



Grounding of the bulk carrier *Shen Neng 1* at Douglas Shoal, Queensland

3 April 2010

Shen Neng 1 aground at Douglas Shoal



Abstract

At 1705¹ on 3 April 2010, *Shen Neng 1* grounded at Douglas Shoal, about 50 miles² north of the entrance to the port of Gladstone, Queensland.

The ship had departed Gladstone at 1054 that day after loading a full cargo of coal destined for Bayuquan, China. The ship's hull was seriously damaged by the grounding and a number of water ballast tanks and at least one fuel oil tank were breached resulting in pollution. Sea water also entered the engine room. Salvors boarded the ship on 4 April. The ship was refloated on 12 April and towed to a location off Great Keppel Island.

The ATSB investigation is continuing.

FACTUAL INFORMATION

The information contained in this preliminary report is derived from the initial investigation of the occurrence. Readers are cautioned that there is the possibility that new evidence may become available during the course of the investigation which may alter the circumstances as depicted in this report.

Shen Neng 1

Shen Neng 1 (IMO 9040871) is a Chinese registered bulk carrier owned by Shenzhen Energy Transport, China and managed by Tosco Keymax International Ship Management Company, China. The ship was built in 1993 in Japan and, at the time of the incident, it was classed with the China Classification Society (CCS).

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- fostering safety awareness, knowledge and action.

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1 All times in this report are local times, Coordinated Universal Time (UTC) +10 hours.

2 A nautical mile of 1852 m.

Shen Neng 1 is a conventional, gearless 'Panamax'³ bulk carrier. The ship has an overall length of 225.0 m, an extreme breadth of 32.3 m and a depth of 18.3 m. At a summer draught of 13.291 m, it has a deadweight of 70,181 tonnes.

The ship is fitted with navigational equipment consistent with SOLAS⁴ requirements. The equipment includes two global positioning system (GPS) units, an automatic radar plotting aid (ARPA) equipped radar with GPS input and a gyro compass with an auto-pilot.

Propulsive power is provided by a Sulzer 6RTA62, single acting, direct reversing, two-stroke diesel engine. The engine drives a fixed pitch propeller and, at sea, is run at 83 rpm to give the ship a speed of about 12 knots⁵.

The ship's crew of 23 Chinese nationals held qualifications for their positions in accordance with international requirements. The deck officers comprised the master and three mates. The watch-keeping schedule for the mates required them to keep 4 hours on, 8 hours off, watches both at sea and in port. In practice, it was necessary for the chief mate to work considerable additional hours in port to oversee cargo operations.

Shen Neng 1's master had 24 years of seagoing experience, the last seven in command. He had been on board the ship for about 6 months.

The chief mate's 20 years at sea, included 11 years as a mate and the last three as chief mate. He had joined the ship about 1 month before the incident and it was his first visit to Gladstone.

The second mate had been at sea for 12 years and it was his second ship at this rank. He had been on board the ship for about 4 months.

Approaches to Gladstone

The choice of the route to be navigated by a ship departing the port of Gladstone is principally determined by its destination and draught. Ships intending to transit the Torres Strait (maximum

transit draught 12.2 m) usually follow the coast northwards along the Inner Route of the Great Barrier Reef (GBR). Pilotage is compulsory in the Inner Route north from latitude 16°40'S off Cairns (the narrower and shallower part of this route).

Most other ships departing Gladstone exit the GBR area near the port and then set a course towards their destinations. The GBR area off Gladstone can be safely navigated using passages between the islands, reefs and shoals by keeping the ship inside designated shipping areas (DSA⁶). Navigable waters in these passages are deep and wide and the boundaries of the GBR Marine Park and other restricted areas are clearly marked on navigational charts.

Ships can pass either to the north or the south of Lady Elliott Island, east-southeast of Gladstone. The island has a lighthouse and other islands in the vicinity are also fitted with lights (Figure 1).

Another navigable passage lies north of the Capricorn Group, past North Reef lighthouse. It is estimated that about one-third of the ships entering or exiting the GBR in the Gladstone area use this passage. *Shen Neng 1* transited this passage to arrive at Gladstone and the master intended to use it again on the outbound voyage to China.

The coastal vessel traffic service (VTS) operating in the GBR employs a number of traffic monitoring and surveillance systems. The southern limit of the VTS area is at latitude 22° S, near High Peak Island; about 120 miles north of Gladstone. Consequently, the approaches to Gladstone were outside the coverage of this coastal VTS at the time of the incident.

