Report of Investigation into the grounding of the Chinese registered cargo vessel "Zhong Fu Fa Zhan" on the Adamasta Rock in North Cheung Chau Traffic Separation Scheme on 08 May 2011

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

Completed on 25 April 2012

Purpose of Investigation

This incident is investigated, and published in accordance with the IMO Resolution MSC 255(84), the Code of the International Standards and Recommended Practices for a Safety Investigation into a Marine Casualty or Marine Incident (Casualty Investigation Code) adopted on 16 May 2008.

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 improving the safety of life at sea and avoiding similar incident in future.

The conclusions drawn in this report aim to identify the different factors contributing to the incident. They are 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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1. Summary

1.1 At 2220 on 7 May 2011, the Chinese registered river-trade cargo vessel Zhong Fu Fa Zhan departed the loading berth at Tseung Kwan O, in Junk Bay, Hong Kong after loaded a cargo of 2,200 tonnes of soil for discharge in Taishan, China. The weather was fine and the visibility was good. The navigation equipment and main engines were in normal working condition.

1.2 The Master was on duty alone in the bridge after departure. The Chief Officer took over the watch from the Master at 0000 on 8 May 2011, also alone at the bridge.

1.3 At about 0031 and 0032 on 8 May 2011, the Chief Officer made a report to VTC[1] by radio. About 40 seconds later, the ship ran aground on the shoal of Adamasta Rock in North Cheung Chau Traffic Separation Scheme while the Chief Officer was making entries into ship log book. The vessel hit the underwater rock in the middle of the shoal, giving off big banging sound and severe ship vibration. The cargo hold was staved and seawater entered into the cargo hold. The vessel finally stopped and grounded firmly on the southwestern edge of the shoal at position 22°13.39′N 114°01.34′E.

1.4 All the seven crewmembers on board were rescued without injuries. There was no oil pollution to the water. The vessel sustained severe hull damage at the bottom in way of the cargo hold and was salvaged a few weeks later.

1.5 The investigation revealed that the following were the main contributing factors to the accident:

- The Master of the vessel did not carry out proper voyage planning, using charts, nautical publications and all available information, for the safe passage of his vessel;
- The Master and the Chief Officer did not request for additional watch-keeping ratings to assist in look-out duty while the vessel was sailing in congested water and in the Traffic Separation Scheme;
- The Master and the Chief Officer relied solely on the un-approved Electronic Charting System on board for monitoring of ship position and sailing; and
- Prior to the accident, the Officer's attention on conning the vessel was distracted by making vessel's position reports to Marine Department and making entries into ship's log book.

[1] Vessel Traffic Centre to provide Vessel Traffic Service (VTS), Call Sign: Hong Kong Mardep

Fig.1 – North and South Cheung Chau Separation Scheme (The direction of Buoyage changed at Lantau SE Buoy)

2. Description of the Vessel

Vessel Name:	*Zhong Fu Fa Zhan (Fig.2)*
Registered Number:	2006F2300349
Call Sign:	Nil
Flag:	China
Port of Registry:	Chong Qing
Trade of Vessel:	River Trade Vessel
Ship Type:	Dry Cargo Ship
Gross Tonnage:	2,765
Net Tonnage:	1,549
Length (LOA):	87.60 metres
Breadth (molded):	13.60 metres
Depth (molded):	4.60 metres
Summer Draft:	3.80 metres (for container cargo)
	3.50 metres (for soil cargo)
Main Engine:	Diesel Engine, Model: Z6170ZLCZ-3, 2 sets
Engine Power:	330.00kW x 2, (rated output power 330kW at rpm of 1200r/min)
Propulsion:	2 sets of Fixed pitch Propeller, Diameter: 2.1 metres
Service speed:	8.0 knots
Year of Built:	20 May 2006 (Date on which Keel was laid: 08 October 2005)
Owners:	ChongQing Chief Shipping Co.,Ltd (重慶中孚發展有限公司)
Managers:	GuangDong ChangJiang Shipping Co. (廣東長江船務有限公司)
Class:	Register of Shipping of GuangDong Province, Guang Zhou Branch (廣東省船舶檢驗局廣州分局 ZC)
Casualties:	Nil

Fig.2 – *Zhong Fu Fa Zhan* grounded on the shoal near the Adamasta Rock (view from south)

3. Sources of Evidence

3.1 The Master, watchkeeping officers and ratings, and the Management Company of *Zhong Fu Fa Zhan*.

3.2 Guangdong Maritime Safety Administration, People's Republic of China (China MSA).

3.3 The Vessel Traffic Centre of Hong Kong Marine Department.

3.4 The Hong Kong Observatory.

4. Outline of Events

.1 At 2220[2] on 7 May 2011, the Chinese registered river-trade cargo ship *Zhong Fu Fa Zhan* departed from the loading wharf at Tseung Kwan O, Junk Bay, Hong Kong with a cargo of 2,200 tonnes of soil in its cargo hold and sailed for Taishan, China. The observed drafts of the vessel on departure were 3.20 metres forward, and 3.70 metres aft. The vessel listed slightly to the starboard on departure. The Master was on the first watch at and after ship departure without watch-keeping rating on the bridge.

.2 At 2357 on 7 May 2011, the Chief Officer took over the navigation watch on the bridge. The vessel was passing north of Green Island and entering into the western fairway. The Master left the bridge at about 0000 on 8 May 2011. All navigation equipment and lights were in normal working condition. There was no watch-keeping rating on the bridge.

.3 According to VTC record, at 0021 on 8 May 2011, the vessel passed the Hei Ling Buoy and proceeded on a course over ground (COG) 241º, with a speed of about 8.5 knots.

.4 At 0030, the vessel was on a COG 236º, with a speed of about 8.0 knots and started turning gradually to port. About 21 seconds later, the vessel was on COG 221º, with a speed of about 9.0 knots. And about 71 seconds later, she was on a COG 214º, with a speed of about 8.0 knots proceeding towards the shoal between the Adamasta Rock and the Adamasta Rock NW light buoy.

.5 At 0031, according to the requirement of Hong Kong Vessel Traffic Service reporting system at the reporting point of Adamasta Rock, the Chief Officer made the first attempt of radio call to VTC to report ship's position. At the time of the reporting, the vessel was approaching to the shoal on a COG 208º, maintaining a speed of about 8.0 knots.

.6 At about 0032, the Chief Officer reported to VTC on passing the reporting point of Adamasta Rock and confirmed her next reporting point would be on passing the Fan Lau Kok (the southwestern end of Siu A Chau Traffic Separation Scheme). The vessel was standing on a COG 208º and proceeding towards the shoal directly.

.7 About 40 seconds after the VTC reporting and while the Chief Officer was making entries into ship log book, the vessel ran aground on the underwater rock,

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[2] The times are in Local Time (UTC+08) as recorded by the track recorder of Hong Kong Vessel Traffic Centre (VTC) radar

giving off big banging sound and severe hull vibration. Water entered into its cargo hold.

.8 At about 0033, the vessel stopped and grounded firmly at the position 22°13.39′ N, 114°01.34′ E (i.e. on the extending shoal between the Adamasta Rock light tower and the Adamasta Rock NW light buoy).

.9 At about 0035, the Master of the vessel reported to VTC that his vessel's cargo hold was flooding and requested for assistance. The VTC informed the Fire Services Department and the Police to provide the necessary assistance.

.10 At about 0038, the Master reported to VTC that no crew was injured and there was no oil pollution.

.11 At about 0055, all 7 crewmembers of the vessel were rescued by the Police launch.

Fig.3 - The overview of Zhong Fu Fa Zhan grounded on the extended shoal of Adamasta Rock on her south-bound voyage

5. Analysis of Evidences

5.1 Weather Condition

At the time of the accident, the weather was fine with a moderate southeasterly wind at a speed of about 27 km/hr. Visibility was very good about 16 km to 18 km. Sea condition was slight.

