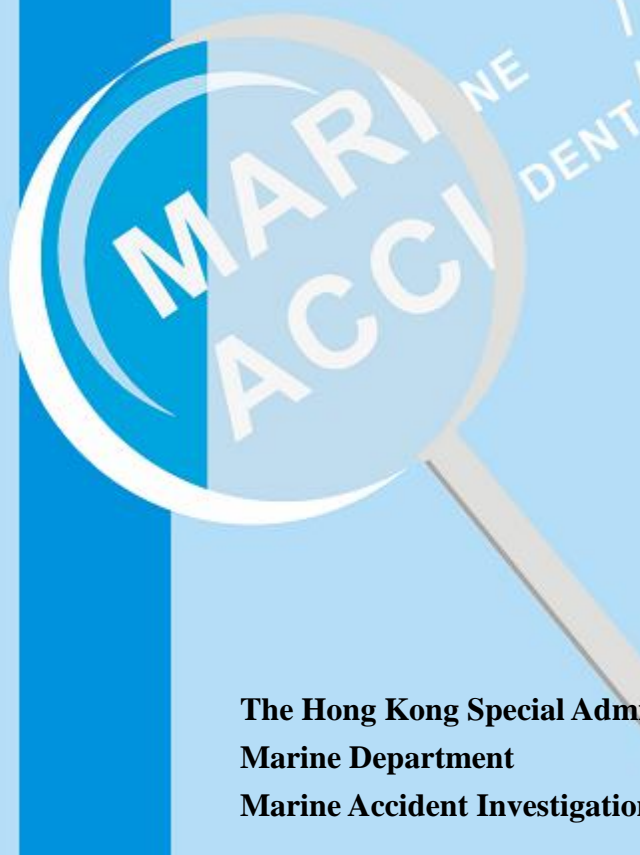




**Electrical blackout and
subsequent grounding of
the Iranian registered container ship
“*Touska*” at the Magazine Island,
Hong Kong on 5 November 2017**



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

19 August 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 2114 hours on 5 November 2017, the Iranian registered container “*Touska*” (*the vessel*) ran aground at the Magazine Island, Hong Kong.

The vessel departed Kaohsiung, Taiwan for Shenzhen, China at 1706 hours on 3 November 2017. On 5 November 2017 afternoon, *the vessel* anchored outside Hong Kong waters due to unavailability of berth in Shenzhen.

At 2100 hours on 5 November 2017, *the vessel* en route to Shenzhen again. Whilst in transit in Hong Kong waters at 2109 hours, a blackout happened on board that affected the maneuverability of *the vessel*. Although both port and starboard anchors were let go, *the vessel* finally went aground just off the Magazine Island at 2114 hours.

The investigation had revealed that the automatic backflushing filter, which was used to screen out dirty particles from the fuel oil, failed to supply fuel oil to the generator engines. Thus, it caused the blackout and subsequent grounding of *the vessel*.

1. Descriptions of the vessel

Ship name	:	<i>Touska</i> (Figure 1)
Flag	:	Islamic Republic of Iran
Port of registry	:	Qeshm
IMO number	:	9328900
Type	:	Container Ship
Year built, shipyard	:	2008, Hyundai Mipo Dock Ulsan, the Republic of Korea
Gross tonnage	:	54,851
Net tonnage	:	34,827
Summer deadweight	:	66432 tonnes
Length overall	:	294.12 metres
Breadth	:	32.20 metres
Engine output, type	:	41,096 kW, MAN B&W 9K90MC-C6
Classification society	:	Lloyd's Register (LR)
Registered owner	:	Mosakhar Darya Shipping Company
Management Company	:	Rahbaran Omid Darya Ship Management Company



Figure 1 *The vessel*

2. Sources of evidence

2.1 The statements of the crew of *the vessel*.

2.2 The information provided by the management company and the crew of *the vessel*.

3. Outline of events

(All times are local time UTC + 8 hours.)

