

附件 1



The safety investigation report into the Grounding
Accident of

MV Shen Neng 1

on Douglas Shoal, Queensland
on 3 April 2010

Maritime Safety Administration, P.R.China

www.msa.gov.cn

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1. SUMMARY

1.1 Outline of the Accident

At about 1705 on 3rd April 2010, the China registered bulk carrier *ShenNeng 1* grounded on the Entry Prohibited Area of the Great Barrier Reef Marine Park, Douglas Shoal, Queensland (AP 23°06'S/ 151°39.6'E). The ship was owned by Shenzhen Energy Transport, and managed by Tosco Keymax International Ship Management Company. At the time of the accident, the ship was loaded with a cargo of about 68,052 tons of coal and departed for Bayuquan port of China. The ship's bottom was damaged with a small amount of fuel oil leakage. Some amount of coral reef was damaged without casualty, and the direct economic loss is unspecified.

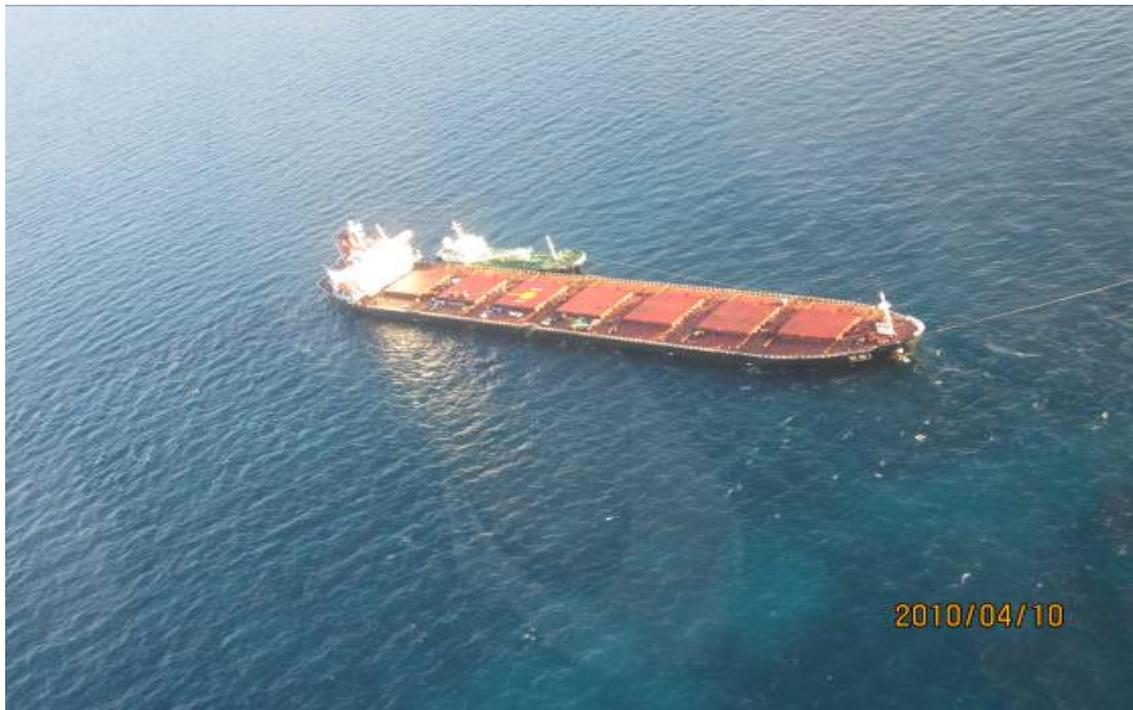


Figure 1: *ShenNeng 1* agrounded on Douglas Shoal

1.2 Investigation into the Accident

As authority of the flag state of *ShenNeng 1*, China Maritime Safety Administration dispatched two investigators to Australia for the accident. They arrived at Brisbane Airport on 16th April LT and boarded *ShenNeng 1*, which is 40 miles away from Douglas City, via helicopter on 17th and started the investigation immediately. They interviewed the master, the chief mate, the second mate and the seaman on watch at the time of the accident. The investigators checked the ship's damage, and it was found that the port double bottom water ballast tanks and NO. 3 and NO.5

starboard water ballast tanks were flooded and sea water was found in NO.4 cargo hold. The salvage equipment was kept running, pumping air into ballast tanks through air hole, to keep the ship float. The Investigators kept copies of the certifications of *ShenNeng 1*, and some other relevant records and documents. They also collect some physical evidence and news reports about the accident from local Medias besides an AIS record and 10 on-site checking records.