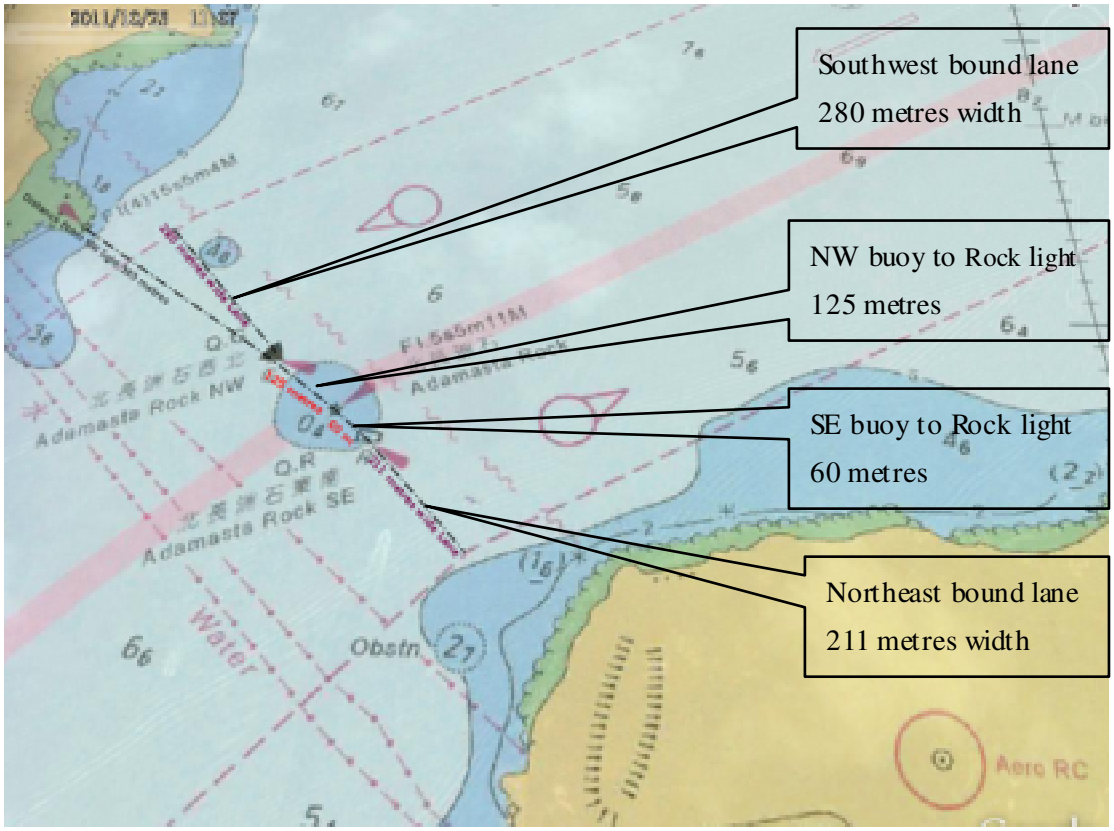

Fig.4 - The Traffic Separation scheme in the Adamasta Rock Area

5.2 North Cheung Chau Traffic Separation Scheme *(Fig.1 & 4)*

.1 According to the Sailing Direction NP30 (edition 2010), the North Cheung Chau Traffic Separation Scheme (TSS) is the northern branch of the route southwest approach to Hong Kong from Lantau Channel of Zhujiang Kou. The whole TSS is from northwest of Siu A Chau until the Kau Yi Chau (safe water). The separation line of the TSS starts at the precaution area of Siu A Chau North light buoy (safe water), then marked by the Lantau SE Light Buoy (safe water, 22°12.61′N 114°00.46′E)[3], the Adamasta Rock Light (white concrete tower, radar

[3] At this point the convention direction of buoyage changes from southwestern bounding to northeastern bounding, meaning the color of lateral buoy (if installed) would be changed from "green" on port hand to "green" on starboard hand while approaching to Hong Kong from southwest along the traffic lane of Siu A Chau TSS and North Cheung Chau TSS.

reflector, 2m in height[4]), the Hei Ling light buoy (safe water, 22º14.21′N 114º02.81′E) and ended at the precaution area of Kau Yi Chau SE light buoy. The extent of the shoal surrounding the Adamasta Rock is marked by light buoys on the NW and SE sides. The TSS has not sought the adoption by International Maritime Organization (IMO) and is a recommended scheme only. Mariners using this TSS should, as far as practicable, follow the rules laid down in rule 10 (b) to (l) of International Regulations for Preventing Collisions at Sea (1972).

.2 In view of the depth of water and narrowness of the navigable channel in the area, the North Cheung Chau Traffic Separation Scheme established by Marine Department is intended to be used by small vessels. As a number of small vessels and passenger high-speed crafts using that part of waters, the traffic density in this Traffic Separation Scheme is normally high. However, at the time of the accident, it is evident from the VTC radar record and the statement provided by the Chief Officer of the vessel that there were only a few vessels in the vicinity and they were far away from own vessel. As such, the movements of the vessel were not restricted.

5.3 Water Depth, Tide Height and Tidal Stream of the Adamasta Rock *(Fig.5)*

.1 Apart from one 4.8 metres deep shallow patch located at about 190 metres off the Adamasta Rock NW Buoy and near to the outer boundary of the southwesterly bound traffic lane, the minimum water depth within the channel is 5.6 metres.

.2 The oval-shaped Adamasta Rock shoal is located at the middle of the Adamasta Channel. It is about 150 metres long with a minimum depth about 0.1 metre (chart datum) *(Fig.5)*. The Adamasta Rock Light tower was erected on the shallowest point (about 0.1 metre depth in datum).

.3 The VTC radar image record showed that the vessel entered the shoal at position about 22-13.42N 114-01.38E with depth of 2.1 metres (chart datum). The shoal rises steeply to about 0.4 metre depth (chart datum) within 10 metres distance on the port side of the vessel. The vessel finally seated at position 22-13.39N 114-01.34E with water only about 2.6 metres deep (chart datum).

.4 According to the tide table of Hong Kong for the location of Chi Ma Wan near to the Adamasta Channel, there would be a low tide with 0.4 metre high at 1846 on 7 May 2011 and a high tide with 1.4 metre high at 0136 on 08 May 2011. The rise of water within a period of 6.8 hours was 1.0 metre.