- 3.1 On 3 November 2017, *the vessel* departed Kaohsiung and sailed to her destination port, Shenzhen, China through Hong Kong waters. On 4 November 2017, *the vessel* anchored outside Hong Kong waters.
- 3.2 On 5 November 2017, *the vessel* sailed to Shenzhen at about 1430 hours but returned to waters outside Hong Kong at about 1535 hours due to the unavailability of berth in Shenzhen.
- 3.3 At about 2100 hours, *the vessel* sailed to Shenzhen again with a pilot and a co-pilot on board. The master exchanged vessel information with the pilots according to the procedure of the safety management system (SMS). The third officer and an able-bodied seaman (AB) as helmsman were also on the bridge.
- 3.4 Meanwhile, the chief engineer, the second engineer, the third engineer, and the electrician were in the engine room. No. 2 and No.3 generators were running, and each generator supplied about 24% of its rated load.
- 3.5 At about 2104 hours, the pilot ordered half ahead. The third officer increased the propulsion power making *the vessel's* speed going up to about 10 knots. At about 2106 hours, the pilot ordered the rudder to hard port, and the AB responded accordingly. *The vessel* then sailed on a course of 308°.
- 3.6 At about 2109 hours, No. 2 and No. 3 generator engines slowed down and then stopped resulting in a blackout of *the vessel*. The emergency generator started automatically after about 26 seconds.
- 3.7 After the blackout, *the vessel* lost its propulsion power and control of the steering gears and was slowing down. About one minute later, with the sea current about 3.5 knots from the port side, *the vessel* started turning to the starboard side and heading to the Magazine Island (Figure 2).
- 3.8 According to the requirements of the SMS, an anchor team consisting of the chief officer, the bosun, and two ordinary seamen was on standby for any emergency. After the blackout, the master immediately instructed the anchor team to proceed to the forward anchor station to let go of both the port and starboard anchors by using the walkie-talkie and the public address system.

- 3.9 Both anchors were let go at about 2112 hours. However, the action could not stop *the vessel* to run aground at about 2114 hours (Figure 2).
- 3.10 With the emergency generator running, the emergency lights were on. The second engineer first started the generator engine diesel oil flushing pump using compressed air (Figure 3). He was then able to start the No. 1 and No. 2 generator engines. The main electrical power supply resumed at about 2115 hours after *the vessel* was already aground.