1.3 Glossary of Abbreviations and Acronyms

AIS	-	Automatic Identification System
VHF	-	Very High Frequency
GPS	-	Global Positioning System
NAVTEX-	-	Navigational Telex
FSC	-	Flag State Control
CCS	-	China Classification Society
AMSA	-	Australian Maritime Safety Authority
DSC	-	Digital Selective Calling
SMC	-	Safety Management Certificate
STCW	-	Standards of Training, Certification and Watchkeeping
DSA	-	Dangerous Sailing Area

2. SHIP, CREW AND OWNER

2.1 *ShenNeng 1*

2.1.1 Particulars

Name	:	<i>ShenNeng 1</i>
Port of Registry	:	Shenzhen, China
Call sign	:	BXAN
IMO Number	:	9040871
Ship Type	:	Bulk carrier
Length overall	:	225.00 m
Moulded breadth	:	32.26 m
Moulded depth	:	18.354 m
Gross tonnage	:	36,575
Net tonnage	:	23,279
Builder	:	Japan
Date built	:	06-02-1993
Engine power	:	9,450kw
Owners	:	Shenzhen Energy Transport, China

Address : Room 2-5,19thFloor, East Build 2, Middle Shennan Road, Futian district, Shenzhen, China
Ship manager :Tosco Keymax International Ship Management Company, China

2.1.2 Safety Management Certificate

ShenNeng 1's Document of Compliance (ID:BJ078706) was issued on 3rd July 2007 and would be expired on 15th June 2012.

2.1.3 Flag State Control

The latest FSC for *ShenNeng 1* was done on 22nd June 2009 at Shenzhen Port; six deficiencies were found and all of them were corrected on 23rd June with a review.

2.1.4 Bridge Equipment

Name	Model	Remark
Radar No.1	FURUNO FAR-2827	malfunction
Radar No.2	JRC RAAS4NM9-25KPON-35	
AIS	SAILOR KDU1905	
NAVTEX	NCR300A/JRC	
VHF/DSC	JHS-31	
GPS NO.1	RAYTHEON NAV398	
GPS NO.2	FURUNO GP-80	

2.1.5 Fuel Oil on Board

There were 978 tons of bunker fuel oil and 154 tons of diesel oil on board when the accident happened.

2.1.6 Insurance

.1 Hull Insurance

The insurer : Chinese insurance
Insurance value : 329,000,000RMB
Period of insurance : From 01-01-2010 to 12-31-2010
Issue Date : 01-04-2010

.2 Shipowners' Liability Insurance

The insurer : THE LONDON STEAM-SHIP OWNERS' MUTUAL INSURANCE ASSOCIATION LTD.

Period of insurance : 02-20-2010 to 02-20-2011

Issue Date : 01-26-2010

All the certificates of *ShenNeng 1* are within the period of validity.

2.2 Manning

At the time of the accident, *ShenNeng 1* had a crew of 23 Chinese seafarers who held qualifications for their positions in accordance with international requirements. The deck officers were comprised by the master and three mates. While at sea, at anchor and in port, the mates maintained a traditional watch keeping routine of 4 hours on and 8 hours off. In port, the chief mate worked additional hours as required for cargo operations.

The master was 48 years old with 24 years of seagoing experience and had been a master for 7 years. He joined *ShenNeng 1* six months before the grounding. He had visited Webb in November 2009, and this was his second visit to Austria.

The chief mate was 46 years old with 20 years of seagoing experience, the last 11 years as a mate in charge of navigation watches and 3 years chief mate experience. *ShenNeng 1* was his fourth ship as chief mate. He joined *ShenNeng 1* one month before the grounding.

The second mate had served on board for 12 years, *ShenNeng 1* was his second ship as second mate and he had been on board this ship for about 4 months.

