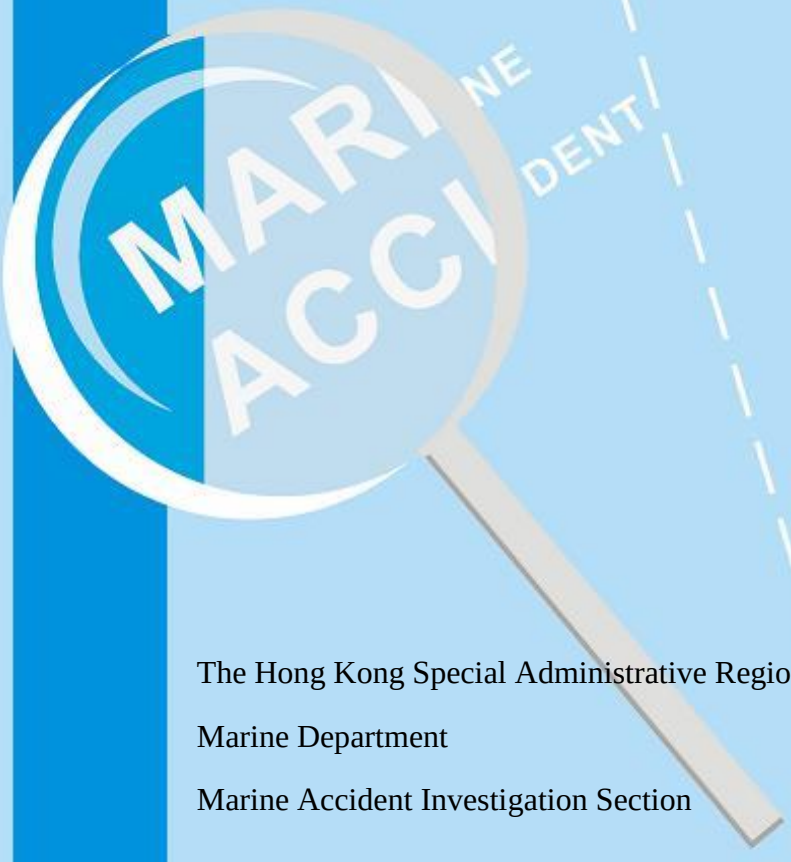
Report of investigation into the fire accident on board Hong Kong registered bulk carrier "*Fortune Harmony*" at Montevideo anchorage, Uruguay on 22 September 2016



The Hong Kong Special Administrative Region

Marine Department

Marine Accident Investigation Section

28 October 2019

Purpose of Investigation

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 enhancing the safety of life at sea and avoiding similar incidents in future.

It is 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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Summary

At about 2231 hours (UTC-3[1]) on 22 September 2016, a fire broke out in the accommodation of the Hong Kong registered bulk carrier "Fortune Harmony" (*the vessel*) which was anchored at Montevideo anchorage, Uruguay. Fire-fighting operation had been activated but in vain. All the crew had evacuated to the midship of *the vessel.* By the time 0334 hours on 23 September 2016, the fire was extinguished itself. As a result of the fire, the D-deck accommodation was damaged and the bridge wings were also affected. No injuries and oil pollution were reported.

The investigation revealed that the fire was most probably caused by faulty electrical equipment /device or its accessories in a crew cabin which caused short circuit, heat and sparks to ignite the materials beside it.

The investigation also identified several safety issues that should be addressed. Firstly, the crew's response to the fire accident was far from satisfactory. They neither possessed basic knowledge or technique to combat the fire nor were able to effectively utilize the fire-fighting system on board. In particular, the crew did not manage to suppress the fire at an early stage with an operable fire pump. Secondly, the reset of fire pump was not proficient. As a result, the emergency fire pump could not be used to combat the fire after the blackout of the engine room. Lastly, the fire drill conducted by the crew was ineffective and some action points were not conducted. The bridge was unattended after acknowledging the fire detection alarm. There were evidences that the on board shipboard safety management system had room for improvement.

After the incident, the management company conducted an internal investigation in accordance with the safety management procedure. A circular promulgated the causes of accident and the corresponding preventive and corrective actions throughout its fleet; in particular to the proper use of electrical appliances in crew cabins. Also enhanced training on inspection of electrical appliances and fire / evacuation drills were provided to *the vessel*'s crew.