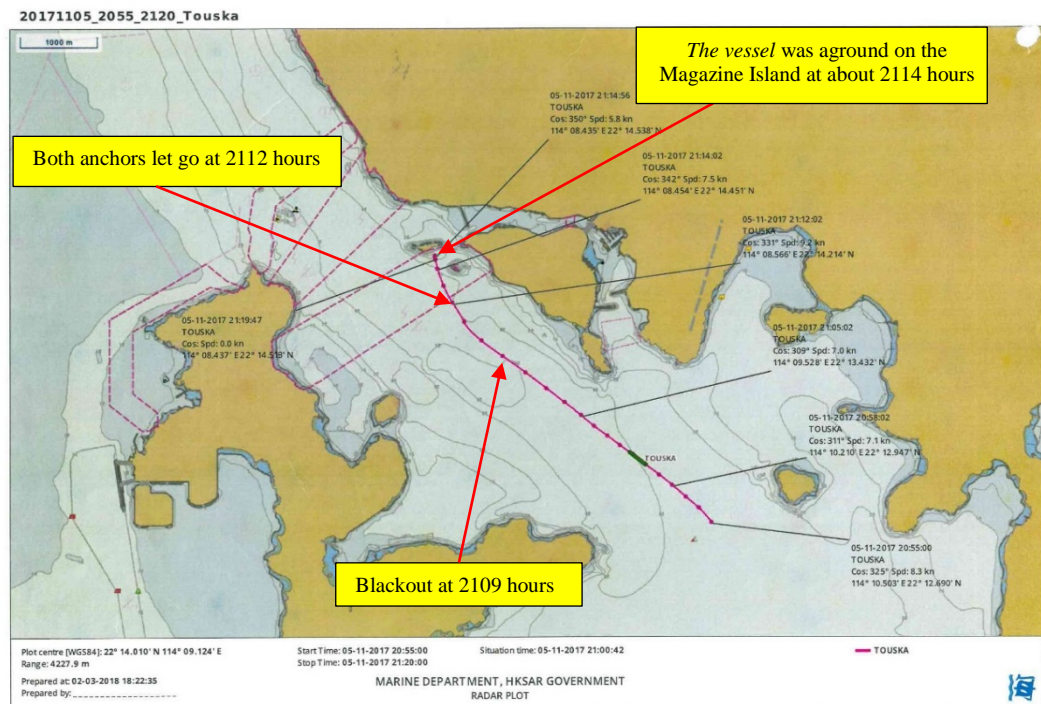


Figure 2 Radar plot of *the vessel*

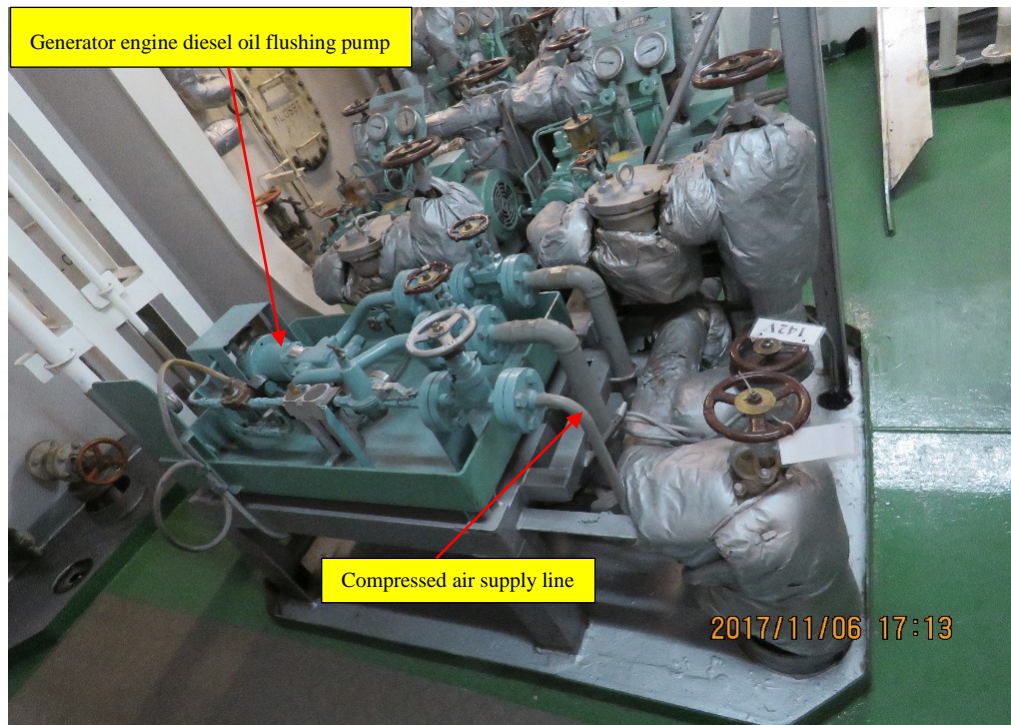


Figure 3 Generator engine diesel oil flushing pump

- 3.11 *The vessel* was refloated at 2240 hours on 6 November 2017. The underwater inspection conducted on 7 November 2017 morning revealed the keel plate in way of the bulbous bow was buckled with damaged openings ranged from 100 mm to 650 mm in length. Other than localized grounding marks on the port and starboard sides of the forward hull bottom, there was no visible damage to other parts of the hull. No oil pollution was reported in this accident.

4. Analysis

Certification and experience

- 4.1 The master had more than five years of experience in the capacity of master and joined *the vessel* on 24 May 2017.
- 4.2 The third officer worked on board *the vessel* for four months and for the management company for about 13 months.
- 4.3 The chief engineer had experience in the capacity of chief engineer for nine years and worked on board *the vessel* as chief engineer for about two and a half months.
- 4.4 The second engineer had experience in the capacity of second engineer for one and a half year and worked on board *the vessel* before for five months. He joined *the vessel* for about one month.
- 4.5 The AB had about 12 years of experience as an able-bodied seaman and worked on board *the vessel* for about 45 days.
- 4.6 All the crew, including the master, held valid certificates of competency or certificates of proficiency relevant to their ranks issued by the flag State. Furthermore, the manning complied with the flag State's minimum safe manning requirements.