2.3 Owner and Ship Manager

2.3.1 Owner

Shenzhen Energy Transport Co., Ltd, which was founded in September 1994, is fully controlled by Shenzhen Energy Group Co., Ltd. Its main business covers waterway transportation cargo agency, including fuel, raw materials and equipment for energy project; domestic general cargo coastal shipping transportation and international general cargo shipping transportation. At the time of the accident, the company was mainly engaged in bulk transportation and operated a fleet of two bulk carriers with 70000 DWT respectively. Shenzhen Energy Transport Co., Ltd is located in Futian District of Shenzhen city, China.

2.3.2 Ship Manager

2.3.2.1 Overview

Tosco Keymax International Ship Management Co., Ltd was incorporated in Tanggu, Tianjin in June, 2006. The company is a Sino-Japanese joint venture which is formed by COSCO Bulk Carrier Co., Ltd with the Japanese KEYMAX Company by way of capital enlarging and shareholders reorganizing of Tianjin Ocean Ships Operation Co., Ltd.

The main business includes seamen recruiting, training and dispatching; ship management; ship agency; ship-building supervision; ship sale& purchase; ship's technical and safety management; ship repair; other business for maintaining normal technical and sailing condition.

The company's Ship Management Department was composed of two groups with 2 managers and 8 qualified chief engineers as maintenance superintendents. At the time of the accident, the company actually managed a total of 30 vessels, including 9 China flagged vessels, 9 Hong Kong and 12 Panama flagged vessels.

2.3.2.2 The Management

Ships were operated by the Management Department individually, the manager and the technical superintendents boarded for inspection from time to time. Most of the work of the Safety Supervision Department was fulfilled directly by the Designated Person (DP) while the manager was mainly responsible for SMS supervision. The responsibility of DP's ship safety management was not clearly stated in SMS Manual.

At the time of the accident, there were 2 safety inspectors in Safety Supervision Department but one of them had not yet established a contractual labor relationship with the company required by the domestic law; they boarded for inspection from time to time before the accident. It was found that:

- It is recorded on *ShenNeng 1*'s crew competency assessment report released in the second half of 2009 that "the chief mate Mr.Lingzhixin is weak in safety management" and "some officers and engineers are weak in oral English". The chief mate had been replaced consequently, but no evidence was found that corresponding trainings had been proposed and proceeded, according to the requirements by "analysis of the records of crew training and education" of SMS.
- The stability report of *ShenNeng 1* was not kept by the ship manager, and the loading booklet which was listed was not found by an on-site inspection. That was inconsistent with the requirements by "when the hull and structural damage occurs, the ship drawings, including stability report, should be referred by the company's emergency response team" from section 4.3.1 of "The Emergency Response Procedures" of SMS.
- The internal audit report and the effectiveness assessment report in 2009, which should be issued to the fleet, were not kept by the ship manage department. Therefore, the responsible stuff from the ship manage department could not be ensured to make proper corrections to the deficiencies timely.

- *ShenNeng Iran* aground on Douglas Shoal, Queensland on 3rd April, 2010. The chief mate had been working continuously when loading in Australia without a minimum of 10 hours' rest in a 24-hour period. Similar deficiencies were also found from other ships managed by the company.

2.3.2.3 Emergency Response

It was found that the company took a proper response on receiving the report into the grounding of *ShenNeng 1*. Steps of the emergency response from initiating actions in the emergency plan, reporting the accident to the legal agency, informing relevant parties, communicating with Australian authorities, recording the emergency actions, were executed in accordance with the requirements of SMS.

3. POLLUTION AND DAMAGES TO THE CORAL REEFS

A small amount of fuel oil leakage was found off *ShenNeng 1* on 4th April, and according to the pictures taken underwater on 11th April, it was found that the bottom of the vessel and some amount of coral reef were damaged.

4. ENVIRONMENTAL CONDITIONS

4.1 Weather

At the time of the accident, it was sunny and a little cloudy with good visibility.

4.2 Sea Conditions

Southeast winds 3 ~ 4, with slight sea.

