knots.

Crew

The Minimum Safe Manning Certificate of *APL California* stipulated a crew of 15. At the time of the occurrence, the vessel was manned by a crew of 22 Indian nationals.

The chief officer embarked on *APL California* at Port Said, Egypt, on 21 December 2019. He had 14 years of experience at sea and a total of two years of experience in his present rank. His STCW[1] certificate of competence as a chief officer was issued by the Indian Government in 2013. He had been sailing as a chief officer with the Company for about 10 months. The chief officer kept the 0400-0800 and 1600-2000 navigational watch.

The bosun had been at sea for 11 years. He had been working in his present rank for two years and had been serving with the Company for about seven years. He had embarked on *APL California* at the port of Singapore, on 30 January 2020. The bosun had completed the shipboard familiarization on 04 February 2020, which included mooring equipment. Additionally, in November 2019, he had attended a shore-based crew safety training, which encompassed critical shipboard operations such as mooring operations.

Work and rest hours[2]

The chief officer's hours of rest records for the day of occurrence up until the accident[3] indicated that he had 6.5 hours of rest, which would not satisfy the requirements of the regulations.

Prior to commencing work at 2000 on the day of occurrence, the bosun had a total of 13 hours of rest for that day. His work and rest hour records satisfied the relevant international requirements.

OS1 and OS2, the other two crew members of the forward mooring party, were ordinary seafarers. The hours of rest records for OS1 indicated that until the accident, they were in accordance with the requirements, having had 11 hours of rest on the day. On the other hand, the records of the hours of rest for OS2 indicated that on the day of occurrence he had a total of 8.5 hours of rest, which was less than the number of hours required by the regulations[4].

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1 IMO. (2001). *The International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978, as amended in 1995 and 1997 (STCW Convention)*. London: Author.

2 In this section, regulations refer to the STCW Code Part A Section A-VIII/1 and the MLC 2006, Regulation 2.3.

3 The accident had occurred at 2119 (LT), on 14 May 2020, for the purposes of rest hours, the period from 0000 (LT) of 14 May 2020 until 2130 (LT) of 14 May 2020, was considered.

4 This will be analyzed further in the safety investigation report.

Environment
The South Southeast wind was reported to have been Force three on the Beaufort scale. The swell was approaching the vessel from the South Southeast, with a height of 0.3 m. The visibility was approximately five nautical miles and the sky was overcast. The air and sea temperatures were recorded at 22 ℃ and 18 ℃, respectively.

Location of accident
The vessel was fitted with mooring equipment at its forward upper deck area, on her port and starboard sides. The equipment was installed abreast of Bay 15 and consisted of two mooring bitts and an air-driven capstan (Figure 1). The capstan had a rated load of 0.4 mt and a speed of 34 m min^{-1}.

Fixed artificial lighting illuminated the site.

Figure 1: Mooring bitts where the tug's line was made fast for departure

Pre-accident events – cargo hold inspections
APL California had left Zhoushan Dry Dock, China, a few days earlier. During her time in the dry dock, her ballast tanks had been opened, inspected, and closed again. The access manholes to these ballast tanks were fitted in various cargo holds.

The vessel arrived at Ningbo, which was her second port of call after leaving dry dock, on 14 May 2020. During the cargo operations, several tanks were ballasted, and duty officers were instructed to carry out cargo hold inspections, once the ballasting operations were complete. However, it was later reported to the chief officer that these inspections could not be completed on time, due to the vessel's tight schedule, with the crew being busy with the loading of refrigerated containers.

The vessel's Safety Management System manual (SMS Manual) required that, in addition to the daily soundings, the cargo hold bilge soundings were to be checked during / after ballasting operations.

Narrative[5]
On 14 May 2020, at around 2018, cargo operations were completed at the port of Ningbo, China. The vessel was prepared for departure and a pilot boarded 30 minutes after completion of cargo. The voyage leg from the berth to the outer pilot station was 30 nm, which *APL California* would have covered in about three hours. Being a pilotage area, navigation required a helmsman (fulfilled by one of the three able seafarers deck) and manned anchor stations.

The crew at the forward mooring station consisted of the chief officer, the bosun and two OS. A tug was made fast forward with the tug's line on the starboard side of the upper deck, in line with bay 15. At 2106, all mooring lines had been cast off and brought on board. Shortly after securing all lines on the forward mooring station, the chief officer, being concerned with the crew's rest hours, asked both OS to proceed with the inspection of the cargo holds. The departure of the OS from the mooring station meant that the bosun was left alone with the chief officer to tend to the tug's line.