Fatigue, alcohol and drug abuse

- 4.7 There was no evidence to show that any crew, including the master, had suffered from fatigue at work or alcohol and drug abuse.

Weather and sea condition

- 4.8 The weather was cloudy with north-easterly wind force 2 and north-westerly current of about 3 to 4 knots. The wind and current effect had a significant impact on pushing *the vessel* towards the Magazine Island when she was in a not-under-command condition.

Anchor team

- 4.9 When *the vessel* proceeded to Shenzhen, the master had prepared a standby anchor team according to the procedure of SMS. After the master had given the order to drop both anchors, the anchor team took actions swiftly. It is apparent that dropping of the anchors had slowed down *the vessel* and reduced extensive damage to the hull.



Figure 4 *The vessel aground in front of the rocks*

Maneuverability of *the vessel* during blackout

- 4.10 There are many factors affecting the maneuverability of a ship such as the design of rudder and its angle, the ship speed and hull form, the wind and current effects, etc. The effectiveness of a rudder is greatly reduced at slow ship speed or even lost due to the lack of water flow across its surface.
- 4.11 After the blackout, the main engine stopped and induced a slowdown in *the vessel's* speed. Although the emergency generator resumed supplying electrical power to the steering gear after a 26-second blackout, the rudder effectiveness was reduced by the slow ship speed. The rudder turning force was overcome by the sea current and resulting *the vessel* moved towards the Magazine Island.

Heavy fuel oil and diesel oil piping systems for generator engines

- 4.12 In Figure 5, the pipe lines of the heavy fuel oil (HFO) piping system, the diesel oil piping system and the common pipe lines for both systems were marked in blue, red and green respectively.
- 4.13 The HFO piping system consists of a feeding line from the HFO service tank to the generator engines via the HFO supply pumps, the HFO booster pumps, the auto backflushing filter (ABFF) and the heaters. In this system, pumps and heaters are of duplex type, but the ABFF is of simplex design. In case the ABFF fails to operate, HFO cannot be fed into the generator engines.
- 4.14 The diesel oil piping system consists of a feeding line from the diesel oil service tank to the generator engines via the generator engine diesel oil flushing pump

(flushing pump). If there is no electrical power supply, compressed air can be used to drive this pump and supply diesel oil to the generator engines.

- 4.15 In this accident, the second engineer opened the inlet and outlet valves of the flushing pump and used compressed air to drive the flushing pump so that diesel oil could be supplied to No. 1 and No.2 generators and the main electrical power supply was resumed at about 2115 hours.