4.3 Navigational Area

Routes departing from Gladstone were determined principally by ships' destinations and draughts. Ships with draughts less than 12.2 meters intending to transit the Torres Strait usually follow the Queensland coast northwards along the Inner Route of the GBR. Different from other areas, pilotage is compulsory in the waterways north of Cairns; many other ships departing Gladstone exit the GBR near the port and then set a course towards their destinations. The GBR area off Gladstone can be safely navigated by using the general use zone and DSAs between the islands, reefs and shoals. This area has enough breadth and depth. The limits of the Great Barrier Reef

Marine Park and other Entry Prohibited Area are clearly marked on charts.

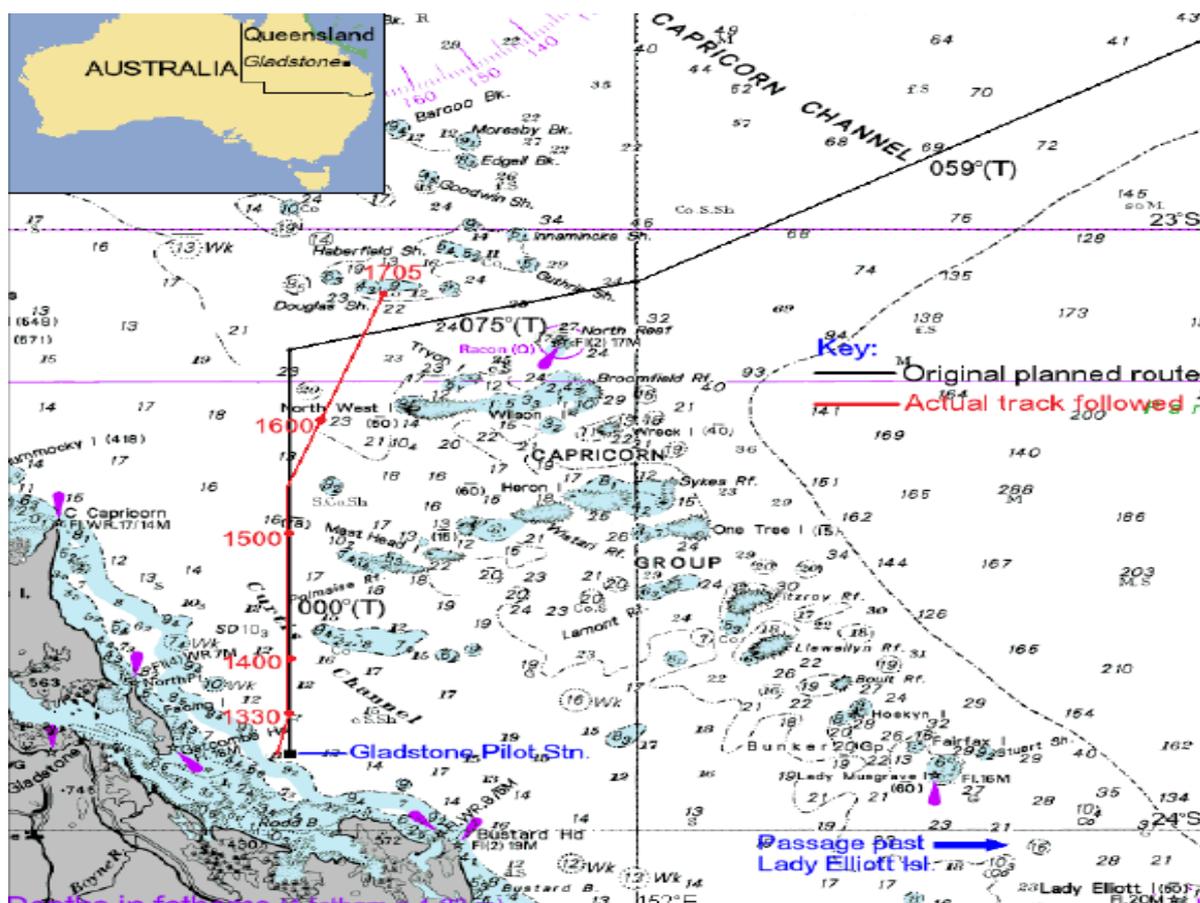


Figure 2: Chart Aus 426

One of the regularly used shipping routes is to pass through Lady Elliott Island which equipped with navigation light, east-southeast of Gladstone. Another navigable passage, which *ShenNeng 1* chose to go through, is through the passage to the north of the Capricorn Group, and it is estimated that 1/3 of the ships inbound will use this passage. *ShenNeng 1* planned to follow the reciprocal courses of those used on the inbound passage when departure.