The incident

On 24 March 2010, *Shen Neng 1* anchored in the Gladstone anchorage to wait for a berth to load coal. Over the next 8 days, the crew kept normal anchor watches and carried out routine maintenance work.

At about 0300 on 2 April, the chief mate went forward to weigh anchor. At 0320, the anchor was aweigh and the master turned the ship towards the pilot station. The chief mate came aft and at

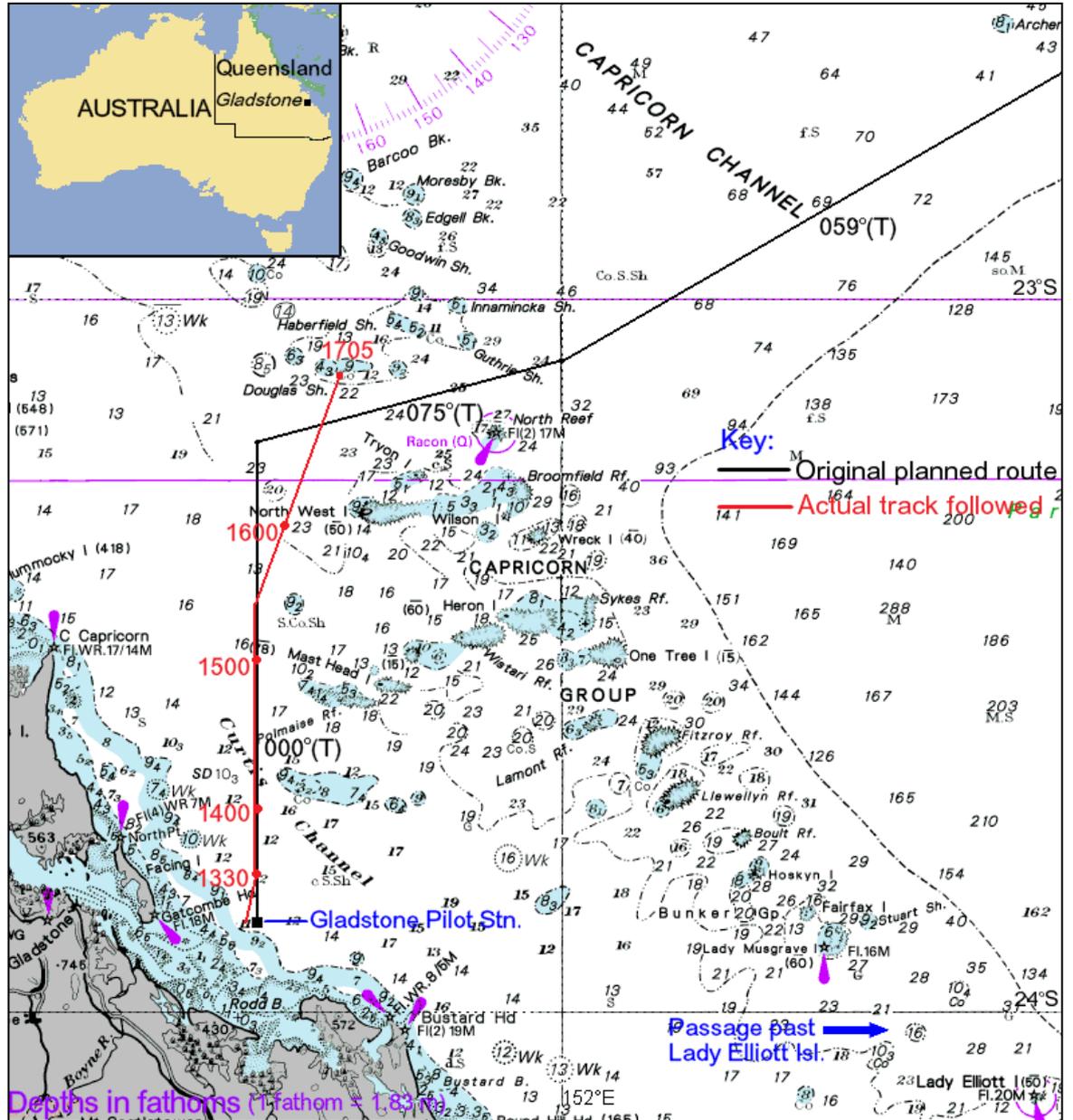
3 A ship limited in size to the Panama Canal's dimensions.

4 The International Convention for the Safety of Life at Sea, 1974, as amended.

5 One knot, or 1 nautical mile per hour = 1.852 km/hour.

6 Commercial ships of 50 m or more in length must navigate within DSA limits.

Figure 1: Section of navigational chart Aus 426 showing area off Gladstone and Shen Neng 1's original planned route, its actual track and positions plotted by the ship's crew



about 0400, relieved the second mate on the bridge. A harbour pilot boarded at 0410 and shortly thereafter, the ship entered the port.