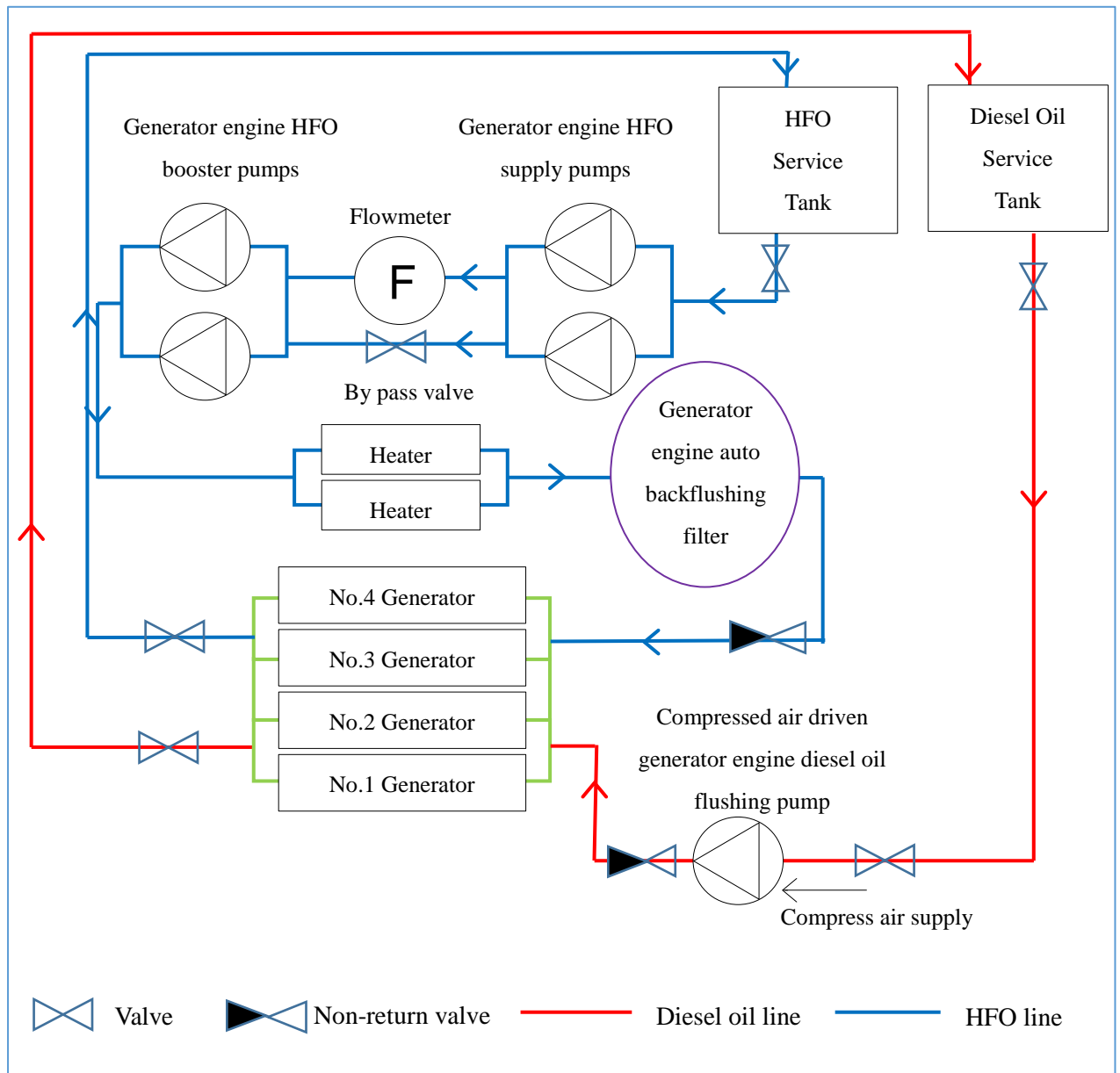


Figure 5 Schematic diagram of the HFO and diesel oil piping systems for generator engines

Auto Backflushing Filter (ABFF)

- 4.16 The function of the ABFF is to remove dirty particles from HFO by the filter elements and to allow the cleaned HFO to feed into the generator engines. The filter elements are housed into two chambers in which the functions of filtration and regeneration are carried out simultaneously and separately.
- 4.17 The filter chambers are mounted on top of the filter housing. Each of these chambers housed eight filter elements vertically positioned. The filtering work is divided up in such a way that at any one time, one of the filter chambers can regenerate while the other carries out filtering. In the event of the capacity of the filter elements in the filter chamber that is currently operating being contaminated, the regenerated reserve element will take over.
- 4.18 The indicator for contamination is the pressure differential between the dirty and the clean side of the filters. Regeneration with the assistance of compressed air is activated by a differential pressure switch (DPS) with the signal fed into an Electronic Control System (ECS). The ECS controls, monitors and records the regeneration operation. The HFO system pressure remains at a constant level even when the regeneration is in progress.
- 4.19 After the accident, the filter chamber covers of the ABFF were removed for inspection on 13 November 2017. The condition of the filter elements in one of the two filter chambers is shown in Figure 6 below.