At 2116, after the vessel was swung to align her with the outbound channel, the master

[5] Unless otherwise stated, all times are local time (UTC + 8).

ordered the forward party to cast off the forward tug's line. Upon arriving near Bay 15, the bosun cleared the pick-up gear of the tug's line and made turns of it around the nearby capstan, to release the tug's line from the vessel's mooring bitts. Once tension was taken on the capstan, the chief officer cleared the tug line's eye from the mooring bitts (Figure 2).

Figure 2: A photo simulation of the bosun holding on to the pick-up gear and the chief officer clearing the eye of the tug's line from the mooring bitts

The bosun then started to control the lowering of the tug's line by easing the tension on the pick-up gear (Figure 3). At this stage, the chief officer moved further aft to keep clear of the moving line.

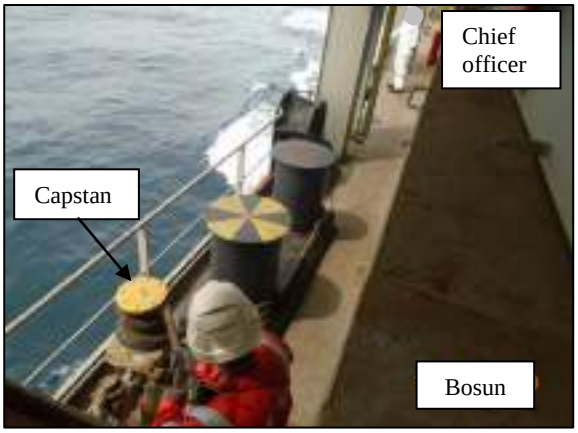

Figure 3: A photo simulation indicating the bosun and chief officer's positions while the tug's line was being lowered

At 2118, the eye of the tug's line reached the waterline, and the chief officer reported to the bridge that the forward tug was cast off. At this time, while the pick-up gear was still moving under tension, the bosun noticed that the vessel's messenger line was still attached to the pick-up gear by a knot. While he attempted to disconnect these ropes[6] (Figure 4), his left leg was caught between the pick-up gear and the mooring bitts (Figure 5).

Figure 4: A photo simulation of the bosun attempting to disconnect the messenger line and the pick-up gear

Figure 5: A photo simulation of the bosun's left leg getting caught in between the pick-up gear and the mooring bitts

[6] It was stated that the vessel's messenger line was a 30 mm nylon rope of brown colour, and the tug's pick-up gear was approximately 20 mm x 15 m polypropylene rope, of a light brown colour.

The bosun called the chief officer for help, who rushed aft, closer to the tug, to signal the tug to stop heaving the line. Records indicated that at this time, the master had ordered the main engine from dead slow ahead to slow ahead.

Shortly after, the chief officer contacted the bridge via the portable VHF radio, requesting that the tug stops heaving on the tug's line.

Returning to the bosun's location, the chief officer noticed that the bosun had sustained severe leg injuries and that he required immediate shore medical assistance. At 2119, the severity of the injury was communicated to the master, who immediately requested the pilot to arrange for the vessel to be anchored and for shore medical assistance to be received.

At 2154, the vessel anchored for the bosun's evacuation. By 2359, another tug came alongside and the bosun was transferred to it and eventually to a local hospital for surgery.

Injuries suffered by the bosun

The bosun was admitted to the hospital during the early hours of 15 May 2020. He was diagnosed with an open dislocation of the left ankle joint, and a comminute fracture of the lower segment of the tibia and the fibula. Additionally, he had also suffered from artery, nerve, and muscle injuries to his left leg. A segment of skin on his left leg had been lacerated.

The bosun stayed at the hospital for treatment, for approximately 2.5 months. He was then repatriated to his hometown to undergo physiotherapy and continue with his treatment.

Personal protective equipment (PPE)

At the time of occurrence, the bosun was reportedly wearing a safety helmet with a chin strap, boiler suit, working gloves and safety shoes.

Consumption of alcohol

Following the accident, an alcohol test was conducted on all deck crew, including the bosun. The results of this test were negative for all of them.

ANALYSIS

Aim

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 or incidents from occurring in the future.

Cause of accident

While the tug's line was being retrieved by the tug during the casting off operation, the bosun realised that the vessel's messenger line and the tug's pick-up gear were still attached. During an attempt to undo the knot connecting these lines, his left leg was caught by the running line. Consequently, his leg was pressed against the mooring bitts, leading to serious injuries.

Dynamics of the accident

The bosun's experience at sea combined with the training and familiarisation received, indicated that he had adequate knowledge and experience in mooring operations, as well as in the handling of ropes. The safety investigation believes that the bosun was therefore aware of the hazards related to a mooring rope's bight.

Further information from the Company, revealed that it was not normal for the messenger line to remain attached to the tug's pick-up gear while releasing the tug's line. The messenger line would normally be disconnected after the tug was made fast. In addition, there were indications that more personnel would have been required to cast off the tug. In view of the aforementioned,

circumstances as they presented themselves to the bosun, at the time of the occurrence, were unexpected.