[1] All times in this report are Universal Co-ordinated Time -3.

1. Description of the vessel

Ship name		Fortune Harmony (Figure 1)
Flag	:	Hong Kong, China
Port of registry	:	Hong Kong
IMO number	:	9592094
Type	:	Bulk carrier
Year built, shipyard	:	2012, Dalian Shipbuilding Industry Co. Ltd
Gross tonnage	:	44,543
Net tonnage	:	27,004
Summer deadweight	:	64,400 metric tonnes
Length overall	:	225.440 metres
Breadth	:	32.260 metres
Engine power, type		9,800kW, MAN B & W 5S60ME-C8.1
Classification society	:	DNV GL
Registered owner	:	Earn Luck Enterprise Limited
Management company	:	COSCO Shanghai Ship Management Co. Ltd
Number of crew	:	24

Figure 1 *The vessel*

2. Sources of evidence

2.1 The accident investigation reports from the management company (the company).

2.2 The statements of the crew provided by the company.

2.3 The preliminary survey report prepared by the Lloyd's Agents at the Port of Montevideo (instructed by the H&M underwriters of *the vessel*).

3. Outline of events

3.1 At about 1300 hours on 22 September 2016, *the vessel* anchored at Montevideo anchorage, Uruguay preparing to load cargo at Recalada, Argentina.

3.2 At about 2231 hours, the alarm of the fire detection system on the navigation bridge was activated. The duty third officer (3/O) and able-bodied seaman (AB) on the bridge both rushed to D-deck immediately to investigate the situation (Figures 2 and 3). When they arrived on D-deck, they found that acrid smoke was belching out from the third engineer (3/E)'s cabin into the corridor. The 3/O banged the cabin door, but no one responded.

3.3 3/O instructed AB to alert the other occupants on D-deck by knocking their cabin doors. 3/O then returned to the bridge to sound the general emergency alarm and broadcasted the emergency situation through the public address system.