By about 0600, *Shen Neng 1*'s crew were standing by to make fast the tugs for berthing. The third mate had relieved the chief mate on the bridge and he had then gone forward. The second mate was standing by aft.

By 0720, the ship was all fast alongside its berth and at 0820, cargo loading started. The chief mate actively supervised loading and de-ballasting

operations. It was his first loading of the ship and he remained in the ship's cargo office/control room for most of the day.

At about 0100 on 3 April, the chief mate left the second mate in charge of cargo operations and went to his cabin to sleep. He was woken at 0300, when the cargo surveyor boarded for the completion of loading and the draught survey.

At 0540, loading of 68,052 tonnes of coal was completed. *Shen Neng 1*'s draught was 13.29 m forward and 13.38 m aft. The crew prepared the

ship for sailing and the chief mate attended to final cargo calculations. He had breakfast at 0900 and then completed the cargo paperwork.

At 1035, a pilot boarded *Shen Neng 1* and by 1043, tugs had been made fast. For departure, the master and all three mates were at their usual stations with the chief mate forward.

At 1054, the ship left its berth and shortly after 1100, the tugs were let go. At about 1115, the chief mate left the forecastle, had lunch and went to his cabin. He showered and then relaxed.

By 1200, the third mate had been relieved on the bridge by the second mate. *Shen Neng 1* was piloted out of Gladstone in the shipping channel and at 1306, the pilot disembarked the ship.

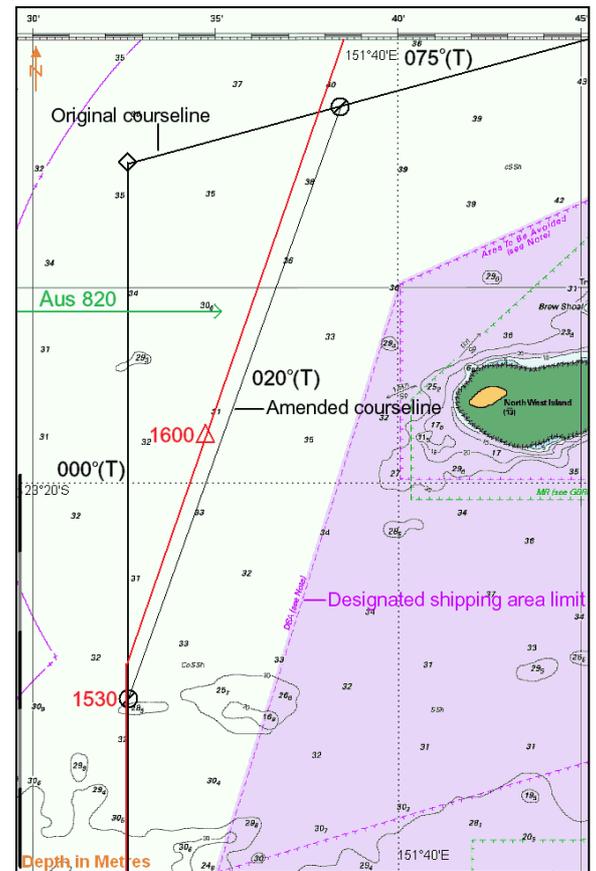
The master initially steered a course to keep clear of an inbound ship and at 1330, the course was altered to steer the planned 000° (T) track. Sea speed to commence the sea passage was ordered at the same time. The weather was good with a partly cloudy sky, clear visibility, a south-easterly breeze at about 15 knots and slight seas.

After *Shen Neng 1* had settled on the 000° (T) course in auto-pilot, the second mate asked the master if he could adjust the planned route to slightly reduce the passage distance. He indicated the proposed amendment on the chart. The master agreed and the second mate marked the amended 020° (T) track, about 3 miles from and parallel to, the DSA limit on chart Aus 819 and the next chart Aus 820. A line with the notation 'Aus 820' to indicate a change of chart was also marked on chart Aus 819 (Figure 2). The original route marked on chart Aus 819 was not erased.

The original course alteration points (waypoints) in the passage plan had been set in the GPS unit. Alarms were set to sound if the ship was 0.3 of a mile off-track and when the next waypoint was 0.2 of a mile away. The ARPA radar displayed the bearing to the next waypoint. The amended waypoints were not set in the GPS unit. Consequently, when the ship followed the amended 020° (T) track, the GPS unit and radar could not provide appropriate and relevant indications or alarms.

