Report of investigation into the fire accident on board the Panama registered General Cargo vessel "*Affluent Ocean*" at Kellett Anchorage No.3, Hong Kong on 2 June 2021

The Hong Kong Special Administrative Region
Marine Department
Marine Accident Investigation Section

22 July 2022

Purpose of Investigation

The purpose of this investigation, conducted by the Marine Accident Investigation Branch (MAIB) 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 MAIB 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 1620 hours on 2 June 2021, a fire broke out on board Panama registered general cargo vessel "Affluent Ocean" (*the vessel*) causing its structural damage while *the vessel* was anchoring at Kellett Anchorage No.3, Hong Kong, for loading scrap metal in bulk. The fire was extinguished at about 0820 hours on 3 June 2021. Fortunately, there were no casualties and oil pollution.

The investigation had identified that the contributory factors leading to this accident were that the crew members underestimated the risk of loading scrap metal that might combust spontaneously; failed to follow the shipboard Safety Management System (SMS) to carry out a risk assessment properly and establish a contingency plan to respond to the potential fire risk when loading scrap metal, especially when trimming the cargo using the grab; failed to use the shipboard fixed carbon dioxide fire-extinguishing flooding system (CO_2 system) to put out the cargo fire; and failed to maintain the shipboard bilge pump properly for emergency use to bring the vessel upright when heavily listed.

1. Description of *the vessel*

Ship name	:	*AFFLUENT OCEAN* (Figure 1)
Flag	:	Panama
Port of registry	:	Panama
IMO number	:	9162320
Type	:	General Cargo
Year built, shipyard	:	1997, HIGAKI SHIPBUILDING CO., LTD.
Gross tonnage	:	6,448
Net tonnage	:	3,592
Length overall	:	99.99 metres
Breadth	:	19.60 metres
Engine power, type	:	3883 kW, B&W 6L35MC x 1 set
Classification society	:	Panama Maritime Documentation Services Inc.
Registered owner	:	Runyang Shipping Limited
Management company	:	Weihai Yunhao International Ship Management Co., Ltd

Figure 1: *AFFLUENT OCEAN*

2. Sources of evidence

2.1 Information provided by the Master, Chief Officer and the management company of *the vessel.*

2.2 The Hong Kong Observatory (HKO).

2.3 The Harbour Patrol Section (HPS) and Vessel Traffic Centre (VTC) of the Hong Kong Marine Department (MD).

3. Outline of events

(All times were local time UTC + 8 hours)

3.1 At 1230 hours on 31 May 2021, *the vessel* departed the port of Guangzhou, China and bound for Hong Kong.

3.2 At 2305 hours, *the vessel* anchored at Kellett Anchorage No.3 (KA3), Hong Kong awaiting loading cargo of scrap metal. (Figure 2)