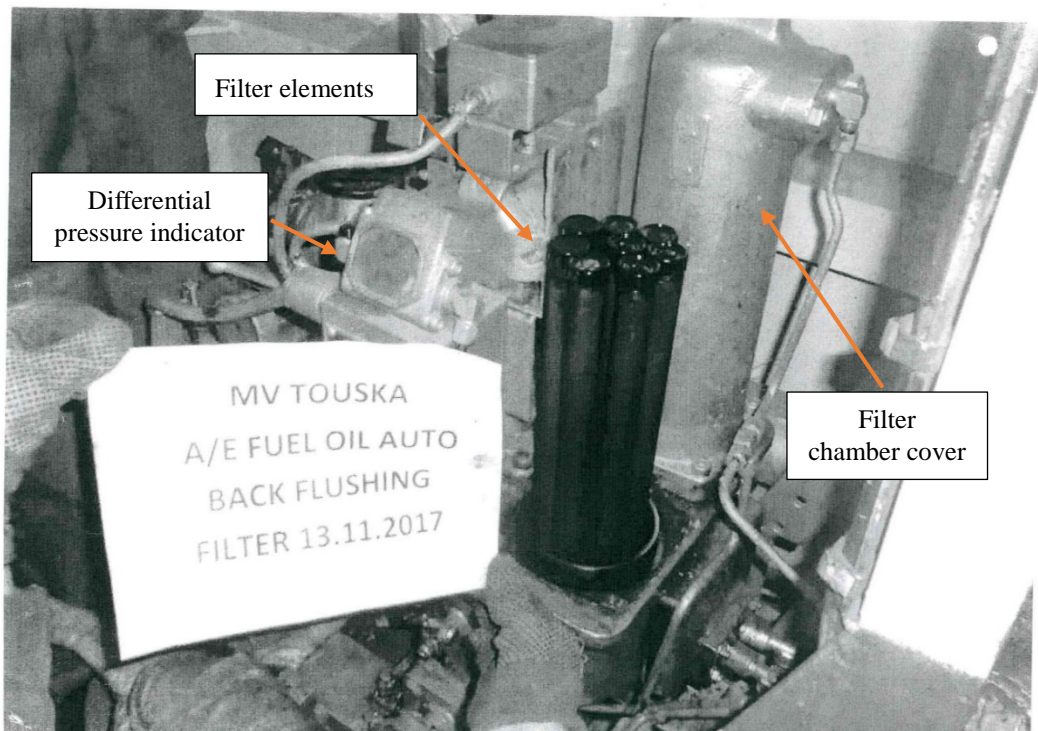


Figure 6 ABFF with one of the two filter chamber covers removed

Probable cause of the accident

- 4.20 The management company carried out an investigation into the accident. Based on the information collected from the concerned crew and the company investigator's observation, the management company concluded that the blackout was caused by *"Sudden failure of auxiliary engines automatic backflush fuel filter mechanism which caused abrupt discontinuation of fuel flow to running generators and consequently led to power failure and blackout"*.
- 4.21 Failure of the ABFF might be caused by the malfunctioning of the DPS and/or the ECS. If the DPS fails to provide a signal or there is an interruption of this signal to the ECS to start the regeneration operation when the filter elements are contaminated, this will block the fuel supply to the generator engines. Furthermore, if the ECS fails to control the regeneration operation, even the DPS can send out a signal, the result will be the same.
- 4.22 Preventive maintenance and close monitoring of the ABFF is essential as the failure of the ABFF will stop the fuel supply to the generator engines. Proper maintenance of other equipment of the HFO system, such as HFO purifiers, filters and heaters etc., is also important since this will help to maintain the quality of HFO fed to the ABFF and reduce the chance of failure of the ABFF.

5. Conclusions

- 5.1 At about 2109 hours on 5 November 2017, a blackout happened on board *the vessel*. Consequently, the main engine stopped and the steering gear was out of control. Even with both anchors dropped into the sea, *the vessel* with her inertia and the push by the sea current drifted towards the Magazine Island and went aground at about 2114 hours.
- 5.2 The investigation identified the contributing factor was the failure of the auto backflushing filter of the heavy fuel oil system to generator engines. The engine crew could not identify the problem in time. As a result, no fuel oil was supplied to the generator engines. Thus, it caused the blackout and subsequent grounding of *the vessel*.

6. Recommendations

6.1 The management company should issue a circular informing all masters, officers and crew of the findings of the investigation and the lessons learnt from this accident and instructing them to:-

- a) monitor closely the performance and function of the ABFF especially during sailing in the harbour and congested waters etc.; and
- b) carry out proper preventive maintenance of the ABFF and other equipment of the HFO system of the generators in order to avoid any sudden failure of the equipment.

7. Submission

- 7.1 The draft investigation reports had been sent to the management company and the master of *the vessel* for their comments.
- 7.2 Comments were received from the management company. The report was amended as appropriate according to the comments.