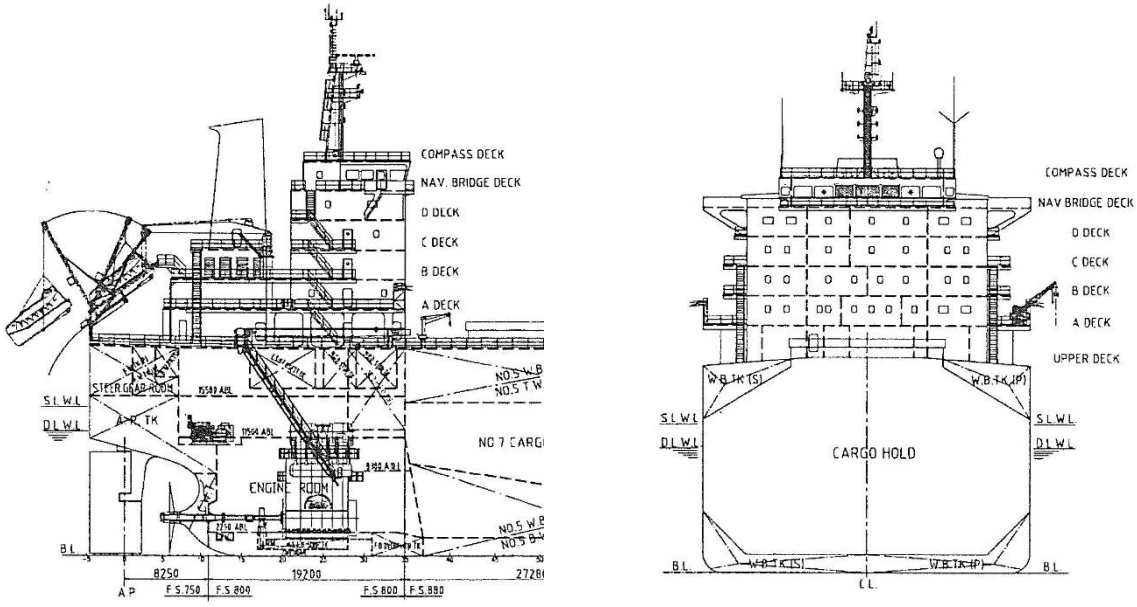

Figure 2 Side and front views of *the vessel*

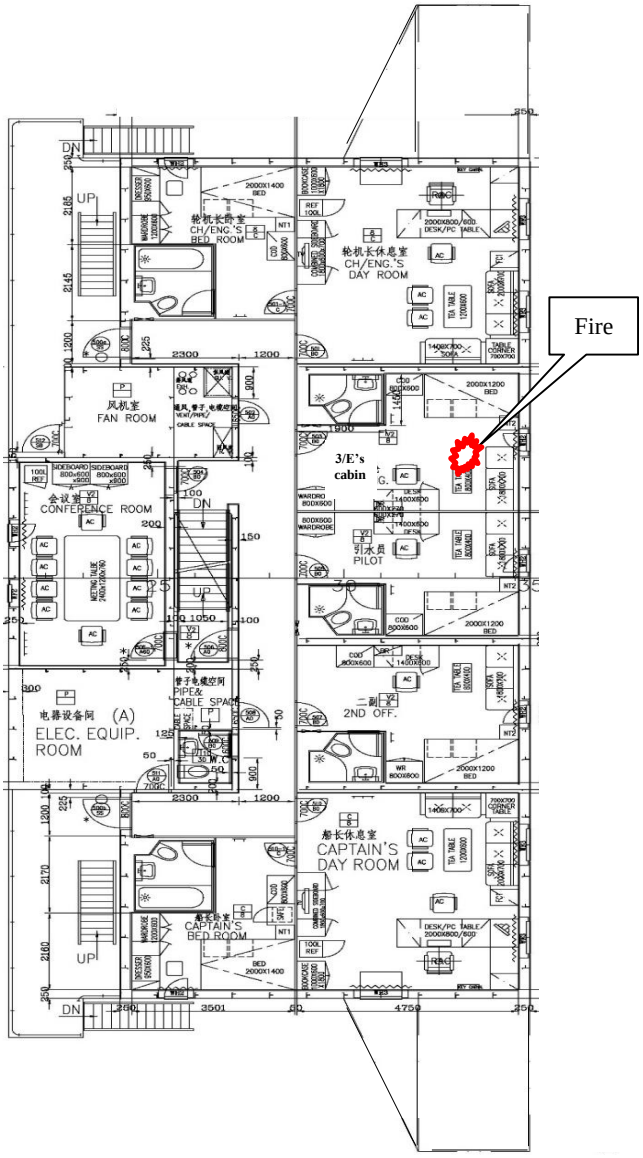

Figure 3 Layout of the D-deck accommodation

3.4 At about 2233 hours, the master and chief officer (C/O) came on the bridge. The C/O then again broadcasted all the crew to combat fire through the public address system.

3.5 When the general emergency alarm firstly sounded by 3/O, 3/E was discussing the next day work schedule with the second engineer (2/E) and the electrical officer (E/O) in E/O's cabin on C-deck. 3/E rushed to D-deck after hearing the alarm and saw smoke emitting from his cabin. He then ran rapidly to the stairway and grabbed a portable extinguisher from a crew member.

3.6 3/E opened his cabin door and tackled the fire by releasing the portable fire extinguisher. It had little effect and the fire intensified instead due to air ingress when the cabin door was opened. In addition, heavy black smoke with choking smell was spreading out from the cabin door to the accommodation on D-deck. He retreated from the cabin immediately.

3.7 At about 2234 hours, firefighting teams were formed according to the muster list but without head count. C/O instructed the crew to prepare two fire hoses for boundary cooling on each side of the accommodation on D-deck. At about 2236 hours, two of the crew members equipped with fireman outfits and a portable fire extinguisher entered D-deck from the aft starboard entrance. However, they retreated very soon due to the dense smoke and heat. C/O then instructed them to jet water into the accommodation through the aft starboard entrance door on D-deck. At 2237 hours, it was confirmed that all crew evacuated from the accommodation.

3.8 At about 2238 hours, the fire pump stopped supplying water to the fire line due to power tripping. All firefighting teams retreated to C-deck. Two minutes later, the fire pump was restarted by manually overriding the trip switch and the firefighting teams continued combating the fire by jetting water through the aft starboard entrance on D-deck.