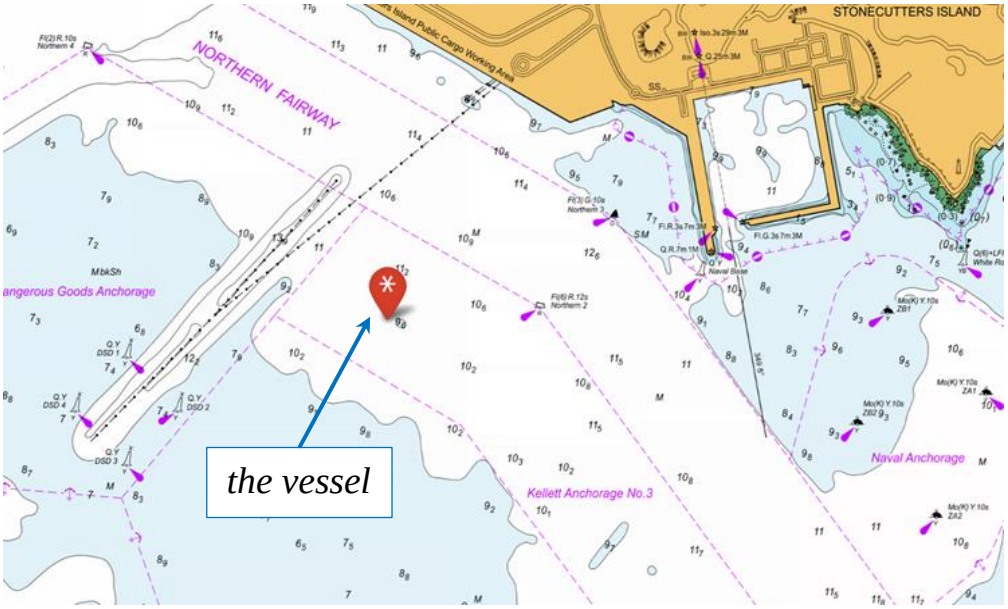

Figure 2: *The vessel* anchored at KA3

3.3 At 0915 hours on 1 June 2021, *the vessel* commenced loading her cargo of scrap metal in bulk. Two cargo barges were alongside the port and starboard sides of *the vessel* for unloading the cargo to *the vessel* using their derricks and spider grabs.

3.4 At about 1620 hours on 2 June 2021, when the duty Chief Officer (C/O) of *the vessel* was near the port side of the No. 2 cargo hold (*the hold*), he saw smokes emitted from the portside fore part of *the hold* while the port side barge was trimming the cargo of *the hold* by using its grab. The C/O immediately informed the Second Officer (2/O) via the walkie-talkie, and the 2/O then reported the incident by phone to the Master of *the vessel*.

3.5 The Master, who was working on the bridge, immediately announced to muster all crew members at the port side main deck

for emergency response via the shipboard public addressing system. Subsequently, the Master informed the Designated Person Ashore (DPA) of the management company (Company) of the incident as well as the local agent through the DPA.

3.6 At about 1623 hours, all crew members mustered at the port side main deck and prepared fire hoses for firefighting. One fire hose shot water to the cargo in *the hold* when other fire hoses were for boundary cooling. At the same time, the C/O informed the port side barge to discharge the concerned cargo to find the fire source.

3.7 At about 1700 hours, when the cargo in *the hold* was discharged from a height of 12 metres to 10 metres, fireboats of the Fire Services Department (FSD) arrived at the scene (Figure 3). In order to make room for fireboats to fight the fire, the port side barge shifted to the forward of *the vessel,* and the discharge of the cargo had to stop. The Master then informed the C/O to request the starboard side barge to continue discharging the cargo of *the hold* to find the fire source, but the barge refused.

Figure 3: the scene of the fire when fireboats arrived

3.8 At about 1720[1] hours, fireboats commenced shooting water to the

[1] According to the report of Class survey issued on 4 June 2021 by the Panama Maritime Documentation Service Inc.

No.2 cargo hold (Figure 4).

Figure 4: The fireboat was shooting water

3.9 At about 1750 hours, a patrol boat of MD arrived at the vicinity of the scene, and the Pollution Control Unit of MD was informed to standby for combating the oil spill (Figure 5).

Figure 5: the scene when the MD patrol boat arrived

3.10 At about 1800 hours, five firemen from FSD (*the firemen*) boarded *the vessel* and carried out firefighting. They informed the Master to keep the boundary cooling with fire hoses.

3.11 At about 1900 hours, while seeing the naked fire, *the firemen* informed the Master to muster all crew members at the forward deck. According to the suggestion of the Master, *the firemen* discharged the foam for about 5 minutes then continued with the water jet.

3.12 At 2300 hours, *the vessel* listed to port side about 10~15°, and the fire became fierce. All crew members of *the vessel* were evacuated from the forward deck of *the vessel* through the pilot ladder.

3.13 At about 2307 hours, an explosion was reported on board *the vessel*. The fire was upgraded to No. 3 alarm at 2311 hours as announced by FSD.

3.14 At about 2315 hours, *the firemen* evacuated from the fire scene, and continued fighting the fire at the nearby areas with the fire monitors of the fireboats.