5. THE INCIDENT

The below-listed view of the incident was based on statements by the duty officers of *ShenNeng 1*, the track of AIS, record of the Log Book and so on in relation to the grounding. Unless additional explanation, all the time mentioned in this report is local time of the Eastern of Australia.

On 9th March 2010, *ShenNeng 1* left the anchorage of Qin Huangdao for Yosu, South Korea for bunkering. After a 13 day's voyage, she anchored in the anchorage off the port of Gladstone, Australia waiting for berth scheduled on 24 March 2010.

On 1st April, the chief mate spent the whole day preparing the ship's cargo stowage plan and other maritime affairs. He didn't go back to his accommodation for rest until 0100 on the next day.

At about 0300 on 2nd April, the chief mate went to the forecandle to supervise the crew weighing anchor.

By 0320, the anchor was aweigh. The master turned the ship and navigated it towards the pilot boarding ground.

At about 0400, the chief mate relieved the second mate on the bridge.

At 0410, a pilot boarded *ShenNeng 1* via a pilot boat.

At about 0600, the crew made the tugs fast. The third mate relieved the chief mate on the bridge, who then went to the forecastle. The second mate went to his usual station aft.

By 0720, *ShenNeng 1* was all fast; the chief mate checked the draught with the draft surveyor from the harbor.

At 0820, loading started and the chief mate supervised loading and de-ballasting operations.

At about 0100 on 3rd April, the second mate replaced the chief mate to supervise the operations and the chief mate went back to his cabin for sleep.

At about 0300, the chief mate was wakened and resumes his duty to adjust and check the draught with the draft surveyor from the harbor.

At 0540, the chief mate checked the final loading of *ShenNeng 1*. The ship was loaded with 68,052 tons of coal with her draughts 13.29m forward and 13.38m aft. After loading, the ship's crew carried out their routine duties for departure.

At 0900, the chief mate went for breakfast, and returned to continue the paperwork preparation for departure and cargo.

At about 1035, a harbor pilot went on board for departure.

By 1043, the tugs had been made fast.

At 1054, the ship departed the berth.

At about 1115, the chief mate came back from the forecastle to have lunch, and then went back to his cabin to rest.

By 1200, the second mate relieved the third mate on the bridge.

At about 1306, the pilot disembarked.

At 1330, *ShenNeng 1*'s speed was fixed with the course 000, auto-pilot. The visibility was good. GPS, AIS, VHF and starboard side Radar all switched on, CH 16 on watch.

Shortly afterwards, the second mate suggested the master whether he could amend the track to economize voyage, and he explained his new plan to the master. With the master's permission, he laid a new course line of 020 on the chart, and the new track of 020 would be parallel to, and about 3 miles from, the DSA limit off North West Island.

By 1400, the master handed over the conduct of the ship to the second mate and left the bridge. The second mate coned the vessel with a duty seaman, and made *ShenNeng 1* a speed of about 12 knots. The second mate had the vessel positioned with GPS.

At 1530, the second mate altered course to 020, but he didn't enter the new amended waypoints coordinates in GPS unit. Soon afterwards, the GPS cross track error (XTE) alarm sounded. The second mate cancelled the alarm manually.

At about 1530, the chief mate was waked by an alarm clock after about two hours' short break.

At about 1550, the chief mate approached to the bridge to replace the second mate. The second mate explained the changes to the passage plan to the chief mate. At 1600, the second mate fixed *ShenNeng 1*'s position on chart and handed the watch over to the chief mate. He then left the bridge.

At about 1600, the chief mate checked the new track and found the North West Island and the other dangers in the area to be avoided. The ship was still on the amended track on Chart Aus 819.

