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- fostering safety awareness, knowledge and action.

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Foundering of the general cargo ship *Tycoon* at Christmas Island 8 January 2012

Abstract

On 6 January 2012, the Panama registered general cargo ship *Tycoon* was moored in Flying Fish Cove, Christmas Island (Figure 1). The ship remained at the moorings over the following days while cargo operations were carried out.

In the early hours of 8 January, the wind speed and sea state increased and the moorings failed to keep *Tycoon* in position. At about 0620, the ship made contact with the adjacent rock-face and shore crane pylon. Despite several attempts to move *Tycoon* away, it continued to pound against the rock-face and pylon and the engine room began flooding through a tear in the hull.

At about 0930, the decision was made to abandon ship. At 1030, the crew climbed down the ship's accommodation ladder one at a time and jumped into the sea. From there, they were recovered by the crews of three Royal Australian Navy rigid hull inflatable boats which were

standing by to assist.

At about 1100 on 9 January, the ship suffered a catastrophic failure of its hull. The contents of the number two hold were exposed to the sea. Damage to the hull near the engine room had already allowed oil and other pollutants to be washed into the sea.

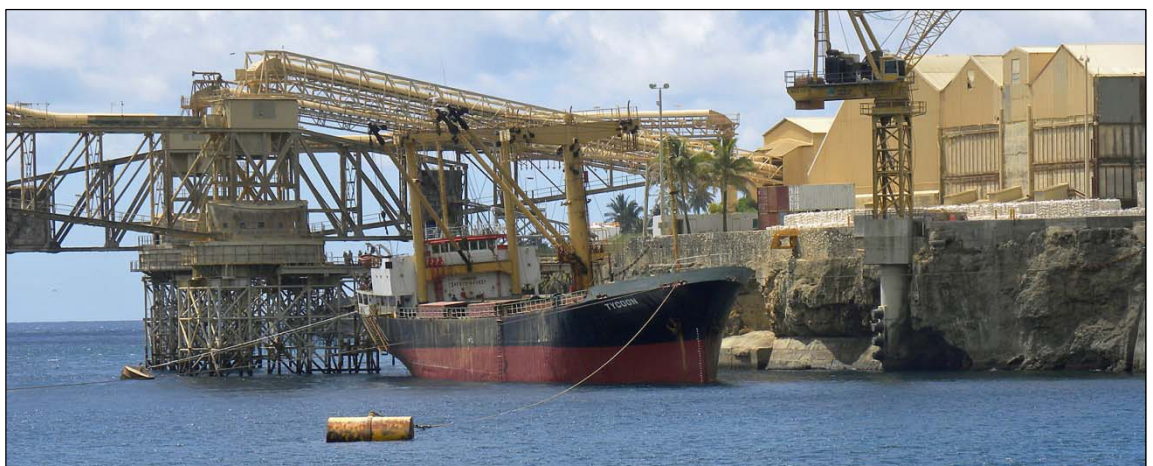
FACTUAL INFORMATION

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.

Tycoon

Tycoon (IMO No. 8304220) was a general cargo ship (Figure 1) that was built in 1983 by Sanyo

Figure 1: *Tycoon* moored at Flying Fish Cove during a previous visit



Zosen, Japan. It had an overall length of 84.66 m, a beam of 14.51 m and a deadweight of 4,129 tonnes at a summer draught of 6.246 m.

The ship's two cargo holds were located forward of the accommodation superstructure and were serviced by one 25 tonne derrick and two 15 tonne derricks.

Propulsive power was provided by an Akasaka 6DM38AK four-stroke, single acting, diesel engine that delivered 1,471 kW. The main engine drove a single, fixed pitch propeller which gave the ship a service speed of about 10.5 knots¹.

At the time of the incident, *Tycoon* was registered in Panama and classed with the Panama Bureau of Shipping. It was owned by Tycoon Navigation, Panama, and managed by Ocean Grow International Ship Management, Taiwan.

The ship had a crew of 15 Myanmar nationals, all of whom were appropriately qualified to sail on board the ship.

The master had 33 years of seagoing experience. He held a Panamanian master's certificate of competency that was first issued in 1993. He had been sailing as master since that time and had been master of *Tycoon* for about 10 years.

