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Australian Transport Safety Bureau

Water ingress into steering gear compartment onboard *Goliath*

Bass Strait, on 7 March 2018

ATSB Transport Safety Report
Marine Occurrence Investigation
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Addendum

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What happened

At about 1454 Eastern Daylight-saving Time[1] on 5 March 2018, the 143 m, self-unloading cement carrier *Goliath* (Figure 1) arrived in Melbourne, Victoria, after a 21-hour voyage from Devonport, Tasmania. Cargo operations commenced and continued into the following day. At about 2330 on 6 March, the master was informed that there were problems with the cargo quality making it difficult to discharge, and consequently departure would be delayed. At midnight, the third mate completed his cargo watch and prepared for the vessel's departure but, as departure was delayed, at 0200 he was relieved of his duties by the master and retired for rest. The chief mate was roused from sleep at 0230 to attend to the cargo issues and cargo discharge was completed soon thereafter. The chief mate then remained on duty for departure and for his normal 0400 to 0800 navigation watch.

Figure 1: *Goliath*

Source: Lester Hunt, MarineTraffic.com

At 0315, on 7 March, under the guidance of the pilot exempt master,[2] stand-by for departure was called. At 0718, *Goliath* commenced sea passage bound for Devonport. At 0800, the chief mate handed the navigation watch to the third mate. During watch handover, in addition to navigation information, the planned ballast water exchange operation was discussed. The chief mate also advised that he would be inspecting the cargo holds during the morning.

In addition to normal navigation and shipboard routines, a shore-based trainer had embarked in Melbourne to conduct a programme of onboard training during the voyage to Devonport. Two sessions were to be held, from 1300 to 1500 and 1530 to 1730. The navigation watches were altered to allow the rostered officer of the watch (OOW) to attend one of the training sessions.

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1 Eastern Daylight Time (EDT): Coordinated Universal Time (UTC) + 11 hours.

2 *Goliath*'s master had a pilot exemption for Melbourne and Devonport and piloted the ship into and out of each port. The master also acted as the ship's agent.

At 0815, the third mate, as OOW, commenced the routine ballast water exchange as required under the ship's ballast water management plan.[3] Ballast movements (water in or out) followed a prescribed sequence and timing, as laid out in the plan. The ballast pumps and remotely operated valves were controlled and their status (open or closed) monitored by the OOW from the ballast control panel located in the ship's wheelhouse. Assistance around the ship was provided by the duty integrated rating (IR), who operated manual ballast valves, sounded tanks (measured water levels), and removed tank access covers as required. There was no way to remotely monitor the status of the manual valves, and no record was routinely taken of the valves in use and their status. Verification of the manual valve status was reliant upon communications between the OOW and the duty IR, via the ship's handheld UHF radios.

Goliath's ballast system consists of eleven tanks. Ten tanks are located forward of the engine room and one tank aft, the after peak. The system is serviced by two 500 m^3/hr ballast pumps via a ring main which could be split via an isolating valve at the bow. This allows number 1 ballast pump to be configured to service the after peak tank and the starboard side ballast tanks, and number 2 pump to service the fore peak tank and the port side ballast tanks. This effectively segregated the two pumping systems, was the usual configuration, and was in use on 7 March.

At 1200, the second mate took over the watch and the ballasting operations. Elsewhere, the chief mate had completed hold inspections and rested until 1500 after which he was scheduled to attend the training. The second mate attended training from 1300, and the third mate returned to the bridge at that time to take the watch.

At 1420, the ballast system was configured to complete the after peak tank water exchange. At 1453 the second mate returned to the bridge to again take over the watch. However, the third mate retained the watch to complete the after peak tank ballasting which involved lowering the level to 8.5 m for ship stability requirements.

At 1500, the third mate contacted the duty IR and asked that the two after peak manually operated valves be closed (Figure 2). For reasons that could not be determined, the requested valve closures were not actioned. The third mate did not confirm with the IR that the message had been received and actioned so he was unaware that the valves connecting the after peak tank to the starboard ballast main had not been closed.

The watch was handed to the second mate who then continued with the next scheduled ballast movement of exchanging the water in the fore peak tank, also unaware that the valves to/from the after peak tank remained open. The third mate left the bridge and attended training before going to bed thereafter. The chief mate attended the same training session and the second mate remained on watch beyond 1600, when the chief mate usually took the watch.

At 1620, flow-through water exchange[4] of port and starboard ballast tanks commenced. This involved the use of both ballast pumps and systems. At 1730, the chief mate came onto the bridge and took over the watch.