At about 1630, the chief engineer go upstairs to the bridge, he checked the Rotation Speed of the main engine and asked for the ship's speed.

At about 1635, the chief engineer left the bridge. The chief mate decided to fix the ship's position at 1700.

At about 1700, the duty seaman noticed the ship's GPS position (23°06'.0S /151°39'.2E) was not on Chart Aus 819.

At about 1701, as the duty seaman was taking out the next chart from the chart table drawer, the ship shook suddenly and the speed decreased sharply.

At about 1702, the chief mate immediately ordered the duty seaman to alter course to starboard. However, the ship's speed rapidly decreased.

At about 1703, the starboard helm came no effect, the ship began to shudder and soon the ship's speed decreased to zero.

By 1705, *ShenNeng 1* grounded on Douglas Shoal with a heading of 020. GPS indicated the position was APPROX.23° 06'.0S/ 151° 39'.6E. It was read from the chart a depth of 10.7m where the seabed is composed of coarse sand, shells and coral. The Tide Table of Tryon island where was near to *ShenNeng 1*'s position indicated that it was 0.8m which was almost low tide at Douglas Shoal, and the next high tide would be 2.8m at 0002 on 4th April.

6. SEARCH AND RESCUE

At about 1706, the chief mate telephoned the master, requiring him to come to the bridge. The master hurried to the bridge, and ordered the ship's position fixed by the chief mate.

At about 1710, the chief engineer and the second mate arrived on the bridge. The GPS position confirmed that *ShenNeng 1* had already been grounded. The master then ordered to stop engine immediately, and sent the chief mate forward to let go an anchor. He also ordered all tanks sounded and water depths around the ship checked.

At 1730, the starboard anchor was let go and 2 shackles of anchor cable put in the water. Tank soundings revealed that *ShenNeng 1*'s hull was damaged. NO.3 port double bottom water ballast tank was flooded and there was water ingress into other water ballast tanks on the port side. The master informed the ship's managers.

At 1840, the master reported the grounding to the Australian Maritime Safety Authority (AMSA). AMSA made necessary notifications to various parties. The Gladstone regional harbor master (RHM) started an emergency response immediately by establishing an incident control center and making arrangements for rescue.

Over the next few hours, RHM made the necessary arrangements for the supply of aircraft, pollution response equipment and personnel.

By 2330, a suitable night operation helicopter left for *ShenNeng 1*'s location with AMSA casualty coordinators on board.

During the night, *ShenNeng 1*'s heading changed as the ship moved with the higher tide. However, it still remained aground.

At about 0545 on 4th April, a fixed-wing aircraft and some other equipment were deployed to spray oil spill dispersant in the area around the ship. A water police vessel and a Maritime Safety Queensland (MSQ) survey vessel arrived at the ship's location to monitor the situation and assist

the emergency response. A tug from Gladstone and another from Brisbane were arranged to proceed to the ship's location.

Later on 4th April, a team from Svitzer Salvage Australasia, who had been appointed as salvors, boarded *ShenNeng 1* via helicopter. Over the following days, the salvage team assessed the damage and began planning for the salvage operation.

At 1948 on 12th April, *ShenNeng 1* refloated. The ship was towed to a location near Great Keppel Island to anchor.

At 0848 on 13th April, *ShenNeng 1* anchored at the reserved area where allowed the salvors to further assess the damage.

7. ANALYSIS

7.1 Unsafe Act

After the chief mate took over the watch, he failed to verify neither the ship's speed nor the wind and sea flow conditions and their effects to ship's speed and course carefully. Although he examined the amended route on the chart, he didn't check up the exact position and time of the waypoint. Furthermore, even after 30 minutes' voyage, he still did not verify the factors mentioned above or the position of the ship for the preparation of turning. Consequently, the ship moved off the turning point and ran aground on Douglas Shoal.

After the handover, the chief mate failed to fully check the navigational areas and circumstances expected to be encountered during his watch, and he did not pay sufficient attention to the dangerous reef areas of Australia.