He had visited Christmas Island on ten occasions in the past on board *Tycoon*. On three occasions, the ship had moored at the inner moorings of Flying Fish Cove and on the other visits, it had moored beneath the cantilever loaders to load bulk phosphate.

Christmas Island

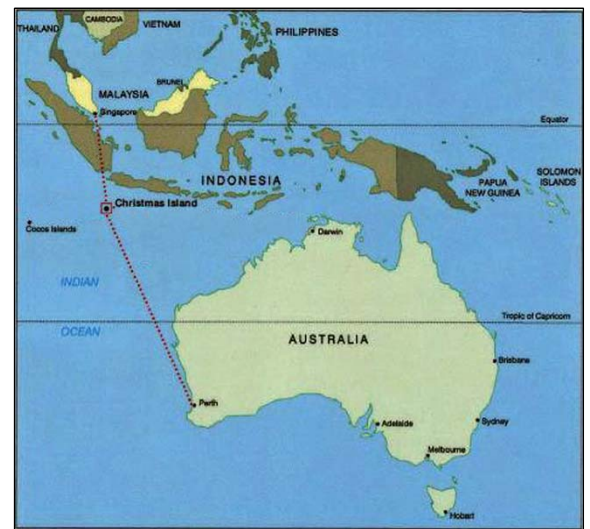
Christmas Island is an external territory of Australia. It is located in the Indian Ocean, about 1,400 miles² northwest of Perth, Western Australia, and 700 miles south of Singapore (Figure 2). Its closest neighbour is Java, Indonesia, which is about 200 miles to the north.

The local economy is based around phosphate mining/export, the support of an immigration detention centre and tourism. The island has high conservation value due to the number of bird, crab and plant species, some of which are unique

to the island. As a result, about 63 per cent of the island is gazetted as National Park.

The island is the summit of a submarine mountain, rising steeply to a central plateau dominated by stands of rainforest. The plateau reaches heights of up to 361 m above sea level and consists mainly of limestone and layers of volcanic rock.

Figure 2: Location of Christmas Island



A narrow encircling coral reef surrounds the island and there is virtually no coastal shelf. The sea plummets to a depth of about 500 m within 200 m of the shore.

Christmas Island is about 135 square kilometres in size and its coastline is an almost continuous sea cliff, of up to 20 m in height. In a few places, the cliff gives way to shallow bays with small sand and coral shingle beaches. The largest of these bays forms the island's only port, Flying Fish Cove.

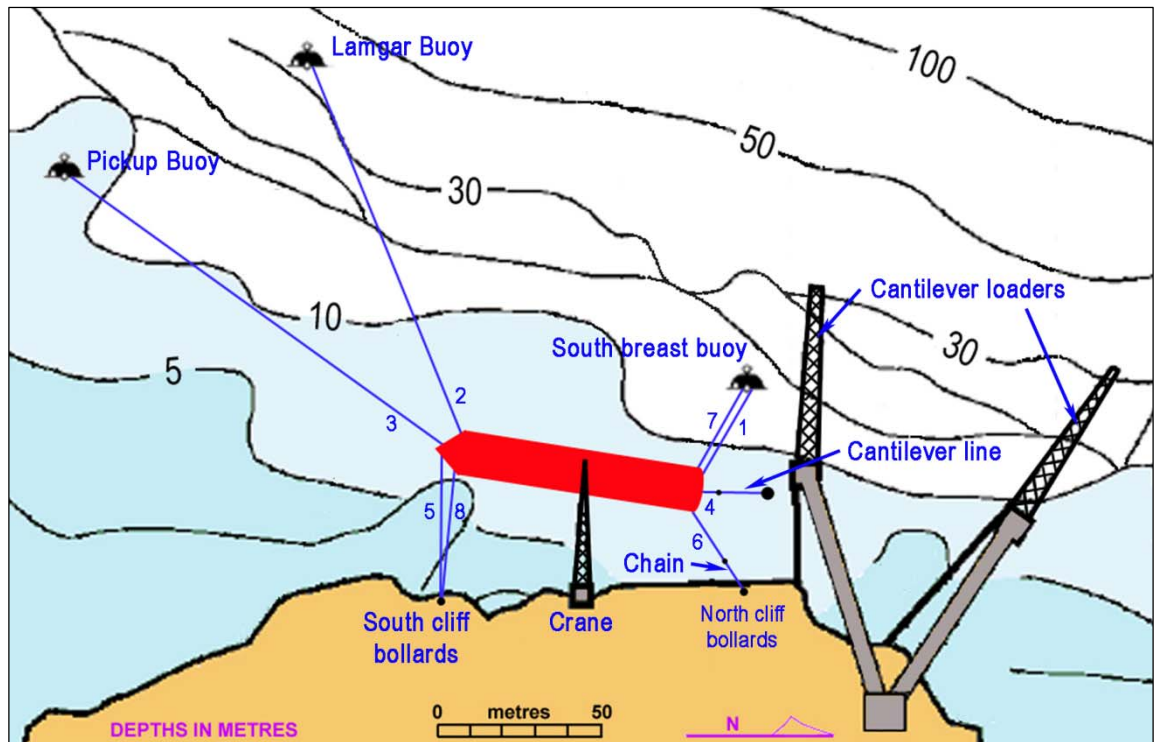
Because of the depth of the seabed and the conditions which can be experienced in Flying Fish Cove, there are no conventional wharf facilities that are suitable for ships. Consequently, ships are either moored to buoys which position the ships under the cantilever bulk loaders or at the inner moorings, in close proximity to the port's single crane. In the latter case, ships are held in position by lines attached to three mooring buoys (Figure 3), a floating 'cantilever' stern line that is permanently shackled to an anchored chain and two chains that are permanently connected to shore-side bollards.