[4] According to the local chart, the height of light should be 5 m

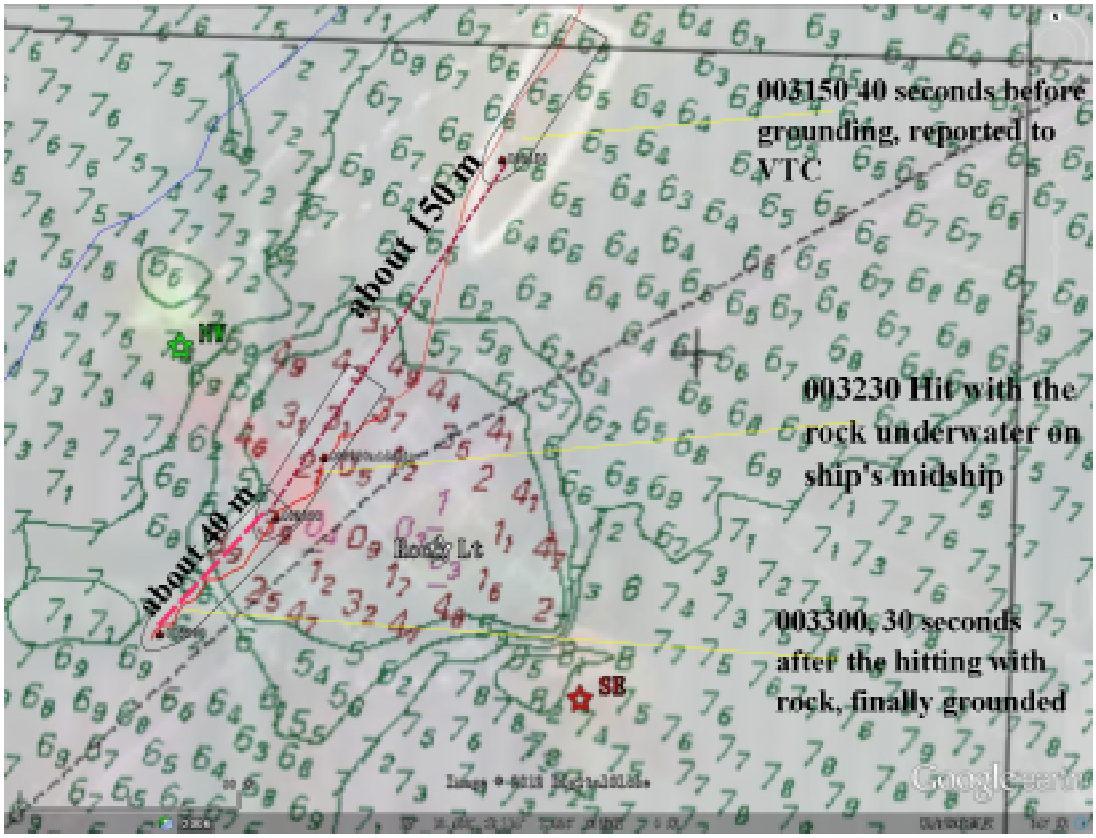

Fig.5 – The hitting point of the rock and the final grounding position of the vessel

.5 The vessel ran aground at about 0032 on 8 May 2011, the tide height is estimated to be about 1.32 metres [5] in the shoal. At the time of grounding, the depth of water at the point of gourndingwould be 3.42 metres (2.1m + 1.32m), and the water depth on its port side would be reduced steeply from the depth 3.42 metres to 1.72 metres (0.4 m + 1.32 m) within about a distance of 10 metres. The ship's draft readings were 3.20 metres forward, 3.60 metres midship, and 3.70 metres aft. Therefore it is suspected that the vessel hit the underwater rock at its midship area when the port side water depth changed from 3.42 to 1.72 meters depth. When hitting the rock, the vessel gave off a big banging sound and also caused severe vibration to the ship. The bottom of the hull on her port side of cargo hold was also starved. Soon after the grounding, the master stopped and reversed the engines immediately. The ship finally stopped after proceeding further in the southwesterly direction some 40 metres away from its first stranding position. Water flooded continuously into the cargo hold. The water depth at the final position of the vessel after grounding was about 3.9 metres (chart datum about 2.6 metres plus 1.32 metres tide). The immediate stopping of

[5] The tide height 1.32m was predicted through the curve For Finding The Height Of The Tide At Times Between High And Low Water.

the ship prevented her from moving into deeper water and sank in the channel.

.6 The time of grounding was about one hour before high tide. The tidal stream is expected to run at the northeasterly direction along the channel, i.e. against the ship's heading and therefore it could not have caused the vessel to drift southward prior to the accident.

5.4 Manning and Qualification

.1 According to *"the regulation of minimum safe manning for Chinese vessel 中華人民共和國船舶最低安全配員規則"* issued in 2006, river trade cargo vessels more than 1600 gross tonnage and power between 441 to 1500kW shall be manned with a master, a chief officer, a second officer, a third officer, a chief engineer, a third engineer, a forth engineer, three sailors and two motormen. For continuous sailing period of less than 16 hours, a third officer, an AB, a forth engineer and a motorman can be exempted from the requirements. Furthermore, one second officer can be exempted for continuous voyage less than 8 hours.

.2 The Minimum Safe Manning Certificate issued by Chang Jiang Maritime Safety Administration of the People's Republic of China allows the vessel to be manned only by one master, one chief officer, one chief engineer, one third engineer, two watch-keeping Able-Body seamen (AB) and one watch-keeping motorman on voyage less than eight hours. The certificate also states that one second officer, one third officer, one forth engineer, one Able-Body seaman (AB) and one motorman are exempted for the ship of continuous sailing period less than 8 hours, and the AB forms part of a navigational watch.

.3 According to the Master of the vessel, the service speed of the vessel was 8.0 knots, and the maximum speed was about 8.5 knots. The distance of the voyage from Junk Bay, Hong Kong to Taishan, China would be about 80 nautical miles (nm) and would take about 9 hours to 14 hours to complete, depending on the weather conditions. And the route from Junk Bay, Hong Kong to Taishan, China was the main trading route of Zhong Fu Fa Zhan and her sister vessels managed by the operation company.

.4 At the time of the accident, the vessel was en-routing from Hong Kong to Taishan, China with the Master, Chief Officer, Chief Engineer, Second Engineer, two ABs and one motorman on board. As the company knew that the voyage would take more than eight hours and such a manning level on board did not comply with the Minimum Safe Manning requirement, but took no action.

.5 The Master of the vessel held a valid Certificate of Competency for grade

one master on river-trade vessels. His certificate was endorsed by the Administration permitting him to work on vessels trading to Hong Kong & Macao. He has been working on board river-trade vessels for 24 years, and has been a grade one master on river trade vessels since 1992. He joined this vessel about two months ago.

.6 The Chief Officer was the Officer On Watch (OOW) at the time of the accident. He held a valid Certificate of Competency for Grade One Chief Officer for river-trade vessels. His certificate was endorsed by the Administration permitting him to work on vessels trading to Hong Kong & Macao. He has been working on board river-trade vessels for 16 years and has worked as Chief Officer since 2007. During the interview of the Chief Officer after the accident, he admitted that he was not clear about the system of buoyage direction in the Adamasta Channel, nor did he know about buoyage direction changes at the Lantau SE light buoy. He joined the vessel three days ago, and he had served on board a sister vessel plying between Hong Kong and Taishan, China several times in 2009.

.7 The Flag State Administration of the vessel does not require the watch-keeping ABs and the watch-keeping Motorman to hold watch-keeping certificates. In the minimum safe manning certificate, it states that the AB forms part of a navigational watch. It was dark at the time of the accident and sailing in a traffic congested narrow channel, but no watch-keeping AB was on duty in the bridge.

5.5 Fatigue, alcohol and drug abuse on board

.1 According to the chief officer, the watching keeping arrangement on board was on a roster of 6-hour-on and 6-hour-off. The Chief Officer took the watch from 0000 to 0600 and 1200 to 1800. A roster posted in the bridge showed that the watch keeping team should consist of an officer and an AB.

.2 The Chief Officer took over the watch from the master at 0000 on 8 May 2011. Before duty, he had taken a continuous rest period for more than 10 hours during port stay. It appeared that he should not have suffered from fatigue.

.3 There is no evidence to show that he was affected by drug or alcohol.

5.6 Certification of the Vessels

.1 The certificate of vessel's nationality and the Minimum Safe Manning Certificate issued by the Chang Jiang Maritime Safety Administration of The People's Republic of China were valid.

.2 The vessel has a valid River Trade Vessel Seaworthiness Certificate, a River Trade Vessel Tonnage Certificate, a River Trade Vessel Oil Pollution Prevention Certificate, a River Trade Vessel Loadline Certificate and a River Trade Vessel Survey Certificate issued by the Guangzhou Branch of Register of Shipping of Guangdong Province. The vessel's last annual inspection was carried out on 10 May 2010.

.3 According to the survey report of the vessel, the maximum draft of the vessel at full load should be 3.5 m (corresponding to a freeboard of 1116 millimeters and a deadweight of 2333 tonnes).