7.2 Unsafe Factors

- Insufficient analysis to the safety of navigation when temporary amendment was made to the passage plan and routes. Ship's passage plan is usually made by the second mate and approved by the master. The master needs to review the plan carefully and highlight the shallow reefs or points, narrow waterways and traffic dense areas which should be specially reminded to watch officers. Meanwhile, he should remind his crewmembers of the risks during the ship's voyage. When the passage plan was amended before the accident, neither analysis was made into the risk of grounding by directly sailing to the shoals, nor the chief mate was reminded to pay due attention to the potential dangers.
- Overlap between two Australian charts is comparatively smaller, comparing with Chinese Chart crew usually used. Evidence showed that the chief mate was not quite accustomed to the chart in Australia version, and when the duty seaman (cadet) found the ship's position was not on the chart, it was too late. The ship had already advanced to the shoals.
- The amended waypoint was not inputted into the ship's GPS unit, and the chief mate was not informed of that there would be no arrival alarm of the new waypoint from GPS. When the voyage plan was approved by the master, the second mate should be dictated to input all the

waypoints information to GPS. In that way, the GPS unit can provide an independent route monitoring capability, including warning the watchkeeper when the ship approaching a waypoint. It is convenient to enter the waypoint to the GPS, but the second mate did not follow the rules as mentioned above. Although the alarm of GPS unit cannot relieve the responsibility of the duty officers for safe navigation, it can be applied as an additional barrier to stop the accident.

- According to SMS requirements, ship's position should be fixed every 30 minutes when coastal navigation. While navigated at sea, the interval should be one hour and one quarter in port. The chief mate planned to fix the ship's position at 1630. However, it was interrupted by the visit of the chief engineer. At about 1630, the chief engineer came to the bridge, checked the rotation speed of the main engine (83 rpm). And it was confirmed that the ship's speed was about 12 knots by the chief officer near the starboard radar. At about 1635, the chief engineer left the bridge, but the interruption had prevented the chief mate from fixing the ship's position as he planned. So he decided that he would fix the ship's position at 1700. When sailing in archipelagic water area, the watch officer should monitor the position continuously.
- The chief mate of *ShenNeng1* took rest less than 10 hours in the preceding 72 hours before the accident. In such an extreme fatigue situation, the chief mate's performance was affected. As a result, he neglected some normal but important tasks as an officer on watch (OOW), and it affected him on maintaining proper performance of his duties.

8. OTHER FINDINGS CONTRIBUTED TO THE ACCIDENT

8.1 Ship's Management

- Deficiency in SMS Manual. The master should review the new plan carefully, and remind his crewmembers of the risks aroused by route changes. It is of equal necessity to input the new waypoint into GPS unit when the voyage plan amended. And the lack of above requirements of amended ship's voyage plan into the ship's SMS Manual is one of the safety factors in this accident.
- Bridge management. Watch handover is of particularly importance in Bridge Management. The specific details should not only be written into SMS documents, but also have their proper supervising or inspection requirements to have the OOW properly implemented. Prior to taking over the watch, that the relieving officer need to be fully aware of the tasks should be recorded into SMS documents.
- Fatigue of the duty officer. It is stated in STCW Convention that watchkeeping personnel should be provided with enough rest periods. Although the master is fully aware of chief officer's fatigue problem, he did not take any effective measures to relieve the chief officer. And such measures should be written into SMS documents.

8.2 Ship Manager

- Overtime working of the crewmembers. Survey of the ship manager reveals that it is a common phenomenon that their staffs on board work overtime, and the issue is not covered by the SMS documents. However, such problems failed to arouse the safety supervision manager's attention. After the accident, the overtime working problem still existed.
- After the initial capacity assessment, there is no sufficient training, re-education and assessment for the crewmembers of the company. Furthermore, the internal management of the company is not strict enough, which eventually leads to poor supervision of its ships.