3.9 The forward boundary of 3/E's cabin was a part of the forward accommodation bulkhead without fire integrity requirement. Most probably, due to the wind about force 7 to 8 on the Beaufort scale blowing from the front together with the high fire temperature acting on the windowpane, the forward window of 3/E's cabin shattered. The strong wind swept through the window and billows of flame blew out from the aft starboard entrance of D-deck. The fire was out of control, and the firefighting team retreated and closed the aft starboard entrance of D-deck.

3.10 At about 2245 hours, C/E shut down the generator engines making blackout of *the vessel*. The master then mustered the crew at the midship of *the vessel*. Only C/O brought a two-way VHF radiotelephone with him. The master broadcasted the distress message with "Mayday" prefix by the VHF radiotelephone. A nearby ship of the same fleet (*the ship*) responded to *the vessel*, and reported the fire accident to the company and the local agent of *the vessel*. But *the ship* failed to relay the distress message to any coastal station.

3.11 The company contacted the Hong Kong Marine Rescue Coordination Centre (HKMRCC) for assistance. Under the advice of HKMRCC, the company contacted the Argentina Rescue Coordination Centre for help.

3.12 At about 0334 hours, the company contacted the master of *the ship* for updating the situation of *the vessel*. The master of *the ship* advised that the fire in the accommodation of *the vessel* had extinguished itself. During the accident, a rescue boat from the Uruguayan administration arrived on the scene. However, no evacuation operation could be taken place due to adverse weather and sea conditions.

3.13 Having confirmed the extinction of the fire, all crew returned to the accommodation and found out that the whole D-deck was burnt out and some parts mostly on the bridge wing deck were affected. The fittings and navigational aids on bridge deck, and all statutory documents in the master's cabin, were ruined.

3.14 At about 0900 hours on 25 September 2016, the Uruguayan Coast Guard officers, classification society surveyors together with the local agent came on board for investigation. After a thorough inspection, the following damages were found: -

(a) All the cabins on D-deck including the cable trunks, cable wirings, electrical distribution boxes and air vent ducting were burnt out (Figure 4).

(b) The bridge wings were affected (Figure 5). The gyro repeaters, rpm indicators for main engine, rudder indicators, EPIRB, MOB lifebuoys and VHF radio, ALDES light socket etc. installed on the wings were damaged.

(c) Two Inmarsat-C printers and a facsimile machine in the bridge near the bridge side doors were affected by the radiation of fire through the side doors. Some of the forward windows were broken or deformed (Figure 6).

(d) Damages were also found on C-deck. The fire door and insulation of the stairway from C-deck to D-deck was burnt. Furthermore, the ceiling and lighting in the crew cabins on C-deck were affected by high temperature.

D-deck officer cabin

D-deck corridor

D-deck officer cabin

3/E Cabin

Figure 4 Burnt out of D-deck

Figure 5 Burnt out of bridge wings

Damage of front window

Fume smoke navigation bridge

Fume smoke printer

Damage of fax machine

Figure 6 Damages in the navigation bridge

4. Analysis

Ship's manning and certification

4.1 The statutory trading certificates of *the vessel* were valid. As per the minimum safe manning requirements, *the vessel* was manned by 24 Chinese crew including the master. They possessed valid certificates of competency or certificates of proficiency appropriate to their respective positions on board.

Fatigue, alcohol and drugs abuse

4.2 Consumption of alcohol by the crew on board was monitored and recorded before arriving port. There was no indication or evidence of alcohol or drug abuse of the master and crew before the fire accident. Furthermore, there was no evidence to show that they suffered from fatigue at work.

Weather and sea conditions

4.3 At the material time, the weather was poor with southerly wind force about 7 to 8 on the Beaufort scale. The state of sea was rough. The ambient condition was not considered a contributory factor for the cause of the fire on board. But the strong wind could intensify and spread fire rapidly especially when the cabin forward windows were broken. Furthermore, the rough sea could also make the firefighting operation difficult.

Probable cause of the fire

4.4 There was little discernible evidence on source of ignition left due to extensive damage of the 3/E's cabin. 3/E did not smoke and there were not many electrical fittings and device in his cabin. It was also reported that, apart from the cabin lighting and the refrigerator, a laptop computer was being charged and there was no electrical equipment left switched on in the cabin. The layout of 3/E's cabin is shown in Figure 7.