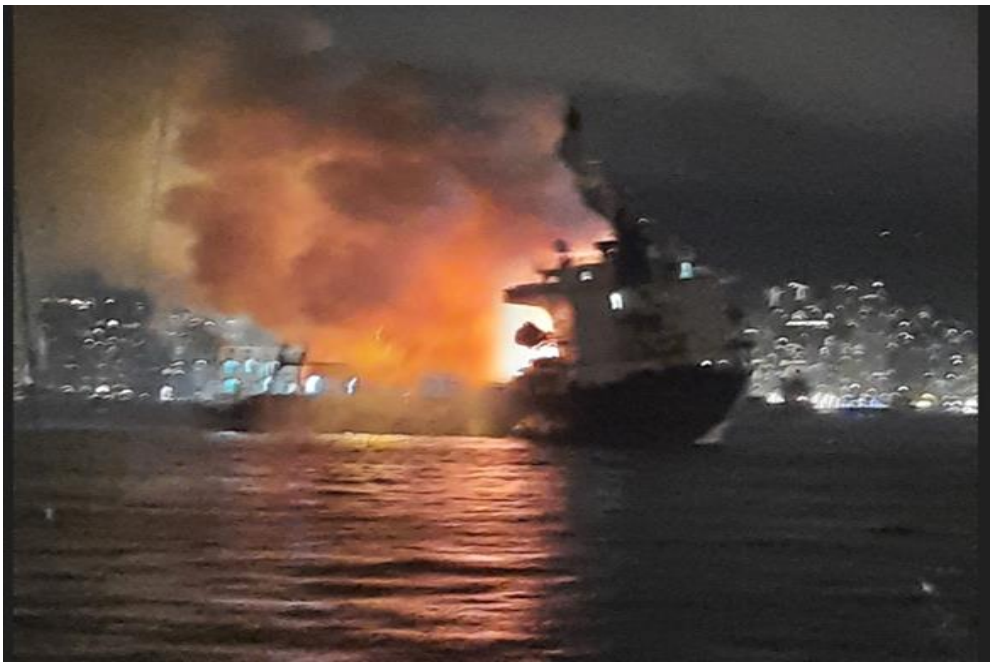

Figure 6: the scene at 2327 hours on 2 June 2021

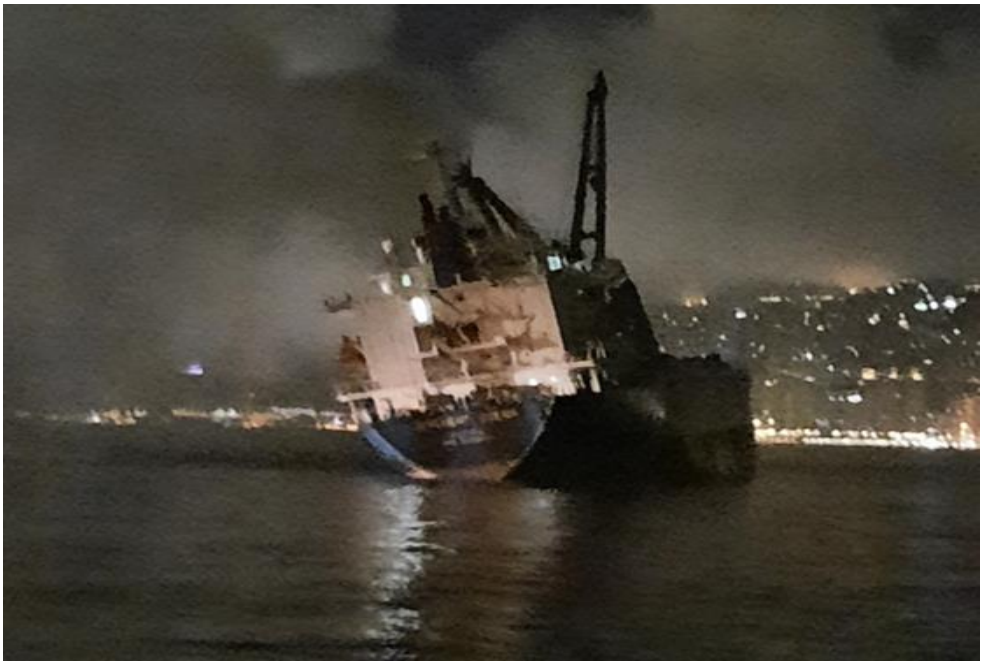

Figure 7 the fire scene at 0254 hours on 3 June 2021

3.15 At about 0512 hours on 3 June 2021, the fire on *the vessel* was still not under control, and dark smoke was continued emitting from the fire scene.