At 1400, the master handed over conduct of the ship to the second mate and left the bridge. The duty seaman remained on the bridge as a lookout. *Shen Neng 1* was making good about 12 knots.

Figure 2: Annotated section of chart Aus 819



The second mate used the GPS to fix the ship's position on the chart. The 1500 position indicated the ship was on the planned track. At 1530, the second mate marked this time next to the amended waypoint and altered the ship's course to 020° (T). Shortly afterwards, the GPS unit's off-track alarm sounded and he acknowledged it.

At 1530, the chief mate was woken by his alarm clock after he had slept for about 30 minutes. At 1550, shortly after the second mate called him for his watch, he went to the bridge.

As part of handing over the bridge watch, the second mate indicated the 020° (T) track on the chart to the chief mate. He explained the change to the original plan, advising that the amended waypoints had not been set in the GPS unit. After fixing *Shen Neng 1*'s 1600 position on the chart, the second mate completed handing over the watch and left the bridge. The watch change for the duty seaman had also been completed.

The chief mate saw the amended course on the chart and noted North West Island and dangers in the area to be avoided to starboard. He thought the ship would be at the amended 075° (T) course

alteration waypoint at about 1700. He did not measure the distance to go to the waypoint or otherwise establish an estimated arrival time there. He felt very tired and positioned himself on the starboard side, where he had a clear view from the bridge windows and of the radar display.

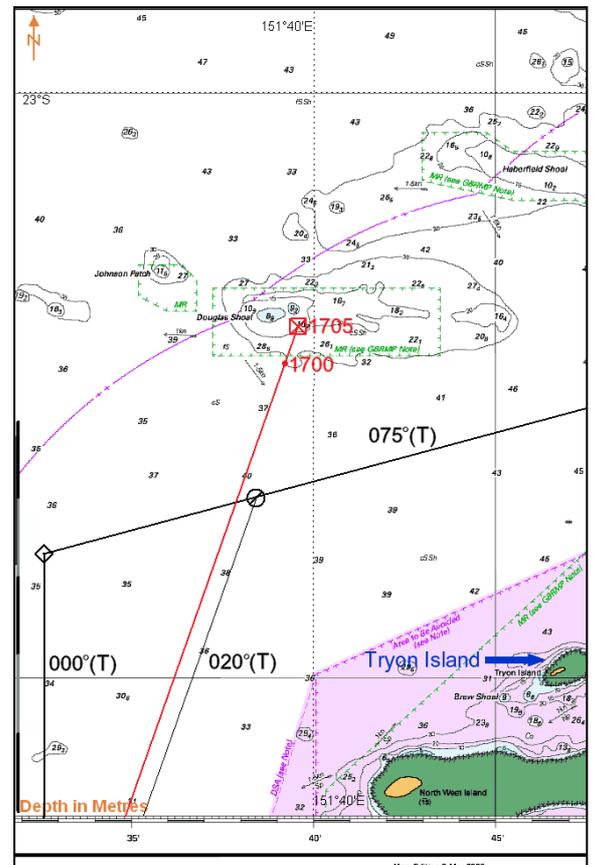
The weather remained good; the wind had freshened to about 20 knots from the east-southeast with moderate seas on a low swell. The duty seaman stood in the forward part of the bridge and kept a lookout. There was no traffic in the vicinity and there was little communication between the seaman and the chief mate.

Shortly after 1600, *Shen Neng 1* moved into the area covered by chart Aus 820. Chart Aus 819 remained on the chart table. At about 1630, the chief engineer came to the bridge. He checked that the main engine speed was 83 rpm. The chief mate, still near the starboard radar, confirmed that the ship's speed was about 12 knots. At about 1635, the chief engineer left the bridge. The chief mate had intended to plot the ship's position at 1630 and now decided that he would wait and plot the position at 1700.

At about 1700, the chief mate recorded the coordinates 23°07.0'S 151°39.2'E in the GPS position log book. This position is not on chart Aus 819 so he took out chart Aus 820 from the chart table drawer. As he placed the chart on the chart table, he noticed that the ship's speed had decreased to about 8 knots. He also saw the 'no go area' marked on the chart around Douglas Shoal and realised the ship was closing on the shoal (Figure 3). He immediately ordered the duty seaman to engage hand steering and quickly alter course to starboard.