Shortly thereafter, at 1736, an engine room alarm (aft bilge well high level) activated and the duty engineer (first engineer) responded. Upon entering the engine room, the first engineer noticed water flowing over the doorstep through the open steering gear room door. This water drained to the aft engine room bilge, resulting in activation of the alarm. The first engineer discovered water coming from a scupper pipe in the steering gear room, which drained into the steering flat bilge well. This bilge well was not fitted with an alarm and was manually drained to the engine room bilge. Consequently, it had overflowed, leading to flooding of the deck to a depth of about 10 cm. The water then overflowed the doorstep, into the engine room, and to the aft bilge well.

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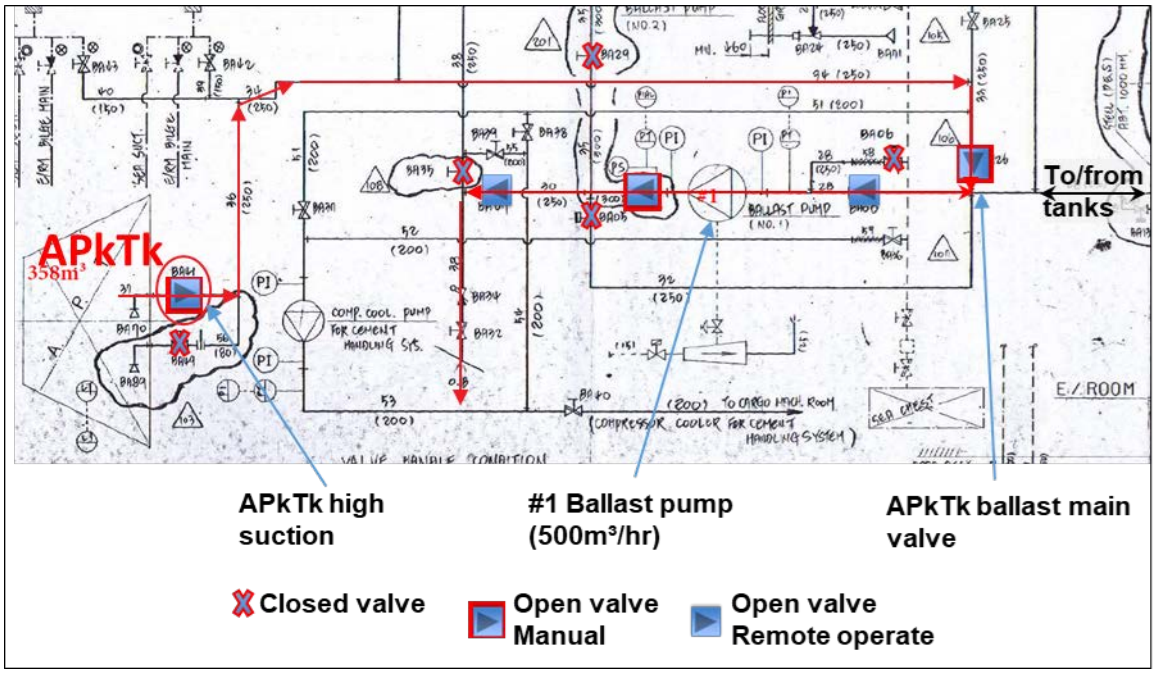
[3] Under Australian and International law, from 8 September 2017 all vessels are required to manage their ballast water in accordance with the International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004.

[4] Flow-through ballast water exchange involved removal of the tank access lids and continually overflowing the tank for a prescribed period of time.

Figure 2: Part of the ballast system piping diagram showing valve configuration for pumping out the after peak tank (APkTk)



Source: CSL Limited, annotated by ATSB

The first engineer noted that the water was salt water but could not find an obvious source in the adjacent spaces. He contacted the chief engineer and the bridge, informed them of the flooding, and inquired about the ballasting process. He also contacted the third engineer and requested he attend the engine room to assist. The first engineer then returned to the engine room to begin transfer of the aft bilge well contents to the bilge holding tank.

At 1745 the ballasting operations were stopped and tanks sounded. The after peak tank sounded at 11.54 m, 3 m higher than at the completion of after peak tank ballasting at 1500. At 1752, after checking stability conditions, the chief mate started pumping down the after peak. The chief mate also directed the duty IR to check the after peak tank ballast line valves. Both valves were found to be open.

Continuing investigations then found water coming up the drain in the CO_2 room, (located on the deck above and atop the starboard side of the steering flat). The senior officers discussed the situation and agreed the most likely cause was a holed scupper pipe running through the after peak tank.