5.7 Navigation equipment on board and the utilization

.1 The following were the navigation equipment installed on the vessel:

- One set of radar in operating condition;
- One set of echo sounder in idle condition;
- Two sets of GPS in operating condition with one of them being connected to the Electronic Charting System;
- One set of magnetic compass in working condition
- Despite that it is not required to have a set of Electronic Charting System (ECS) on board. A set of ECS was installed on board and not verified by the flag State;
- One set of daylight signal lamp kept in the bridge;
- One set of MF/HF radio equipment fitted in the bridge;
- Two sets of VHF radio fitted in the bridge;.
- Three sets of portable Two-Way Radios;
- One set of Public Addressing System;
- Paper charts for local vessels 2009 edition published by the Hong Kong Marine Department.

.2 According to Chief Officer, he steered the vessel in the general direction of traffic flow along the southbound lane in the Adamasta Channel TSS. The ship's position was monitored by GPS displayed on the ECS display screen, and by visual lookout of light buoys. He could not recall his ship's heading figures in compass while the vessel was sailing in the traffic lane of the Adamasta Channel before the accident.

.3 The ship's radar was not used to monitor the ship's position. According to the Master of the vessel, the radar was mainly used to detect the risk of collision with other vessels and assist in taking collision avoidance action. Therefore, the vessel was not monitored by radar for going off-track using the parallel index

techniques.

.4 The echo sounder was not switched on, therefore, no early warning was given by the echo sounder prior to the depth of water becoming critical.

.5 The Chief Officer relied on the ECS and kept visual lookout for monitoring the ship position without using paper charts.

5.8 Ship's hull and water tight integrity

Zhong Fu Fa Zhan is a single hull general dry cargo ship with only one cargo hold. Two watertight transverse bulkheads formed the fore and aft end of the cargo hold *(Fig.6)*. There is no cover for the cargo hold, which spans two thirds the length of the vessel. There is no requirement for the vessel to remain afloat after flooding of any one of the compartments.

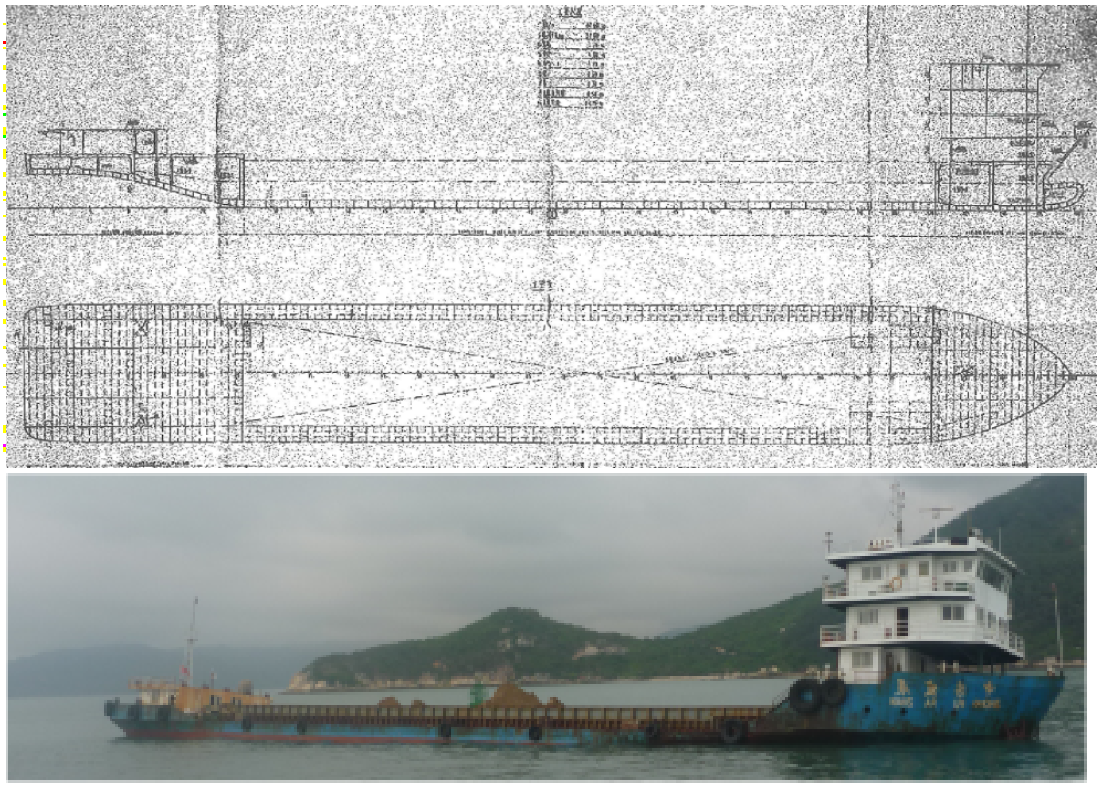

Fig.6- The General arrangement of Zhong Fu Fa Zhan.

5.9 Ship's loading condition

The vessel was loaded with 2,200 tonnes of soil cargo, and fuel oil on board was about 1.55 tonnes before departing from Hong Kong. After finished loading, the master checked the ship's drafts and it was 3.20 metres forward, 3.60 metres mid-ship, 3.70 metres aft, slightly listed to starboard. The midship draft 3.60m obviously exceeded the load line corresponded to the draft of 3.50 m, the required

minimum freeboard was therefore reduced by 100 millimeter. The ship was overloaded.

5.10 Ship's route and Voyage planning

.1 After departure from the loading berth, the vessel proceeded along the Eastern Fairway, Hung Hom Fairway, Central Fairway, South Fairway, North Green Island Fairway, crossed the Western Fairway and entered into the Adamasta Channel. After that, the vessel was expected to pass through the Lantau Channel to exit Hong Kong waters.

.2 A lot of traffic was expected to encounter along the route of the vessel within Hong Kong waters. The fairways and traffic separation schemes are marked by light buoys and beacons.

.3 The Master of the vessel did not prepare a voyage plan (passage plan) before commencing the voyage. Important information for safe navigation such as sailing direction, nautical charts, Marine Department Notices, navigation warnings for hazardous sea areas, weather conditions, etc, were not consulted before sailing.

.4 The track for the voyage was neither marked on ECS nor on paper charts. As shown in *Fig.7*, a previous track (shown in black) marked on the ECS indicated that the vessel had in previously voyage passed close to the Adamasta Rock NW Buoy. Compared the track of vessel at the time of accident (shown in pink) with the previous track, the vessel had moved on a track similar to the previous one but off-set to the south. As a result of such deviation, the vessel ran aground on the shoal.

.5 It is evident that, without proper voyage planning and effective monitoring of ship position during sailing at sea, the navigation officer might have lost his awareness of the dangers and mistakenly steered the vessel into the shoal.