Just as hand steering mode was engaged, the chief mate saw the speed rapidly decreasing to zero and the ship began to shudder. The starboard helm applied had no effect and at 1705, *Shen Neng 1* grounded on a heading of 020° (T) and came to a shuddering stop. The GPS unit indicated the position 23°06.0'S 151°39.6'E, close to a charted depth of 10.7 m at Douglas Shoal where the sea-bed is composed of coarse sand, shells and coral. At Tryon Island nearby, a low water of 0.8 m was predicted at 1706 and a high water of 2.8 m was expected at 0002 the next day.

Figure 3: Annotated section of chart Aus 820



In his cabin, the master was attending to paperwork when he felt the ship shudder and thought the ship's course was being altered. A minute or so later, the chief mate telephoned him, asking him to come to the bridge. The master hurried to the bridge where the chief mate advised him that the ship may be aground. He asked the chief mate to plot the ship's position.

By about 1710, the chief engineer and the second mate, alarmed by the ship's unusual movement, had also arrived on the bridge. The GPS position plotted by the chief mate confirmed *Shen Neng 1* was aground. The main engine rpm had reduced and the master asked the chief engineer to stop the engine. He sent the chief mate forward to let go an anchor and ordered all tanks sounded and water depths around the ship to be checked.

At 1730, the starboard anchor was let go and about 60 m of anchor cable was put in the water. Tank soundings revealed that *Shen Neng 1*'s hull was breached. Number three 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 and subsequently updated the situation. Depth soundings around the ship indicated that it was hard aground. A minimum depth of 11 m was measured on the ship's port side near its mid-length. On the starboard side, the minimum depth was 12 m.

At about 1840, the master reported the grounding to the Australian Maritime Safety Authority (AMSA). By about 1900, AMSA had issued a notice to shipping and made necessary notifications to various parties, including the Gladstone regional harbour master (RHM). The RHM started making arrangements for a response by establishing an incident control centre at the Gladstone offices of Maritime Safety Queensland (MSQ).

Over the next few hours, the RHM made the necessary arrangements for aircraft, pollution response equipment and personnel. By 2330, a suitable night-operation helicopter had left Gladstone for *Shen Neng 1*'s location with an AMSA casualty coordinator on board.

At 0024 on 4 April, the casualty coordinator boarded the ship. The helicopter pilot could not confirm sighting any oil pollution near the ship and returned to Gladstone. Later, the casualty coordinator confirmed some pollution from a breached fuel oil tank. Oil had been forced out of fuel oil tank air vents on deck. Oil and water had also entered the engine room and the main engine was disabled.

During the night, *Shen Neng 1*'s heading changed as the ship turned when it moved with the higher tide but it remained aground. The casualty coordinator offered the master and crew advice and measures to minimise damage and pollution, which were taken.

After about 0545, fixed-wing aircraft and the equipment prepared ashore for spraying oil dispersant were deployed. A water police vessel and an MSQ survey vessel, despatched during the night, had arrived at the ship's location to monitor the situation and assist the incident response. Arrangements were being made for a tug from Gladstone and another from Brisbane to proceed to the ship's location.

Later that day, a team from Svitzer Salvage Australasia (Svitzer), who had been appointed as salvors, boarded *Shen Neng 1* via helicopter. Over

the following days, Svitzer assessed the damage and began planning the salvage operation.

At 1948 on 12 April, *Shen Neng 1* was refloated. The ship was towed to a location off Great Keppel Island, where it was anchored at 0848 on 13 April for salvors to further assess the damage.

INVESTIGATION ACTIVITIES

On 6 and 9 April, investigators from the ATSB boarded *Shen Neng 1* at Douglas Shoal. Relevant members of the ship's crew were interviewed and each gave his account of the incident. The investigators took copies of relevant documents and records and retained the data card from the ship's simplified voyage data recorder (S-VDR).

On 5 April and subsequent days, the investigators attended the incident control centre in Gladstone, interviewed the RHM and collected relevant information from the various agencies involved.

The ATSB will continue to source additional information from the managers of *Shen Neng 1*, MSQ, AMSA and other agencies that are, or may become, involved.

Based on initial evidence, the ATSB investigation will first focus on a number of issues, including:

- *Shen Neng 1*'s bridge resource management practices including passage planning, watch-keeping and passage monitoring.
- The ship and its management company's safety management systems in general with respect to guidance that could have prevented the grounding.
- The ship and its management company's fatigue management systems, including work/rest schedules and practices on board.
- Human factors issues including fatigue, distractions and situational awareness.
- Existing protective measures in the Great Barrier Reef, including the coastal vessel traffic service, coastal pilotage and ship routing guidelines and recommendations.
- Initial incident response on board the ship, control and monitoring from ashore and salvage efforts.