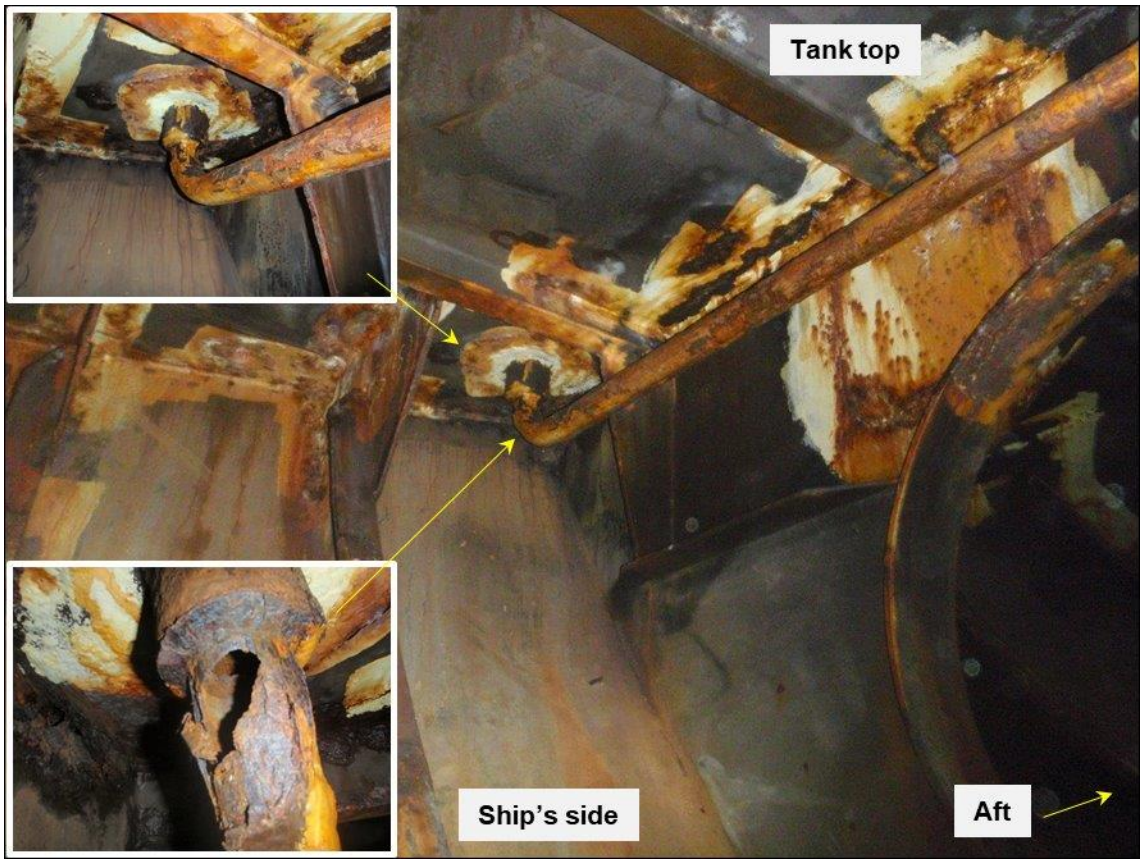
At 1802, the chief engineer informed the master that water had stopped coming from the scupper pipe in the steering flat. The after peak tank was now at 8.37 m and was further lowered to 4.64 m. At 1830, the ballast pump was stopped. Other spaces were checked and tanks sounded. At 1918, a sounding of the after peak tank confirmed that the level was unchanged.

It was determined that the leak had been stopped and the ship was safe to continue passage. At 2224 on 7 March, *Goliath* was all fast alongside in Devonport.

A tank entry and inspection of the after peak tank found the scupper line from the CO_2 room holed, on the outboard (back) side of the pipe, adjacent to the ship's side, just below the tank top (Figure 3). This line ran through the after peak tank before passing through the steering gear room bulkhead to drain into the steering gear room bilge well. The rear of the elbow piece directly below the tank top was heavily corroded and wasted with most of the pipe wall missing.

The tank was rarely filled to a depth which covered the holed section of pipe. However, when the starboard ballast tank was pressed up to overflowing, the open valves to the after peak tank allowed it to also fill. As the tank neared full, water covered the hole in the pipe, drained into the steering gear room bilge well and overflowed.