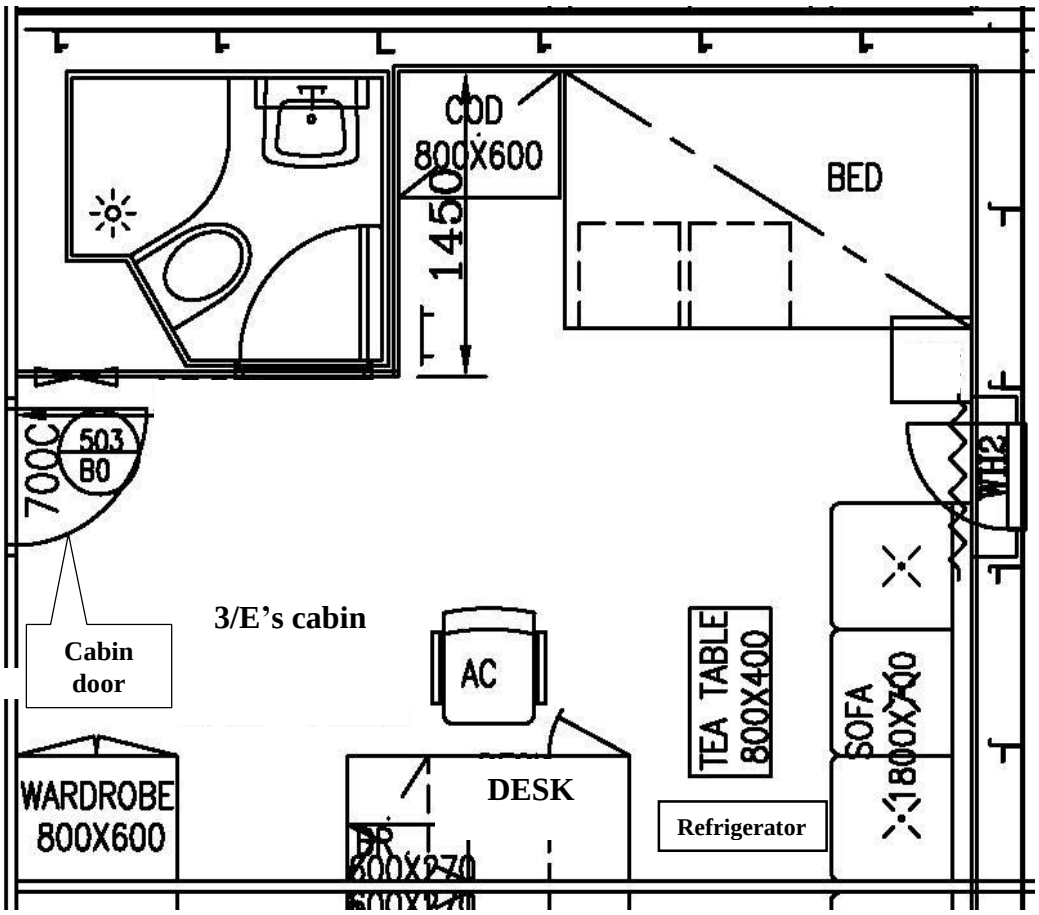

Figure 7 Layout of 3/E's cabin

4.5 When 3/E entered his cabin trying to combat the fire, the smoke and fire were already too big for him to stay inside to put out the fire with a portable fire extinguisher. He could only vaguely saw flames from the direction of sofa. As 3/E's cabin was burnt out extensively, it was difficult to tell the exact source of the fire. When the fire broke out, 3/E left his laptop battery unattended in charging state. Short circuit of electrical equipment generating heat and spark igniting household stuff beside it might be a possible cause of the fire.

Ship emergency response to firefighting

4.6 The crew's response to the fire accident was far from satisfactory. When 3/O sounded the general emergency alarm broadcasting the emergency fire situation through the public address system, the crew failed to muster promptly at the designated muster station for head count and receiving instructions in accordance with SOLAS Chapter III Regulation 19.3.4, as follows:

(a) When fire alarm sounded, 3/E got a fire extinguisher from another crew member and opened his cabin door to combat the fire solely without taking into account the risk of fire spreading. Although 3/E claimed that he had closed his cabin door after failing to put out the fire, the firefighting team saw flames coming out from his cabin when they just arrived at the fire scene. It may deduce that the 3/E's cabin door was not closed tightly after his retreat resulting in the spread of fire to other parts of the accommodation so rapidly.