Barges are launched from a gantry on a jetty located at the southern end of Flying Fish Cove to

1 One knot, or one nautical mile per hour equals 1.852 km/hr.

2 A nautical mile of 1,852 m.

Figure 3: *Tycoon's* mooring arrangement at the inner moorings



run ship's mooring lines to the mooring buoys. If the swell/sea conditions are greater than about 1.2 m, the barges cannot be launched.

THE INCIDENT

On the morning of 6 January 2012, *Tycoon* arrived off Christmas Island following a voyage from Singapore. The ship was carrying a cargo of containers and general cargo and, after discharge, was due to load 3,700 tonnes of bagged phosphate for export to Malaysia.

At 0645³, the Christmas Island pilot boarded *Tycoon* and at 0715, the first of the ship's stern lines was run to the south breast buoy (Line 1 in figure 3). Ship's lines were then connected to the lamgar buoy⁴ (2), the pickup buoy (3) and the cantilever line (4). A forward ship's line was run to the south cliff bollards (5). A ship's line was then connected to the north cliff chain (6), followed by another stern line to the south breast buoy (7).

³ All times referred to in this report are local time, Coordinated Universal Time (UTC) + 7 hours.

⁴ A large mooring buoy, usually secured to the seabed by two anchors, one of which is missing.

By 0730, the ship was all fast and positioned about 25 m forward of the cantilever loader and about 20 m off the rock-face.

At 0800, cargo discharge began and it continued throughout the day. At 1645, cargo operations were completed for the day and the stevedores left the ship by barge. In preparation for the ship's overnight stay, an additional forward port breast line (8) was run ashore to the south cliff face bollards.

At about 2100, the pilot visited the terminal to check on *Tycoon*. The ship was rolling at its moorings but not sufficiently to cause the pilot concern. The master had a mobile telephone and VHF radio and had previously been told to contact the pilot if he needed to for any reason.

At 0630 on 7 January, the stevedores were transferred to *Tycoon* by barge and at 0700, discharge operations started. By 1030, discharge was completed and at 1100, loading of the bagged phosphate began.

By 1645, loading was completed for the day. The stevedores left the ship by barge and the barges were recovered from the water and taken ashore. They had loaded 260 tonnes of phosphate on board. At this time, there was a 2 m sea on a

north-westerly swell of about 0.5 m and the wind was north-north-easterly at about 13 knots⁵.

The pilot assessed the weather forecasts as indicating conditions were suitable to allow the ship to remain moored overnight, but that the conditions might deteriorate late the next day.

At 1600 and again at 2000, the weather was recorded in *Tycoon's* log by the master as north-easterly wind at 11 to 15 knots with a north-easterly sea of 2 to 3 m.