The bosun noticed the development of the situation, *i.e.*, the messenger line still being attached to the tug's pick-up gear while running out, only after the tug's line was released from the vessel's mooring bitts. It is possible that the bosun may have not noticed this earlier due to the similarity of the colour and the size of the tug's pick-up gear and the vessel's messenger line.

Additionally, since the operation was being carried out during night-time, the crew had to rely on the fixed illumination fitted on deck, which emitted a yellow light (Figure 6).

Figure 6: Accident site illuminated at night-time

The fixed light's position was well intended to illuminate the work site. However, its position could have also contributed to shadows being cast in the area, while crew members handled the ropes. The shadows may have been the cause of the bosun's initial oversight of the attached lines as well as of his foot position while he focused on releasing the vessel's messenger line.

For the bosun, taking action by undoing the knot between the two ropes was the way forward to simplify and diagnose the problem. The safety investigation believes that due to the short time span during which the event occurred, the bosun had no time to plan his next step and found himself in a situation that he could control no more.

Manning of the mooring station

Scholars have made significant contributions on how work is often carried out with limited resources, be it information, time, human or equipment. Moreover, it is also submitted that these limitations necessitate people to engage in local adaptations to "balance demands and resources."[7]

The chief officer's request to both OS to proceed for cargo hold inspections, while the tug operations were not yet complete, appeared to fall in this category. This is not to say that the vessel was not adequately manned; in fact, as already indicated elsewhere in this safety investigation report, the vessel was manned in excess of the number stipulated in the Minimum Safe Manning Certificate. However, the (limited) number of crew members available at the time may have stretched the situation because of the multiple, simultaneous tasks being undertaken.

Moreover, it was observed that this task was not meant to be carried out at that particular time, since it had initially been assigned to the duty officers during cargo operations. However, due to the vessel's tight schedule and the crew members being busy with the plugging of the refrigerated containers, the duty officers were unable to execute the task.

The chief officer considered it essential for the vessel's safety, to inspect the cargo holds after ballasting several ballast tanks at Ningbo. Cargo hold bilge soundings were a requirement stipulated in the SMS Manual, which had to be carried out after ballasting operations. Then, since the ballast tanks had

[7] Hollnagel E. (2016). The ETTO principle - efficiency-thoroughness trade-off. Retrieved from https://erikhollnagel.com/ideas/etto-principle/#:~:text=The%20ETTO%20principle%20refers%20to,they%20spend%20on%20doing%20it

been opened and inspected during the dry dock period, it would have been a priority for the chief officer to ensure that the manholes would have been properly secured and that no ballast water would have seeped through.

As a result of these exigencies, the chief officer was in a situation where he had to balance the work required to be done and the crew's rest hours. He was concerned that the crew's rest hours were on the limits and, therefore, he sought to resolve the issue by assigning both OS the cargo hold inspections at an earlier stage.

In the meantime, he had assessed that the tug's line could be successfully cast off by the bosun and himself. In so doing, he committed to take upon himself two important roles, which would have necessitated his full attention:

- supervising the operation, while communicating with the bridge; and
- handling the tug's line.

The vessel's lines were cast off at 2106. The berth to pilot section of the voyage was expected to take around three hours. During this time, anchor stations had to be manned, cargo holds had to be inspected, pilot ladder had to be rigged up, disembarkation of pilot had to be attended to following which, the pilot ladder and anchors would have to be secured.

Since, the OS were needed to be available during the vessel's passage under pilotage at the anchor station, and during the pilot's disembarkation process, it was highly likely that both the OS would have finished their duties after midnight. If the cargo hold inspections were to be carried out after this time, the rest hours of OS 2 would have not met international requirements. This issue seemed to have been recognised by the chief officer, who therefore decided to have the cargo hold inspections completed as soon as possible.

Chief officer's concerns

As mentioned earlier in this safety investigation report, the chief officer was concerned with the execution of cargo hold inspections, as this related to the vessel's safety. The possibility of carrying out the cargo hold inspections the following day was therefore not an option which the chief officer was comfortable with.

A prima facia, one may argue that the chief officer could have sent the OS for cargo hold inspections either after the forward tug was cast off, or possibly even after the pilot disembarked. However, since the chief officer was concerned with the crew member's rest hours not meeting the requirements, the aforementioned did not really present themselves as plausible options to the chief officer.

In all probability, since the cargo hold inspections necessitated that the OS climbs up and down every cargo hold, it was highly likely that the chief officer may have assessed that the risks involved[8] in executing this task at a later stage, would have been higher than if it were executed at the earliest.

Fatigue and alcohol – chief officer and bosun

The rest periods of the chief officer did not comply with the relevant international requirements for the day of occurrence. Although the bosun's rest periods were in line with the relevant requirements, the safety investigation, could not confirm the quality of his rest hours.