(b) When AB banged on the cabin doors on D-deck, the master and C/O promptly attended to the bridge within 2 minutes, but C/E was trapped by heavy smoke when going out of his cabin. Due to late in response to the general emergency alarm and the bang on his door, C/E had to escape through the side window to get out of his cabin on D-deck.

(c) From the moment when the general emergency alarm firstly sounded, it took five minutes to confirm all crew evacuated from the accommodation. This indicated the poor safety awareness of the crew to report to the muster station.

4.7 When the firefighting team entered the fire scene, two fire hoses were still under preparation. The firefighting team failed to put out the fire by an extinguisher and retreated, C/O did not instruct the firefighting team to enter the fire scene again with the use of a fire hose. He only asked the other team to jet water into the accommodation from the aft starboard entrance of D-deck by one of the fire hoses. The other fire hose was still deployed for boundary cooling on the port side of D-deck. This way of tackling the fire was ineffective and could not extinguish the fire.

4.8 Once the electrical supply to D-deck was switched off, the extinguishing of fire by fire hose would be appropriate. The crew did not manage to suppress the fire at an early stage with fire hose in the accident.

4.9 Firefighting team was formed at about 2 minutes after the alarm sounded, and was sent by C/O to go into the fire scene on D-deck with a portable fire extinguisher only. To fight fire in an enclosed space without fire hose, firefighters lose protection by water and may have difficulty finding the way out. They neither possessed basic knowledge or technique to combat the fire nor were able to effectively utilize the fire-fighting system on board.

The reset of fire pump was not proficient

4.10 *The vessel* was provided with No. 1 and No. 2 fire pumps as well as one emergency fire pump. The controls of many electrical equipment including No. 1 and No. 2 fire pumps and emergency fire pump were available on the bridge directly above the fire scene on D-deck. The crew used the No. 2 fire pump supplying water to fire hose. The E/O had isolated the electrical power supply to the fire scene. However, control cables that passed through D-deck from the bridge, would be heated resulting in the tripping or blown of fuses to protect the equipment. For this reason, the fire pump stopped and E/O took more than a minute to manually reset the trip switch to restart the fire pump.

4.11 For the same reason, one of the fuses of the emergency fire pump was blown out. Although the emergency generator on boat deck was not affected, the emergency fire pump was not able to be reset and could not be used to combat the fire after the blackout.

Watchkeeping on board

4.12 When the alarm of the fire detection system sounded on the bridge, 3/O as the officer-on-watch left the bridge together with the watchkeeping rating (AB) for identification of fire. As a result 3/O failed to supervise the emergency situation before handing over to the master and to maintain proper look-out in compliance with Rule 5 of COLREGS (look-out).

Implementation of shipboard safety management system (*SMS*) on board

4.13 Although there were procedures and a Fire Emergency Action Plan (FEAP) for tackling accommodation fire in the *SMS* on board *the vessel*, the crew did not follow them fully in this accident, such as:

(a) to immediate inform the company and prepare for abandon ship, etc.;
(b) to muster at muster station for head count and receiving instruction orders after general emergency alarm sounded;
(c) to act promptly in response to the general emergency alarm to get out of their cabins; and
(d) to prepare other life-saving appliances such as radar transponder, distress flares and Emergency Position Indicating Radio Beacon etc. Although these appliances were all conspicuously located on the navigation bridge, the crew were only able to carry

a two-way very high frequency (VHF) radiotelephone when they evacuated to the midship of *the vessel*.

4.14 Moreover, a discrepancy was found in one of the procedures of the FEAP which instructed the crew to lower *the vessel*'s lifeboat to embarkation deck if at sea. Instead *the vessel*'s lifeboat was free-fall type and this procedure was not ship-specified.