Shortly before 2200, the pilot visited the terminal to check on *Tycoon*. Weather conditions had not changed from the afternoon. While the ship was rolling at the moorings, there was no chafing of the mooring lines and they appeared secure. Unconcerned, he waved to some of the ship's crew members who were fishing on the after deck and left the terminal.

Sometime between 2300 and midnight, the stevedore manager also visited the terminal. He turned on the terminal lights and saw that the swell had picked up a little and that the inner mooring lines were slack. He too saw that the crew were fishing and they appeared to show little concern about the condition of the ship.

At midnight, *Tycoon's* master was relieved on the bridge by the second mate. After a handover, the master went below to his cabin to sleep. At this time, the sea was 3 m on a north-north-westerly swell of about 0.8 m and the wind had backed to a north-westerly at 8 knots.

Sometime between 0200 and 0300 on 8 January, concerned that the weather was deteriorating, the second mate called the master. When the master arrived on the bridge, he confirmed that the weather had worsened since he left and he sent the second mate to the after deck to check on the condition of the mooring lines.

At 0300, the wind was 20 knots from the west-southwest. The sea was 3 m on a swell of 1.0 m from the northwest.

At about 0400, the master placed the engine room on standby and the main engine was readied for immediate use. The wind was now

westerly at 21 knots and the sea was 3 m on a west-north-westerly swell of 1.5 m.

At about 0420, the cantilever line (4) came free at its anchor chain connection. The master was advised and the crew on the after deck recovered the ship's line and the cantilever line using the aft centre-line mooring winch.

The ship then moved forward and began rolling more violently. In the sea conditions, it was being pushed towards the rock-face and crane pylon and then pushed back out to sea as the waves rebounded off the rock-face. The master and crew continued to monitor the situation but did not notify parties ashore that the cantilever line had become disconnected.

At about 0510, the stevedore manager arrived at the terminal. While he was there, he saw that the sea conditions were rough, the cantilever line was no longer connected to its anchor chain and the ship's crew had recovered the line onto the after deck. He could see that *Tycoon* had moved about 5 m forward and that the starboard breast lines (1 and 7) to the south breast buoy were very tight. He went forward, to the shore crane, and saw the ship's master on the bridge. The master indicated to him, using hand signals, that the cantilever line had let go.

At 0543, the sun rose at Flying Fish Cove. High tide that day was predicted to be 1.0 m at 0758 with a low tide of 0.7 m at 1230.

At about 0600, the stevedore manager tried to telephone the pilot to advise him of the situation regarding *Tycoon*. However, he could not get through as the pilot was on another telephone call. He then left the terminal to go to the stevedoring office.

At about 0615, one of *Tycoon's* aft starboard breast lines to the south breast buoy parted. As a result, the one remaining aft starboard breast line began to take the increased strain and the ship started to move ahead and towards the rock-face and crane pylon. The wind was now west-south-westerly at 13 knots and the sea was 4 m on a 1.9 m west-north-westerly swell.

Tycoon moved forward about 35 m and its port bow impacted on the rock-face. In the confused sea and swell close inshore, the ship then began to pound continually against the rock-face and crane pylon.

5 Unless otherwise stated, all weather observations are taken from the log of HMAS *Leeuwin*, which was standing off the port.

At 0620, the pilot returned the stevedore manager's telephone call. The stevedore manager told him that the weather was getting up and that he thought *Tycoon's* master wanted to leave the moorings.

Just after 0620, the stevedore manager heard *Tycoon's* master calling the pilot on VHF channel 16. He answered the call and told the master that the pilot was on his way.

At 0623, the stevedore manager telephoned the harbour master and advised him of the situation. The stevedore manager then went outside to the jetty. From there, he looked at the ship and could see its bow touching the rock-face.

At about 0630, the pilot and the stevedores joined the stevedore manager at the jetty. They decided that the sea conditions would not allow the barges to be launched. The pilot then contacted the master on VHF channel 16 and told him to heave in on the lamgar buoy line (2) in an attempt to move the ship's bow out to seaward. He also told the master to heave in on the remaining after starboard breast line to the south breast buoy in an attempt to stop the ship from impacting the rock-face and crane pylon.

The pilot and the stevedores then went to the terminal where they joined the harbour master, who had just arrived.

The ship's crew tried to heave in on the lamgar buoy line but the forward winches were not powerful enough to pull the ship's bow away from the rock-face. The master then passed this information to the pilot.