Figure 3: Scupper pipe in after peak tank showing corroded and holed elbow



Source: CSL Limited, annotated by ATSB

A condition of class was placed on the ship until suitable repairs had been completed. In the meantime, any ballasting was to be completed with additional monitoring of this area of the ship and tank levels. Procedures were amended to require the duty officer to keep a log of all manual valve operations and ballasting of the after peak tank was to be conducted only during daylight hours. In addition, a status tracking board was made for the manual valves with moveable pegs to be used to show the status of each valve.

Initial repairs involving renewal of the CO_2 room drain line (about 7.5 m), deck and bulkhead penetrations were completed on 10 March. Final repairs, survey and testing were completed on 18 March and the condition of class was lifted.

Findings

These findings should not be read as apportioning blame or liability to any particular organisation or individual.

- The request to manually close the after peak tank ballast line valves was not confirmed or actioned as expected. This led to undetected filling of the after peak tank during subsequent ballasting operations.
- The after peak tank filled to a level sufficient for water to leak into the holed scupper line within the tank and drain into the steering gear room bilge well. This overflowed and flooded the steering gear room.
- There was no structured or formalised system of logging or tracking the status of ballast system manually operated valves. Thus, when closure of the after peak valves was not actioned or confirmed, there was no record at the ballast control panel to show the status of the valves.

Safety action

Whether or not the ATSB identifies safety issues in the course of an investigation, relevant organisations may proactively initiate safety action in order to reduce their safety risk. The ATSB has been advised of the following proactive safety action in response to this occurrence.

Ship owner/operator – CSL Australia

As a result of this occurrence, CSL Australia has advised the ATSB that further to the immediate actions referred to earlier, the following safety actions have also been taken.

- Ballast tank inspection procedures have been reviewed and updated with added emphasis on internal tank fixtures
- During scheduled drydocking of *Goliath* in 2018 it:
  - fitted a ballast water treatment system in compliance with the Ballast Water Management convention which will remove the need for ballast water exchange
  - had the ballast tank remote sounding and alarm system replaced
  - had steelwork in the ballast tanks, including piping in the after peak tank, replaced.

Safety message

Disruption of normal routine, increased workload and changes of shift personnel increase the potential for error. This is particularly important during short sea voyages. All activities carried out during these times need careful and particular attention to ensure all individual tasks are completed and/or their status passed to new personnel.

General details

Occurrence details

Date and time:	7 March 2018 – 1736 EDT	
Occurrence category:	Incident	
Primary occurrence type:	Compartment flooding	
Location:	Bass Strait, about 60 NM north-west of Devonport, Tasmania	
	Latitude: 40° 14.0’ S	Longitude: 145° 46.6’ E

Ship details

Name:	*Goliath*	Year built:	1993
IMO number:	9036430	Gross tonnage:	11,754
Flag State:	Australia	Length overall:	143.00 m
Classification society:	Lloyd’s Register	Moulded breadth:	23.50 m
Owner(s):	CSL Australia	Summer draught:	8.335 m
Manager:	CSL Australia	Main engine(s):	Sulzer 5RTA52, 6,400 kW

About the ATSB

The ATSB is an independent Commonwealth Government statutory agency. The ATSB is governed by a Commission and is entirely separate from transport regulators, policy makers and service providers. The ATSB's function is to improve safety and public confidence in the aviation, marine and rail modes of transport through excellence in: independent investigation of transport accidents and other safety occurrences; safety data recording, analysis and research; and fostering safety awareness, knowledge and action.

The ATSB is responsible for investigating accidents and other transport safety matters involving civil aviation, marine and rail operations in Australia that fall within Commonwealth jurisdiction, as well as participating in overseas investigations involving Australian registered aircraft and ships. A primary concern is the safety of commercial transport, with particular regard to operations involving the travelling public.

The ATSB performs its functions in accordance with the provisions of the *Transport Safety Investigation Act 2003* and Regulations and, where applicable, relevant international agreements.

The object of a safety investigation is to identify and reduce safety-related risk. ATSB investigations determine and communicate the safety factors related to the transport safety matter being investigated.

It is not a function of the ATSB to apportion blame or determine liability. At the same time, an investigation report must include factual material of sufficient weight to support the analysis and findings. At all times the ATSB endeavours to balance the use of material that could imply adverse comment with the need to properly explain what happened, and why, in a fair and unbiased manner.

About this report

Decisions regarding whether to conduct an investigation, and the scope of an investigation, are based on many factors, including the level of safety benefit likely to be obtained from an investigation. For this occurrence, a limited-scope, fact-gathering investigation was conducted in order to produce a short summary report, and allow for greater industry awareness of potential safety issues and possible safety actions.