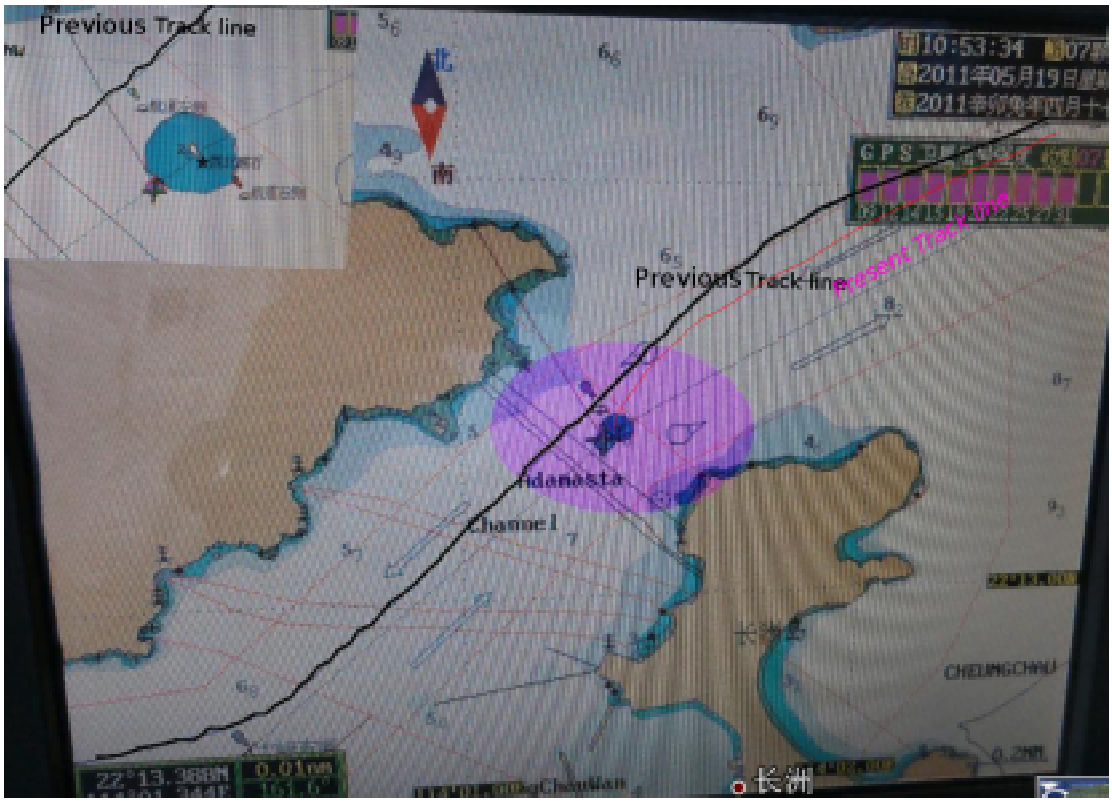

Fig.7- The previous and the present track lines showed on the ECS screen

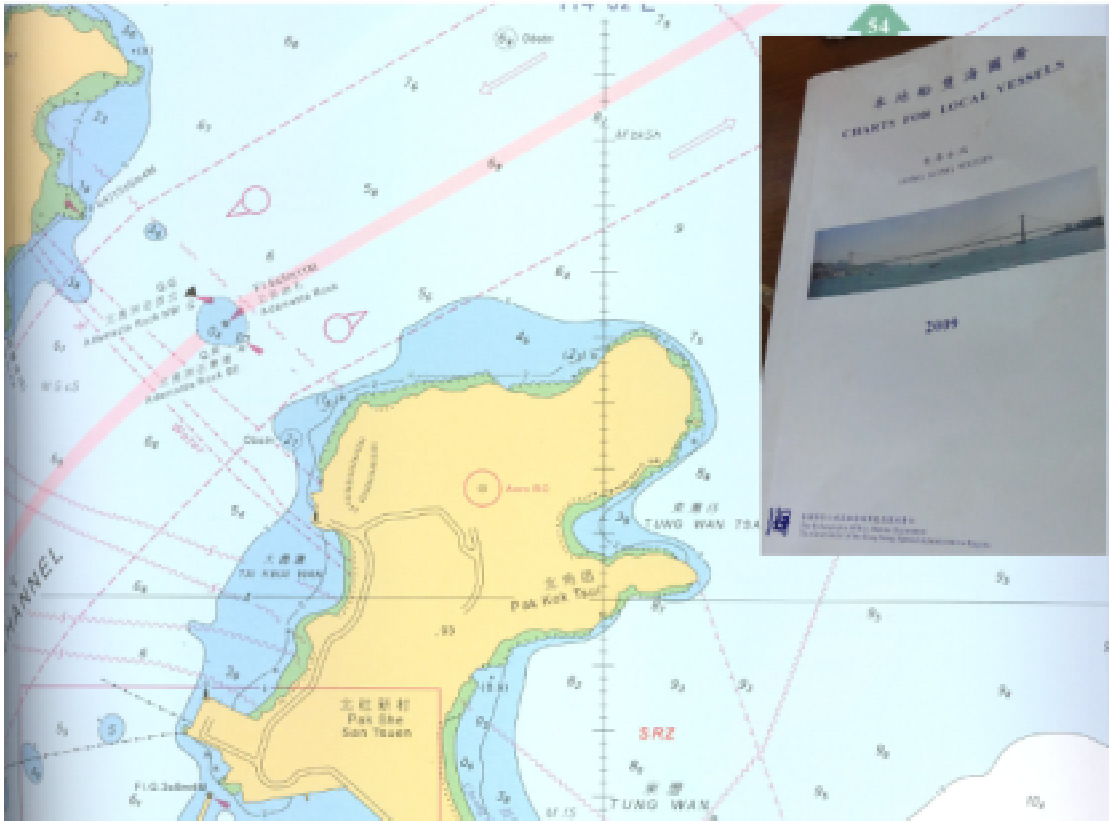

Fig.8 – Paper chart of Adamasta Channel published by Hong Kong Marine Department

5.11 Marks for the Adamasta Rock shoal

.1 The vessel was provided with one booklet of chart *(Fig.8)*- Charts for Local Vessels published in 2009 by the Hong Kong Marine Department. The North Cheung Chau Traffic Separation Scheme is clearly marked on the charts. The Adamasta Channel is the most critical passage in the Traffic Separation Scheme due to the presence of Adamasta Rock and its shoal in the middle of the channel.

.2 The Adamasta Rock is marked by one white concrete light tower - Adamasta Rock Light Fl.5s5m11M. According to the Sailing Direction NP30, the extents of the shoal are marked by two light buoys on the northwest and southeast, i.e. the Adamasta Rock NW light buoy *Q.G.(Quick Flash green light*) marks the northwest extent of the shoal, and the Adamasta Rock SE light buoy *Q.R.(Quick Flash red light)* marks the southeast extent of the shoal (*Paragraph 5.3*).

.3 These light buoys also mark the port side edge of each traffic lane when passing abeam of the Adamasta Rock. The water between the two light buoys is non-navigable water for commercial vessels. The Adamasta Rock NW light buoy is a port hand buoy on the southwest-bound traffic lane, while the Adamasta Rock SE light buoy is a port hand buoy on the northeast-bound traffic lane. Vessels sailing in the lanes should keep the light buoys on their port sides.

.4 The Chief Officer did not use the paper charts to monitor the position of ship during the voyage. Therefore, he was not able to realize the hazards that might have encountered during the passage of vessel in Hong Kong waters.

Fig.9- Electronic Charting System, Model: HR988, and Warning Notice for user

5.12 Electronic Charting System (ECS) *(Fig.9)*

.1 According to Regulation 7 of the "The Stipulation of Equipment Installation of ECS and AIS on Domestic Sailing Ships 國內航行船舶船載電子海圖系統和自動識別系統設備管理規定" of the national law of China, Electronic Charting System (ECS) and Automatic Identification System (AIS) equipments for use on domestic trading vessel shall be type approved by the flag Administration. In Regulation 20, it states that river-trade vessels can use the Electronic Illustrating Charting System for River Trade Vessel for reference only. Watch-keepers shall be mindful to the warning notices issued by the equipment manufacturer from time to time if the system is to be used.

Fig.10 –The display of Adamasta Rock with related light buoys on ECS.

.2 The ECS equipment installed on board Zhong Fu Fa Zhan did not include in the ship's certificate, and had not been assessed by the ship's Classification Society or Flag Administration. The ECS (model HR-988) was not a type-approved equipment by Classification Society or flag Administration and it had not been updated after installation. When the system is switched on, a warning notice will issued to prompt the users that the equipment is only to be used for reference and paper charts and other official navigational materials

should be used for navigation. Apparently, the warning notice was ignored by the watch-keeping officers of the vessel who solely relied on the ECS out of convenience.

.3 Depending on the scale selected for the display screen of ECS *(Fig.10)*, the showing of the Adamasta Rock NW light buoy and SE light buoy on the screen could be confusing to the navigation officers. When a small scale was selected, the Adamasta Rock and the shoal would show only one light beacon, and the marker buoys for the shoal could hardly be distinguishable on the screen. The individual marker buoy appears only when a larger scale is selected for the ECS display.