At about 0647, while the sea was pounding the ship against the rock-face and crane pylon, the crew on the after deck, thinking that the master would be trying to take the ship to sea, cut through the remaining two stern lines.

At 0700, the wind was from the west at 10 knots and the sea was 4 m on a 2.0 m swell from the northwest.

At about 0710, *Tycoon's* master told the pilot that the ship's main engine was 'ready'. In an attempt to get the ship's stern away from the crane pylon, the pilot told the master to run the main engine at full astern and when the ship was moving astern, to put it to full ahead and the rudder hard over to starboard.

The master ran the main engine astern twice for a total of about 1½ minutes but the ship did not move. He made no further attempt to use the main engine.

The stevedores were asked to get two lengths of 32 mm mooring line, which were in the terminal, with a view to running another starboard breast line from the ship's after deck to the 'B' buoy, located about 300 m to seaward of the south breast buoy.

At 0723, the pilot called the Royal Australian Navy ship HMAS *Leeuwin*, which was in the vicinity of Flying Fish Cove, on VHF channel 16 and asked its commanding officer to bring the ship closer to the cove. Once HMAS *Leeuwin* was closer to the cove, the commanding officer was asked if the ship's rigid hull inflatable boat (RHIB) could be used to run a mooring line from *Tycoon* to the 'B' buoy. The commanding officer said that it could and he turned his ship towards the cove, arriving there about 10 minutes later. At 0803, the RHIB was launched.

A heaving line was thrown to *Tycoon's* crew on the after deck of *Tycoon* and secured to the cantilever line that was still connected to the ship's aft centre-line mooring line. This line was then brought ashore and connected to the two lengths of shore line. The free end of this line was passed down to the crew of the RHIB who then took it to the seaward 'B' buoy.

At 0814, two of the RHIB's crew climbed onto the 'B' buoy and put the eye of the line over the buoy's hook. The RHIB was then manoeuvred clear of the buoy and proceeded to stand off *Tycoon* in case it was required to assist again.

While the line was being run, the ship was continually pounded against the rock-face and crane pylon and, at about 0820, a 1 m vertical tear could be seen in the port side of the ship's hull in way of the engine room (Figure 4).

After the line had been attached to the 'B' buoy, the ship's crew started to heave in on it. However, the centre-line winch drum soon filled up with line, so the crew stoppered the line while they moved it onto the outer starboard winch drum. Once this was done, the crew again attempted to heave the line in. However, the ship's winches were not powerful enough to move the ship away from the rock-face and crane pylon.

Figure 4: Tear in hull



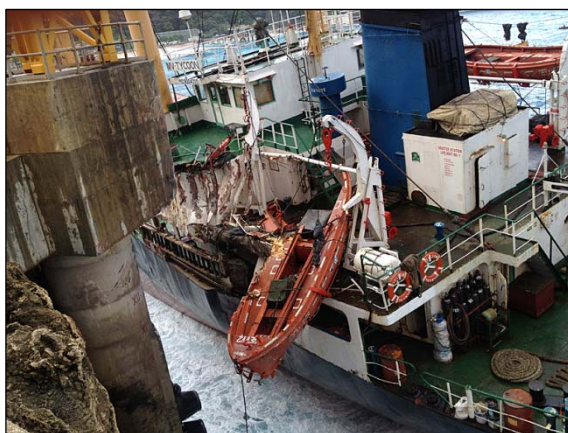
At about 0843, the tear in the ship's hull in way of the engine room had grown to about 2 m in length and had opened up to about 0.5 m in width. The engine room was now taking on water.

At about 0900, torrential rain began to fall as a squall passed through Flying Fish Cove.

When the master was advised that the engine room was flooding, he told the engine room staff to evacuate the engine room and to come to the bridge. He also told the crew on the after deck to stop what they were doing and to also come to the bridge.

By this time, the ship had suffered severe damage to the port side of the accommodation. The port lifeboat had been smashed and was hanging from its davits (Figure 5).

Figure 5: Damage to port side of ship



At 0933, the master told the pilot and harbour master on VHF channel 16 that he wanted to abandon the ship. At 0934, the commanding officer of HMAS *Leeuwin* was asked to have the RHIB standby *Tycoon* in case it was needed

should a crew member fall into the sea in the process of abandoning the ship.