Nonetheless, in the absence of any evidence, which could have indicated that their actions or behaviour were symptomatic of fatigue, fatigue of the chief officer and bosun was not considered a contributory factor to this accident.

[8] Crew members being overcome by fatigue while entering or exiting the cargo holds after being awake for long hours.

While the results of an alcohol test, conducted on board after the occurrence, were negative, a drug test was not conducted. However, in the absence of any evidence which could have indicated that the crew members' actions or behaviour were influenced by effects of drug consumption, drugs and / or alcohol was not considered a contributory factor to this accident.

Conflicting evidence

During the safety investigation, the MSIU encountered conflicting evidence on the manning of the forward mooring station. Initial statements suggested that an OS was present to assist the bosun and chief officer with casting off the tug line. However, information which was provided later to the MSIU, revealed that the tug was being cast off only by the bosun and chief officer.

CONCLUSIONS

1. During the bosun's attempt to undo the knot connecting the tug's pick-up gear and the vessel's messenger line, his left leg was caught in the running line, resulting in serious injuries.
2. The shadows cast in the area, may have contributed to the bosun's unawareness of his foot placement in relation to the running line and the mooring bitts.
3. The vessel's messenger line was still secured to the tug's pick-up gear while the tug was being cast off.
4. The similarity of the vessel's messenger line and the tug's pick-up gear, combined with the shadows in the area, may have contributed to the bosun's delayed awareness that the two ropes were still connected.
5. The two OS, who were part of the forward mooring party, were sent for cargo hold inspection before the tug was cast off.
6. The crew's hours of rest were of concern to the chief officer.
7. The cargo hold inspections were considered a necessity, since cargo hold bilge soundings were a requirement of the vessel's SMS manual and because the ballast tanks were filled after being opened and inspected in the dry dock.
8. The chief officer acted as a supervisor as well as an active participant in casting off the tug line.
9. Although the vessel was manned in accordance with the Minimum Safe Manning Certificate, the (limited) number of crew members available at the time would have stretched the situation because of the multiple, simultaneous tasks being undertaken.

SAFETY ACTIONS TAKEN DURING THE COURSE OF THE SAFETY INVESTIGATION[9]

The following measures were taken by the Company during the safety investigation:

- the vessel's crew were briefed on the accident and reminded to take all the necessary precautions to prevent similar accidents in the future.
- A debriefing on the findings of the accident was given to all deck crew members before assignment of next vessel.
- A safety training module/pre-joining briefing module will be conducted to crew and officers.
- High visibility markings were painted on the upper deck area, close to fairleads, mooring bitts and capstans.

[9] **Safety actions and recommendations shall not create a presumption of blame and / or liability**.

- Procedures on mooring operations were amended to reflect the following requirements: one duty officer and at least two crew members to be present for tug operations, bridge to be informed of any changes in manpower during mooring stations / tug operations, and the messenger line must be disconnected from the tug's pick-up gear after making fast the tug.
- Safety related posters were placed at tug stations.
- Findings of the accident were shared across the Company's fleet.

RECOMMENDATIONS

Synergy Maritime Pvt. Ltd. is recommended to:

13/2021_R1 Conduct an exercise with the aim of ensure that additional relevant ranks of crew members are readily available during special circumstances such as before / after drydocking, and during major repairs.

SHIP PARTICULARS

Vessel Name:	*APL California*
Flag:	Malta
Classification Society:	Nippon Kaiji Kyokai (Class NK)
IMO Number:	9350044
Type:	Container vessel
Registered Owner:	Argosy Private LTD
Managers:	Synergy Maritime PVT LTD
Construction:	Steel
Length Overall:	293.18 m
Registered Length:	279.77 m
Gross Tonnage:	72,704
Minimum Safe Manning:	15
Authorised Cargo:	Containerised cargo

VOYAGE PARTICULARS

Port of Departure:	Ningbo, China
Port of Arrival:	Pusan, South Korea
Type of Voyage:	Short international voyage
Cargo Information:	36,719.7 mt of general cargo in containers
Manning:	22

MARINE OCCURRENCE INFORMATION

Date and Time:	14th May 2020 at 21:17 (LT)
Classification of Occurrence:	Serious Marine Casualty
Location of Occurrence:	29° 57.0’ N 121° 52.7’ E
Place on Board	Upper deck – Starboard side
Injuries / Fatalities:	One serious injury
Damage / Environmental Impact:	None reported
Ship Operation:	Manoeuvring / Under pilotage
Voyage Segment:	Departure
External & Internal Environment:	Moderate South Southeast breeze, with swell approaching from a South Southeasterly direction at a height of 0.3 m. The air and sea temperatures were 22 ℃ and 18 ℃ respectively.
Persons on board:	22