3.16 At about 0820 hours, FSD reported that the fire on *the vessel* was extinguished. The anchoring position of *the vessel* was unchanged throughout the fire (Figure 8).

Figure 8 *the vessel* after fire was extinguished

3.17 At about 1800 hours, *the vessel* was brought to an upright position after shifting the cargo from port side to starboard side onboard.

3.18 At about 1857 hours, FSD stood down, and 5 crew members, including the Master, C/O, Chief Engineer (C/E), Second Engineer and Bosun returned to *the vessel*.

3.19 There was no oil pollution, personal injury, death, or missing reported in the accident. However, according to the report of Class survey by the Panama Maritime Documentation Service Inc., the accident resulted in severe deformation of port side transverse frames, and welding cracks of hold railing and tween stringer plate of *the hold*.

4. Analysis

The vessel's certificates and manning

4.1 The statutory trading certificates of *the vessel* were valid and in order. *The vessel* was manned by 15 crew members, including the Master.

4.2 The Master commenced his sea service in 2003. He worked in the Company for the first time and joined *the vessel* on 30 April 2021. He possessed a Master Certificate of Competency issued by China with validity period till 9 May 2024.

4.3 The C/E possessed a Chief Engineer Certificate of Competency issued by China with validity period till 22 September 2025.

4.4 The C/O commenced his sea service in 2011. He joined *the vessel* on 19 March 2021, serving as C/O for the first time. He possessed a Chief Officer Certificate of Competency issued by China with validity period till 18 November 2025.

4.5 There was no abnormality noted with regard to the certification and qualification of the crew concerned.

Fatigue, alcohol and drug abuse

4.6 There was no evidence to show that the Master and crew were affected by either fatigue at work or abuse of alcohol and drugs.

Weather and sea conditions

4.7 According to the deck logbook record of *the vessel*, the air temperature was 27°C at 1600 hours on 2 June 2021. The weather was cloudy with northeasterly wind of Beaufort Wind Scale Force 3 with general breeze[2]. The sea was smooth. The weather and sea conditions should not be the contributory factors to the accident.

[2] According to the weather information provided by the Hong Kong Observatory, the wind was southerly with light to moderate.

The properties of cargo loaded onboard and the probable causes of the fire

4.8 According to the definition in Appendix 1 of the International Maritime Solid Bulk Cargoes Code (IMSBC Code), scrap metal includes articles on the size of car bodies to fine metal turnings. The weight of individual pieces may also vary greatly. They have no special hazards and no special requirements for stowage and segregation. The scrap metal is a non-combustible, or low fire risk except cargo contains swarf. However, the instruction of "emergency step to avoid fire when shipping steel scrap" (*the instruction*) provided by the Company stated that the part of scrap metal of Hong Kong was live scrap metal, which was easy to have spontaneous combustion and might cause fire when shipping steel scrap.

4.9 The investigation revealed that the cargo loaded onboard *the vessel* was mixed with other combustible substances, such as plastic, papers, sponges, oil can, woods and gas can. (Figure 9)

Plastic mixed

Paper mixed

Sponge mixed

Oil can in the cargo dropped on deck

Wood in cargo dropped on deck

Gas can mixed in the cargo

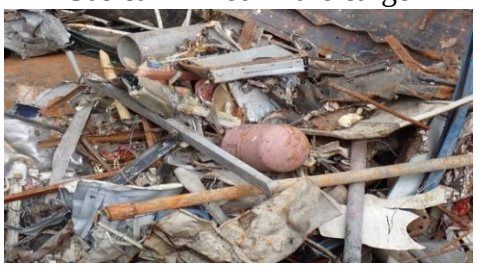

Figure 9 Cargo loaded onboard *the vessel*

4.10 When the duty C/O initially noticed smoke in *the hold* at 1620 hours on 2 June, the stevedores were trimming the cargo with the barge's spider grab. It might be deduced that the fire broke out when the spider grab was trimming the cargo inside the hold causing sparks generated from the metal to metal contact that ignited the combustible substances in the cargo, or possibly as a result of spontaneous combustion.