Fire drill carried out before the accident

4.15 A fire drill was conducted in simulating a fire broken out in the galley on 12 September 2016. According to the drill record, all the crew attended the drill and performed their respective duties including the preparation of the lifesaving appliances for abandoning ship. The master reported that the drill was swift and proficient. However, a recommendation of the drill made by the master was that the donning of the fireman outfits was a bit slow and donning activities should be enhanced in future.

4.16 In the drill some important actions, such as preparation of lifesaving appliances for abandon ship etc., were found missing.

4.17 When comparing the result of this drill with the actual performance during the accident, the effectiveness of the drill was doubtful.

Actions taken by the company after the accident

4.18 Shortly after *the vessel*'s fire accident, the company issued a circular to its fleet notifying them the fire accident and instructing them to take action (e.g. house keeping of the electrical system) in particular the proper use of electrical appliances in their cabins.

4.19 The company had also carried out an internal audit on board *the vessel* after the accident. Non-conformities were raised related to the non-compliance with the *SMS*'s procedures during the fire accident. Furthermore, education on the procedures and requirements of the *SMS*, particularly the inspection and insulation records of electrical appliances and devices installed on board, the fire and evacuation drills etc., was provided as well.

5. Conclusions

5.1 When *the vessel* anchored at Montevideo anchorage, Uruguay, a fire broke out in the accommodation at about 2231 hours on 22 September 2016. The crew tried to put out the fire, but they were not successful. At 2245 hours, C/E stopped generator engines making blackout of *the vessel*. All crew evacuated to the midship of *the vessel*. The fire extinguished itself at about 0334 hours on 23 September 2016. The damage of *the vessel* was mainly on D-deck and the bridge wings were affected. No person injury or oil pollution was reported.

5.2 The investigation revealed that the fire was most probably caused by faulty electrical equipment/device or its accessories in 3/E's cabin which caused short circuit, heat and sparks to ignite the materials beside it.

5.3 The investigation found the following contributory factors leading to extensive damage:

(a) The crew's response to the fire accident was far from satisfactory. They neither possessed basic knowledge or technique to combat the fire nor were able to effectively utilize the fire-fighting system on board. In particular, the crew did not manage to suppress the fire at an early stage with an operable fire pump; and

(b) The reset of fire pumps that had control cables passing the fire scene to the bridge was not proficient. As a result, the emergency fire pump could not be used to combat the fire after the blackout.

5.4 The following safety issues were also found in the investigation:

(a) The last fire drill conducted by the crew was ineffective and some action points were not conducted in the accident;

(b) No watchkeeper on the bridge after acknowledging the fire detection alarm;

(c) Ineffective implementation of shipboard safety management system onboard; and

(d) *The ship* received the distress message, which broadcasted from a portable VHF radiotelephone, had not relayed the distress message by GMDSS system of *the ship* to any coastal station.

6. Recommendations

6.1 In addition to the work that have been carried out in paragraphs 4.18 and 4.19, the company should also:-

(a) inform all the masters, officers and crew of the fleet on the findings of this accident investigation;

(b) review the onboard firefighting and evacuation procedures, taking the following aspects into considerations:

(i) the procedures related to firefighting and evacuation drills and training in order to ensure that the crew would use all the available firefighting equipment on board especially during emergency, the officers would provide assistance / supervision when there is an imminent need to enter cabin or space with fire with great caution;

(ii) the procedures of isolating the power supply to or through the fire scene in accommodation and resetting the fire pumps, and other electrical controls etc.;

(iii) the procedures related to firefighting and evacuation in order to ensure that they are applicable to *the vessel* and watch keeping on the bridge*;* and

(iv) the procedures for the lifesaving equipment to be carried during an evacuation in order to ensure the crew will follow.

6.2 After reviewing the procedures of the onboard *SMS*, the company should arrange to carry out an additional audit on board in order to verify the effectiveness of the implementation of the revised procedures.

6.3 A Hong Kong Merchant Shipping Information Notice is to be issued to promulgate the lessons learnt from the accident.

7. Submission

7.1 The investigation report had been sent to the following parties for their comments :-

(a) the company, the master and chief officer of *the vessel*;

(b) the classification society of *the vessel*; and

(c) the Ship Safety Branch of the Marine Department.

7.2 At the end of the consultation period, no comment was received from the parties mentioned in paragraph 7.1.