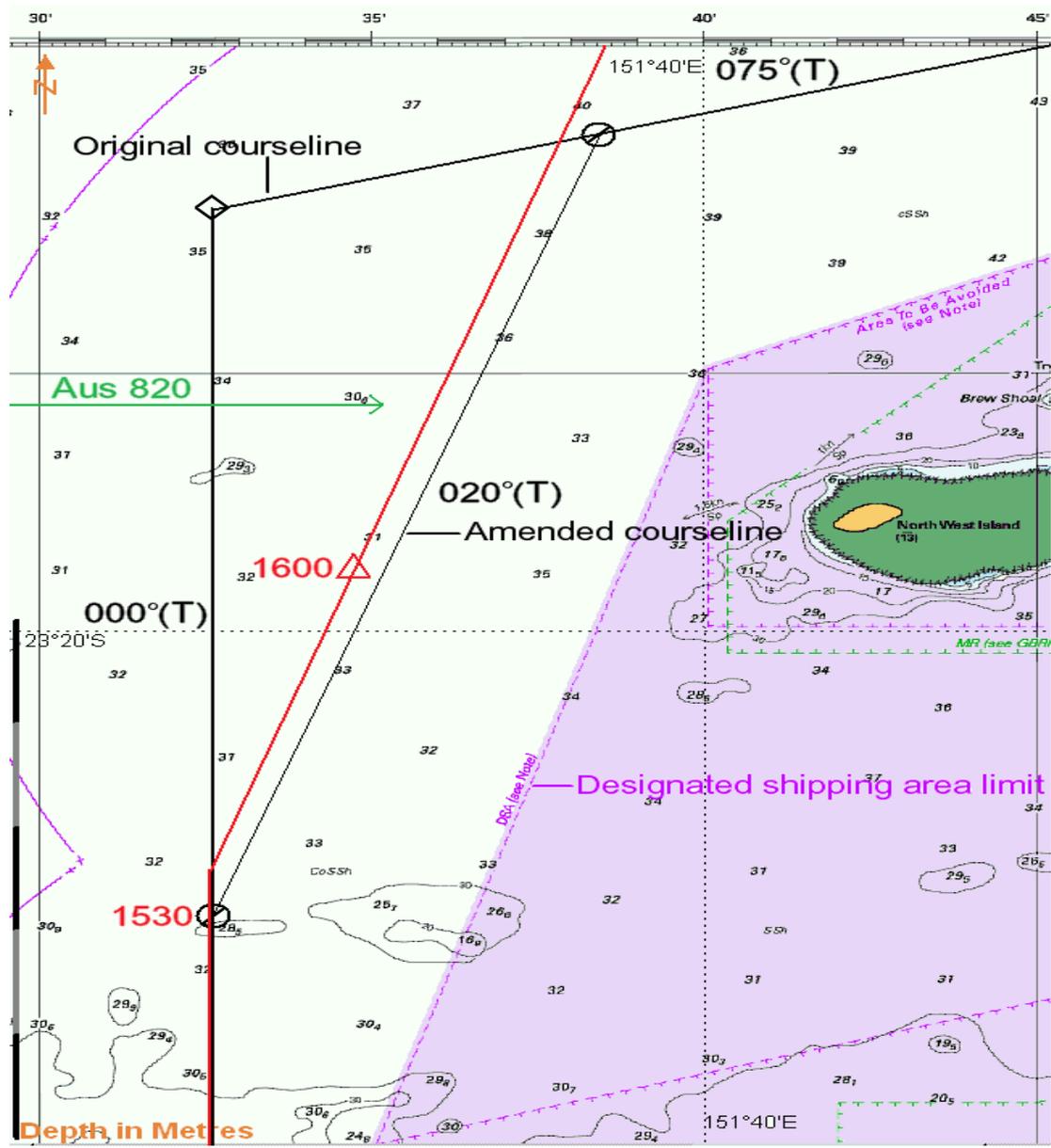
8.3 Crew Competency

It is found that the competency and proficiency of the chief mate of *ShenNeng 1* need to be improved, similar deficiencies were also found in the company's internal audit.

9. RECOMMENDATIONS

Lessons should be learned from the grounding accident of *ShenNeng 1*. It is recommended that owners and ship managers take full emphasis on the issues raised in this report, and take comprehensive investigations into their ships to identify and remove similar unsafe factors. Effective measures shall be developed to prevent similar accidents in the future.

APPENDIX A: Annotated section of navigational chart showing the original and amended route of *ShenNeng 1*



APPENDIX B: Annotated section of navigational chart showing the grounding position of *ShenNeng 1*