.4 Furthermore, the light buoys for marking the extent of the shoal were labeled incorrectly on the screen. The green Adamasta Rock NW light buoy with green light was named as Channel Port Side, and the red Adamasta Rock SE light buoy with red light was named as Channel Starboard Side. The equipment manufacturer might have interpreted the two light buoys incorrectly as the port and starboard hand buoys of a traffic lane.

.5 According to the Chief Officer, he used a small scale for display. Under such circumstance, the Adamasta rock and the two light buoys could only be shown as one light beacon on the ESC display screen.

5.13 Visual Lookout and Monitoring Ship's Position *(Fig.11)*

.1 According to the Master and Chief Officer of the vessel, they relied on the ECS and GPS for navigation and monitoring of ship's position in addition to visually look-outs. They did not use the radar for monitoring of ship's position.

.2 At about three minutes before the vessel ran aground, the Chief Officer saw the green light of Adamasta Rock NW light buoy about 12 degrees on port bow. This light signal was not displayed on the ECS display screen as a small scale for the display was selected.

.3 Reconstructing the track made by the vessel using the images recorded by the VTC radar shown that about two minutes before grounding of the vessel, she started to alter course and moved towards the shoal of the Adamasta Rock. At that moment, the Chief Officer reported the ship's position to VTC for the first time. In the absence of a reply from the VTC after the first call, the Chief Officer reported to VTC again when the vessel was very close to the shoal having the Adamasta Rock NW light buoy on her starboard side with a bearing of just

over 30 degrees. Apparently, the Chief Officer was not aware of the danger that the vessel was entering into the hazardous waters between the light buoys.

.4 After reporting to the VTC for the second time, the Chief Officer made entries into the ship's logbook. However, before doing so, he had spent some time searching for his fallen flashlight which was used for illuminating his writing in the logbook. For approximately 40 seconds, the vessel was unattended. Subsequently, the ship ran aground.

.5 It is evidence that the Chief Officer did not maintain a proper lookout and monitor the ship's position continuously. He was not aware that the vessel had already running off-track and was proceeding towards the shoal. He might have even mistakenly taken the green Adamasta Rock NW light buoy as a starboard hand lateral buoy. It is apparent that in the three minutes prior to the accident, he had taken no action to alter ship's course to avoid grounding of the vessel on the shoal. In the crucial moments, he was occupied by other duties (reporting of ship's position to the VTC, searching for his flashlight and making logbook entry) and that there was no watch-keeping AB in the bridge to assist him in the look-out.

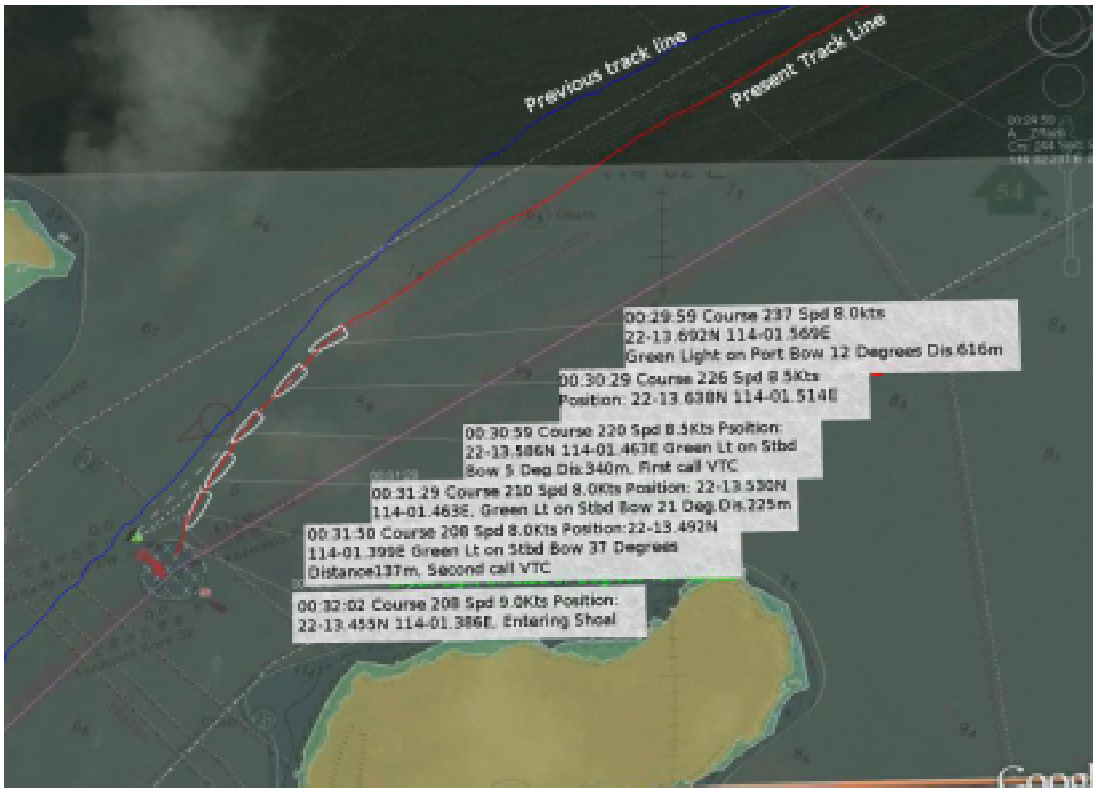

Fig.11 – The movement of ZFFZ running into grounding on the shoal of Adamasta Rock

5.14 Safety management on board

.1 The management company and master of ship should ensure that their ship is manned with the required number of qualified, certificated and medical fit seafarers in accordance with national requirements before sending the ship to sea. In this incident, Zhong Fu Fa Zhan was manned with the number of crew as stipulated in the minimum safe manning certificate issued for voyage less than 8 hours. However, the vessel was actually embarking on a voyage that last for more than 8 hours from Junk bay Hong Kong to Taishan, China on 7 May 2011 *(refer to paragraph 5.4)*. The Company and Master of the vessel did not comply with statutory requirement of the flag State.

.2 The vessel departed the loading berth in Hong Kong at 2220 on 7 May 2011 and had been sailing in the congested harbour of Hong Kong prior to the accident. The Master of the vessel was on watch alone after departure and was relieved by the Chief Officer at 0000 on 8 May 2011. There was only one navigational officer, without additional look-out, on the bridge, despite two ABs were provided on board. It appears that the shipboard management did not consider it necessary to post additional watch-keeper for visual look-out in the bridge even though sailing in congested waters during darkness. Prior to the accident, the Officer of the Watch's attention of conning the ship and carrying out look-out duty were distracted by performing of other duties. The accident could have been avoided should additional watch-keeping ratings be posted in the bridge so that he could assist and report to the Officer of the Watch about any imminent dangers facing the vessel. The Master of the vessel did not ensure safe navigation of vessel while sailing in congested waters.

.3 The Master and Chief Officer on board relied on an unreliable ECS for monitoring of ship position during sailing. The shipboard management failed to ensure the proper use of approved navigation equipment and nautical publications for safe navigation of the ship. The accident could have been avoided had all watch-keeping officers planned the voyage and made proper use of nautical publications and other reliable shipboard equipments instead to monitor the position of ship.

.4 There was no voyage planning for the voyage from Hong Kong to Taishan, China before ship sailing on 7 May 2011. The navigation officers just made reference to previous ship's track stored in the ECS and navigated the vessel according to their own experiences.

5.15 The buoyage arrangement in the Adamasta Rock area

.1 There are no other light buoys for marking the boundaries of both traffic lanes. The shoal is therefore marked by three lights to indicate that the waters in between are un-navigable, i.e. the Adamasta Rock white-colored light tower, the green Adamasta Rock NW light buoy and the red Adamasta SE light buoy. The navigable water is outside the buoys *(Fig.12)*.