By this time, there were a number of emergency response personnel in the terminal and a number of options were put forward in order to get the crew safely off the ship. Following a suggestion from the coxswain of HMAS *Leeuwin*'s RHIB, *Tycoon*'s master was told to lower the ship's starboard accommodation ladder so the crew could climb down it and jump into the sea. They would then be pulled into a navy RHIB.

At about 0935, the commanding officer of HMAS *Leeuwin* asked the commanding officer of HMAS *Maryborough*, which was also in the area at the time, if he could launch its two RHIBs to assist in the rescue. At 0944, the RHIBs were launched and they arrived on scene a short time later.

By 0943, the rain had started to ease.

Tycoon's crew lowered the starboard accommodation ladder and then gathered together in lifejackets on the deck adjacent to it. At 1031, the first crew member climbed down the ladder and jumped into the sea (Figure 6). He was quickly pulled on board the RHIB which had come in close to the ship's side.

Figure 6: Crew member jumping from the ship



At about this time, HMAS *Leeuwin*'s commanding officer estimated that the wind was gusting 'up to 40 knots, average sea height was 2 m offshore with 3+ m surf zones close inshore and on the exposed northwest rock faces'.

By 1037, five of *Tycoon*'s crew members had been pulled from the sea by HMAS *Leeuwin*'s RHIB crew. As that RHIB backed away from the ship, HMAS *Maryborough*'s RHIBs came in and by 1052, all 15 crew had been rescued. *Tycoon*'s

master was the last crew member to leave the stricken ship, taking with him a number of ship's documents.

The conditions prevented the ship's crew from being landed in Flying Fish Cove, so the RHIBs took the crew to the boat ramp at Ethel Beach, on the east coast of the island, where they were landed and provided with medical attention. The master and chief mate were the only crew members who required significant medical attention. The master had injured his back while on board the RHIB and the chief mate's blood pressure was high. They were both admitted to the Christmas Island hospital for observation and released the next day.

For the remainder of 8 January and into 9 January, *Tycoon* remained wedged against the crane pylon. During this time, winds of up to 30 knots, seas of up to 5.0 m and swell of up to 3.5 m continued to pound the ship against the rock-face and crane pylon.

At about 1100 on 9 January, the ship suffered a catastrophic failure of its hull in way of number two hold. The starboard side of the hold collapsed inward exposing the contents of the hold to the sea (Figure 7). Damage to the hull in way of the engine room had also allowed oil and other pollutants to be washed into the sea.

Figure 7: Failure of ship's hull at number 2 hold



On 9 January, an Australian Maritime Safety Authority (AMSA) casualty coordinator and a representative from the Western Australian Department of Transport (Pollution Response) arrived on Christmas Island to begin coordinating a response to the incident.

On 10 January, additional representatives from AMSA and the National Plan⁶ arrived on the island to manage the ongoing response and cleanup of Flying Fish Cove. Many local residents also volunteered their time to assist with the cleanup operations.

At the time this preliminary report was released, the ship remained lying against the rock-face and crane pylon awaiting salvage/removal (Figure 8).

Figure 8: Tycoon awaiting salvage



INVESTIGATION ACTIVITIES

On 10 January 2012, two ATSB investigators attended Christmas Island and interviewed relevant members of the ship's crew. The investigators also interviewed the harbour master, the pilot, the stevedores, customs officers, police officers, crew members from HMAS *Leeuwin*, and other witnesses. They also gathered other information, including relevant documentation and records.

The ATSB is monitoring the ongoing salvage operation and related activities. Additional information has been requested from *Tycoon*'s owners and managers, the port authority, the Australian Federal Police and the Australian Maritime Safety Authority.

⁶ The National Plan to Combat Pollution of the Sea by Oil and other Noxious and Hazardous Substances.

The collection and analysis of a range of evidence is continuing. Based on the initial evidence obtained, the ATSB investigation will be focusing on several areas including:

- The actions of *Tycoon*'s master and crew and those of the port's operational staff.
- The failure of the port's permanent cantilever mooring arrangement and the design and maintenance of the mooring system.
- Port operational procedures, guidelines and associated risk assessments.
- The condition of *Tycoon* and the adequacy of the ship's mooring equipment.
- *Tycoon*'s safety management system and other on board guidance material.