Risk assessment for cargo loading

4.11 According to *the instruction*, it was identified that the scrap metal loaded in Hong Kong could be liable to spontaneous combustion easily and might cause fire, in particular, when shipping steel scrap, the property of which was slightly different from the scrap metal as defined in the IMSBC Code.

4.12 According to paragraph 3.2 of the Risk Assessment Procedure of the shipboard SMS, the Master should identify potential risk or risk on board and carry out risk assessment during the shipboard operation, including establishing a contingency plan.

4.13 *The instruction* established a procedure as "*sprinkle water on top of steel scrap about 10 minutes*" after completion of loading and survey at the loading port. However, the investigation revealed that the Master underestimated the risk of loading scrap metal that might combust spontaneously, and the Master did not follow the shipboard SMS to carry out a risk assessment properly and establish a contingency plan to respond to the potential fire risk when loading scrap metal in Hong Kong, especially when trimming the cargo by using the grab.

Emergency response for fire fighting

4.14 According to paragraph 1,《Shipboard Management Notice • Job Responsibility》of the《Shipboard Safety Operation Manual》(file No. SSOM-2.10), the Master should ensure the safety of the ship and prevent the ship and its goods or other properties from being damaged, and he should handle any accident with caution to avoid its escalation or deterioration.

4.15 When a large quantity of seawater poured into the hold during the firefighting operation, *the vessel* began to list to the port side from 2200 hours to 2300 hours on 2 June 2021.

4.16 In combating the fire, the Master chose to organize the crew to put out the fire with water when smoke was found in *the hold*, and the Master also suggested *the firemen* to use foam when the naked fire appeared at the beginning of the fire. However, all of the above actions failed to control the fire effectively. If the Master decided to close the hatch cover of *the hold* and release the CO_2 with the shipboard CO_2 system to *the hold* in the early stage of the fire before massive seawater was poured into *the hold* causing a heavy list of *the vessel*,[3] the fire might be under control in a short time.

4.17 The investigation also revealed that the bilge pump of *the vessel* was out of order in the fire accident when the vessel had a severe list to port side. The emergency equipment of *the vessel* was not properly maintained for emergency use.

[3] If the vessel is listed heavily, it might bring difficulty in closing the hatch cover of the cargo hold.

5. Conclusions

5.1 At 1620 hours on 2 June 2021, a fire broke out on board *the vessel* causing its structural damage while *the vessel* was anchoring at Kellett Anchorage No.3, Hong Kong, for loading scrap metal in bulk. The fire was extinguished at about 0820 hours on 3 June 2021. Fortunately, there were no casualties and oil pollution.

5.2 The investigation revealed that the main contributory factors that led to the accident were as follows:

(a) the crew members underestimated the risk of loading scrap metal onboard that might spontaneously combust;

(b) the crew members failed to follow the shipboard SMS to carry out a risk assessment properly and establish a contingency plan to respond to the potential fire risk when loading scrap metal, especially when trimming the cargo by the grab;

(c) the crew members failed to select an appropriate opportunity to use the shipboard CO_2 system for combating the fire; and

(d) The crew members failed to maintain the shipboard bilge pump properly for emergency use to bring *the vessel* upright when having a heavy listing as a result of accumulated water used for firefighting.

6. Recommendations

6.1 The owner / management company of the vessel should issue notice / circular informing all masters, officers and crew members of its fleet of the findings of the investigation and lessons learnt from this accident and instruct them to:

(a) enhance safety awareness of the risk of loading scrap metal that might spontaneously combust;

(b) ensure a risk assessment before loading scrap metal cargo in bulk according to the shipboard SMS to establish procedures to respond to the hazards identified;

(c) ensure the shipboard CO_2 system to be used for firefighting in an appropriate opportunity; and

(d) enhance shipboard maintenance to ensure emergency equipment is ready for emergency use.

6.2 A copy of the investigation report should be provided to the Panama Flag Administration for information and attention on the findings of the report.

6.3 A Marine Department Notice should be issued to promulgate the lessons learnt from the incident

7. Submission

7.1 The draft investigation report, in its entirety, was sent to the flag State, the management company and the Master of *the vessel* for their comments.

7.2 By the end of consultation, there was no comment received from the above-mentioned parties.