.2 According to "Maritime Buoyage System and Other Aids to Navigation (MBS)" published in 2010 by the "International Association of Marine Aids to Navigation and Lighthouse Authorities" (IALA-AISM), the Lateral marks in Region A (Hong Kong included) adapts red and green colors by day and night to denote the port and starboard side of channel respectively. It means green to right and red to left when following the Direction of Buoyage System.

.3 The direction of buoyage in the Adamasta Channel is from southwest to northeast *(Fig.1)*. The red Adamasta Rock SE light buoy is a port hand lateral buoy marking the port edge of northeast-bound traffic lane of the channel. However, the green Adamasta Rock NW light buoy becomes a port hand lateral buoy marking the port edge of southwest-bound traffic lane of the channel against the direction of buoyage system.

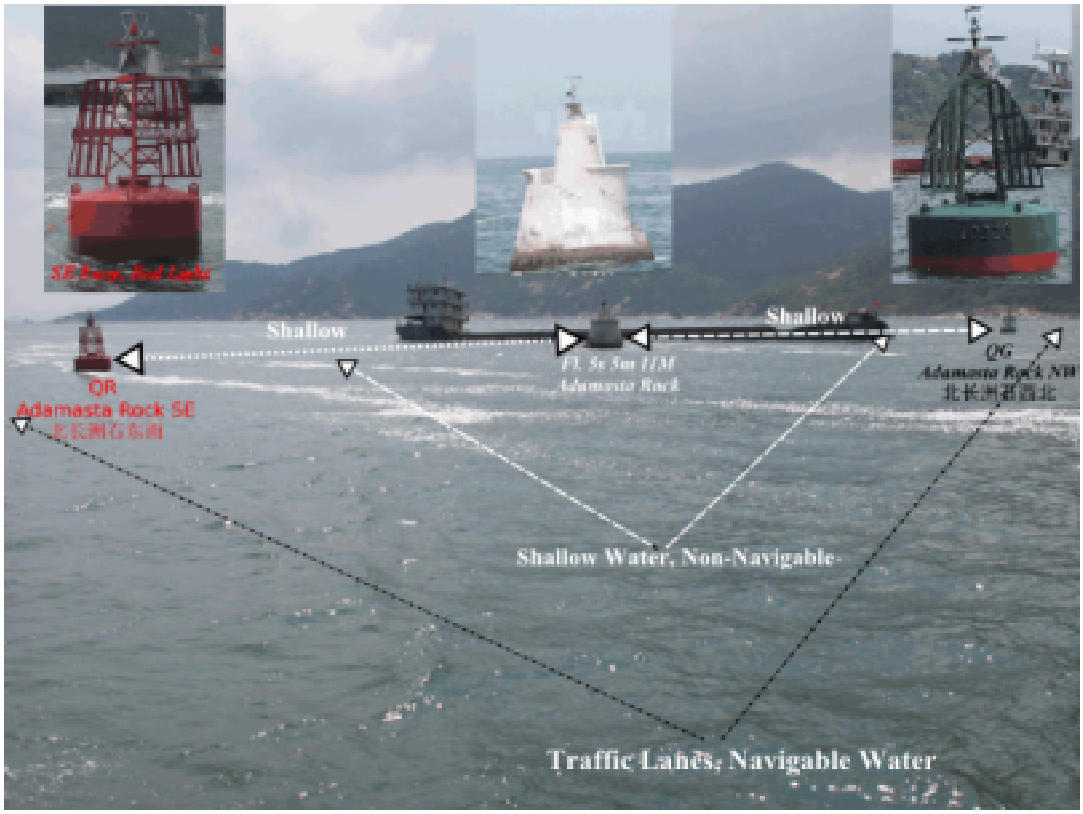

Fig.12 – The buoyage arrangement in Adamasta Rock, view from north

.4 According to the Sailing Direction NP 30, it indicates that the two port hand lateral buoys (i.e. Adamasta Rock NW and SE light buoys) mark the northwest and southeast

extent of the Adamasta Rock. It implies that the two lateral buoys marking the NW and SE extent of Adamasta Rock shoal also mark the port side edge of both traffic lanes and the area in between the two buoys is non-navigable.

.5 It may not be easy for navigation officers new to the area to understand and interpret the lateral buoys and the buoyage arrangement correctly in the vicinity of Adamasta Rock. In this accident, the vessel was navigating towards the shoal between the Adamasta Rock NW light buoy (Green) and Adamasta Rock light tower (White) *(Fig.13)*. The Chief Officer stated that he did not understand the conventional buoyage direction and the direction of buoyage system changes at the point of Lantau SE buoy. The Chief Officer might have visually observed the green light buoy (Adamasta Rock NW) as a starboard hand lateral mark and mistakenly steered the vessel into the shoal.

5.16 Similar Incident

.1 One similar incident happened at 1345 on 29 January 2010, a Chinese registered river-trading cargo vessel ran aground on the shoal of the Adamasta Rock.

.2 At the time of the accident, the weather was fine with good visibility. The vessel was also en-route from Junk Bay to Taishan, China. The vessel's track as recorded by VTC radar *(Fig.14)* showed that she was navigating towards the shoal at a steady course.

.3 It is noted that in both incidents, the vessels were proceeding along the southwest-bound traffic lane on the Traffic Separation Scheme with the green Adamasta NW light buoy on their starboard side and subsequently ran aground on the shoal.

.4 Many vessels, mainly local licensed vessels and high-speed passenger ferries, are using the Adamasta Channel every day. These seasoned masters and coxswains are well aware of the dangers in the Adamasta Channel. However, for watchkeeping deck officers who are not familiar with the waters there, they might not be familiar with the lateral buoys and the buoyage arrangement in the vicinity of the Adamasta Rock thereby increases the risk of running the vessel aground on the shoal.

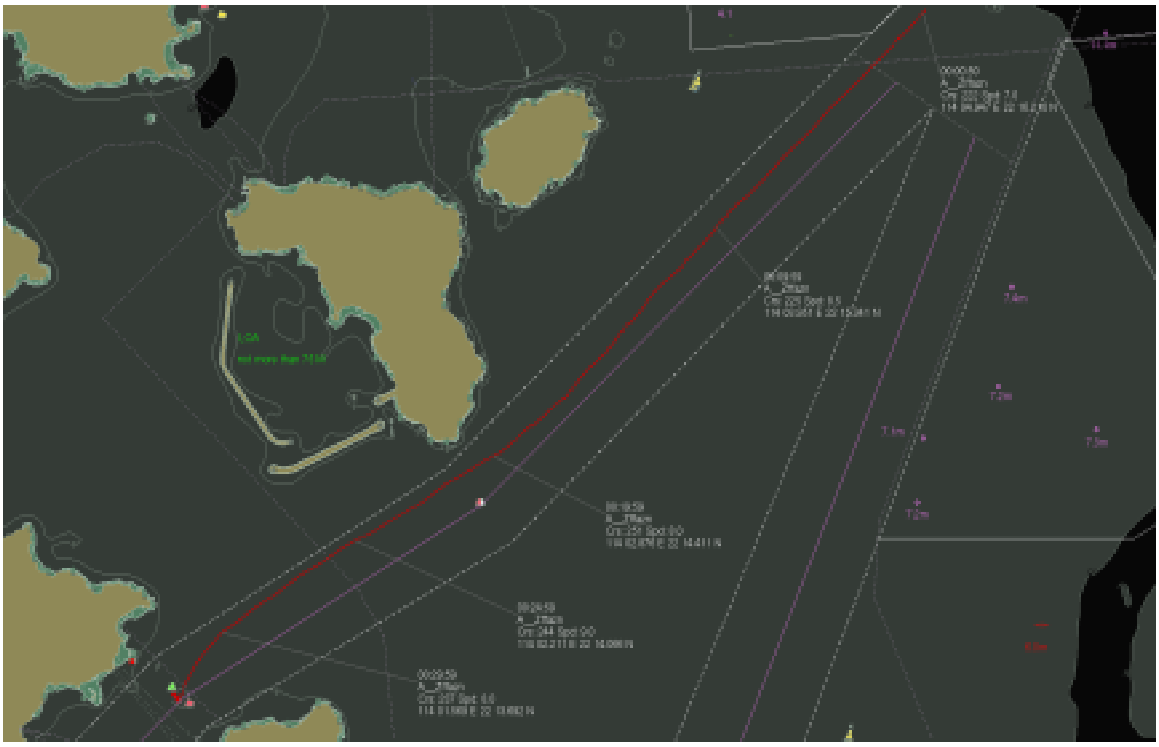

Fig.13-The VTC radar record of Zhong Fu Fa Zhan grounded at 0033 on 8 May 2011

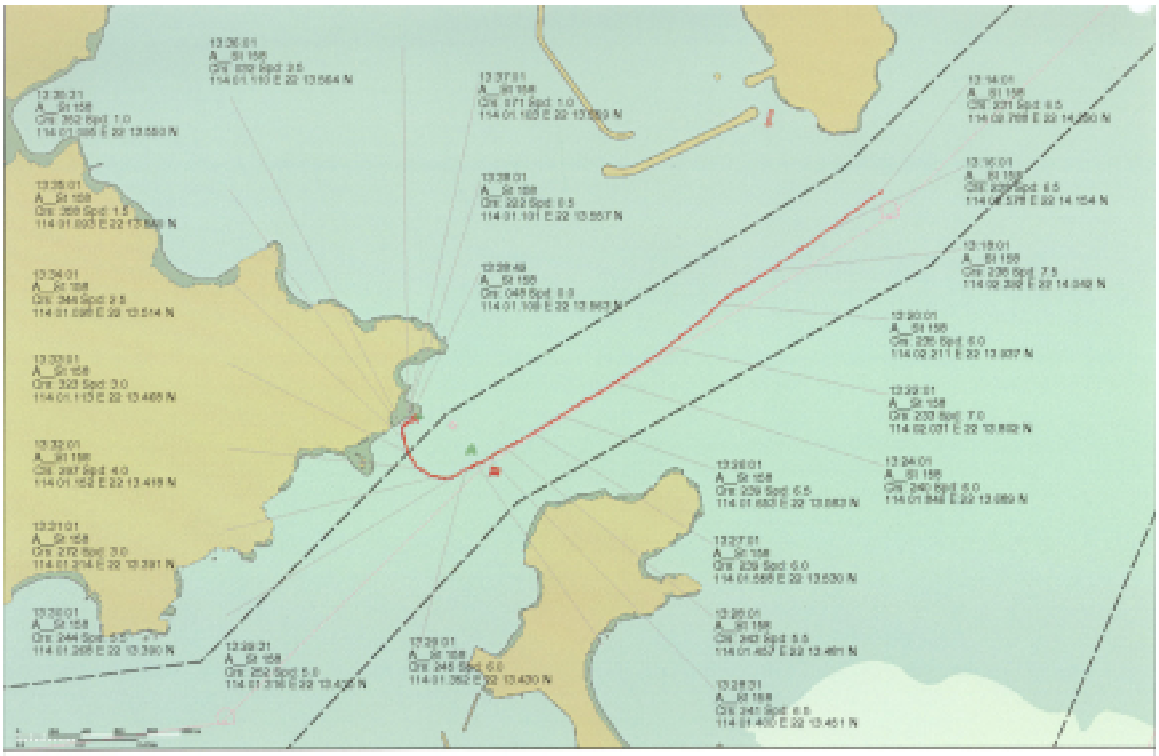

Fig.14-The VTC radar record of Shi Tai 158 grounded at 1345 on 29 Jan.2010

6. Conclusion

6.1 At 2220 on 7 May 2011, the Chinese registered river-trade cargo vessel Zhong Fu Fa Zhan departed the loading berth at Tseung Kwan O in Hong Kong after loaded a cargo of 2,200 tonnes of soil for discharge in Taishan, China. The weather was fine and the visibility was good. The navigation equipment and main engines were in normal working condition.

6.2 The Master was on duty alone in the bridge after departure. The Chief Officer took over the watch from the Master at 0000 on 8 May 2011, also alone at the bridge.

6.3 At about 0031 and 0032 on 8 May 2011, the Chief Officer made a report to VTC by radio. About 40 seconds later, the ship ran aground on the shoal of Adamasta Rock in North Cheung Chau Traffic Separation Scheme while the Chief Officer was making entries into the ship log book. The vessel hit the underwater rock in the middle of the shoal, giving off a big banging sound and causing severe ship vibration. The cargo hold was staved and seawater entered into the cargo hold. The vessel finally stopped and grounded firmly on the southwestern edge of the shoal at position 22°13.39′N 114°01.34′E.

6.4 All the seven crewmembers on board were rescued without injuries. There was no oil pollution to the water. The vessel sustained severe hull damage at the bottom in way of the cargo hold and was salvaged a few weeks later.

6.5 The investigation revealed that the following were the main contributing factors to the accident:

- The Master of the vessel did not carry out proper voyage planning, using charts, nautical publications and all available information, for the safe passage of his vessel;
- The Master and the Chief Officer did not request for additional watch-keeping ratings to assist in look-out duty while the vessel was sailing in congested water and in the Traffic Separation Scheme;
- The Master and the Chief Officer relied solely on an unreliable Electronic Charting System on board for monitoring of ship position during sailing; and
- Prior to the accident, the Officer's attention on conning the vessel was distracted by making vessel's position reports to Marine Department and making entries into ship's log book.

6.6 The investigation into the accident reveals the following safety factors:

- The manning of the vessel for the voyage from Hong Kong to Taishan, China did not comply with the requirement of the flag State (Ref: 5.4.4);
- The Chief Officer was not familiar with the conventional direction of buoyage system (Ref: 5.4.6);
- The Chief Officer may not be familiar with the green Adamasta Rock NW buoy and the red Adamasta Rock SE buoy as the port hand lateral buoys of the channels (Ref: 5.4.6); and
- The vessel was overloaded on her departure from Hong Kong (Ref: 5.9).

7. Recommendations

7.1 A copy of the investigation report into the accident should be sent to the following parties informing them of the findings of this accident investigation:

- the management company, the Master and the Chief Officer of Zhong Fu Fa Zhan; and
- the Maritime Safety Administration of China.

7.2 The management company is required to ensure that the master of Zhong Fu Fa Zhan:

- to carry out proper voyage planning for safe passage of the vessel before sailing, using charts, nautical publications and all available information;
- to provide additional watch-keeping ratings to assist in look-out duty on considering the prevailing circumstances; and
- to instruct all navigational officer to make proper use of paper charts, GPS and radar for monitoring ship position.

7.3 A copy of the report should be provided to the Planning and Service Division of Marine Department for information, particularly to the discussion in paragraph 5.15 & 5.16 of the report.

8. Submissions

8.1 In the event that the conduct of any person or organization is criticized in an accident investigation report, it is the policy of the MD that a copy of the draft report is given to that person or organization so that they can have an opportunity to rebut the criticism or offer evidence not previously available to the investigating officer.

8.2 Copy of the draft report was sent to the management company, the Master and the Chief Officer of Zhong Fu Fa Zhan for their comment.

8.3 Copy of the draft report was also provided to the following interested parties for their information and comment:

- The Maritime Safety Administration (MSA) of the Republic of China;
- The Planning and Service Division of Marine Department;
- The Vessel Traffic Section of Marine Department;
- The Hydrographic Office of Marine Department.

8.4 A submission was received from MSA China, and the report was amended as appropriate.