MARS – Lessons Learned

MARS Report No 378 April 2024

MARS 202419

Dynamic separation of soil cargo contributes to sinking

As edited from the Norwegian Accident investigation report SJØFART 2023/01
(original report only available in Norwegian)

➔ A small bulk carrier was carrying a load of soil which had been loaded, in bulk, into the single hold. The soil had been stored in unprotected heaps ashore and was loaded using an excavator. During loading, it was observed that some of the soil 'flowed' across the cargo hold when released by the excavator.

Once loading was finished, the cargo was evenly distributed in the cargo hold, although slightly higher in the middle of the heap. The crew readied the vessel for the voyage and closed the cargo hatches. Once underway, they encountered increasing swells and wind from starboard. Somewhat later, the vessel started listing to port, and the crew suspected that the cargo had shifted. This was confirmed visually when crew saw that moist soil was sloshing on top in the middle of the hold. This was evidence that either liquefaction or dynamic separation had occurred.

The Master decided to turn the vessel around and seek shelter. As this manoeuvre was being undertaken the vessel suddenly took a strong list to starboard and the crew soon realized that they were in danger due to a loss of stability. A distress call was sent and the crew evacuated the vessel by jumping into the sea wearing immersion suits. All five were eventually picked up by a rescue helicopter. The vessel gradually lost buoyancy and sank as a result of water ingress into the cargo hold and other areas following the loss of stability caused by cargo liquefaction or dynamic separation.

The official investigation found it likely that there was moisture in part of the stockpiled soil that was loaded. The ship's movements caused the cargo to undergo a transformation and initiated the sequence of listing events which culminated in the foundering of the vessel. As it happened, no samples were taken of the cargo, and the cargo was not tested for its transportable moisture limit (TML). The IMSBC Code does not list soil as a Category A cargo, so testing was not a requirement. Neither the shipper nor the vessel's crew were familiar with the properties of the cargo.

Vessel just before foundering

As the report mentions, only special vessel design may help to reduce the potential consequences of cargo shifting when transporting a bulk cargo with an unknown TML. As it stands, there is probably inadequate knowledge in the industry of the requirements that apply to documenting the properties of soil to be carried as bulk cargoes.

Lessons learned

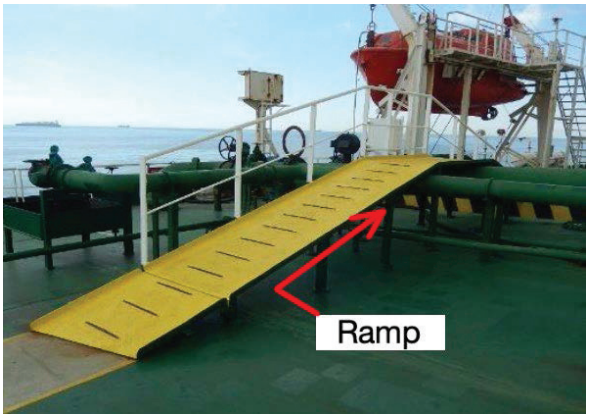
- While liquefaction or dynamic separation has been observed as a key safety issue when dealing with such cargoes as iron ore fines or nickel ore, soil has escaped this attention, probably due to the relatively low volumes transported by sea in bulk.
- This accident demonstrates that certain soils can liquefy or are subject to dynamic separation under certain conditions of moisture content and vessel movement.
- If, during loading, there is reason to suspect that the moisture content is in excess of the TML, stop loading the cargo, inform the owners and seek further advice from your P&I Club.
- If laboratory tests have not been conducted on the cargo, crew can carry out a complementary test on board, known as the 'Can Test' in order to determine, approximately, whether the cargo is at risk of flowing. For example, see the following publication:
- https://www.londonpandi.com/media/2142/reducing-the-risk-of-liquefaction-operational-guidance-for-vessels-that-carry-cargoes-which-may-liquefy.pdf

MARS 202420

Shortcut is a safety slip

➔ The vessel was at anchor. In the early morning hours a crew member went on deck to check the anchor's condition. Instead of taking the known recommended route on the starboard side, known as 'the safe way to the bow', he chose the shorter port side option. This route went via a ramp that led up and over some deck piping.

While crossing the deck ramp, he slipped on the damp surface, lost his balance and fell to the deck from a height of around one metre. The victim complained of a sore left elbow, which had taken the brunt of the fall, and was given first aid. Later that day he was sent ashore for medical attention.



The company investigation found that he was not holding the handrail of the ramp while crossing. Also, his choice of routes, using the shorter port side option instead of the starboard 'safe way to the bow', increased the chances of an accident or incident.

Lessons learned

- Shortcuts are rarely the safest option, but they are often taken, especially for mundane tasks, as we feel we are in control and that nothing could happen. But it does.
- Stairs and ramps require three points of contact for a safe passage.

MARS 202421

Hit and run with two fatalities

As edited from MAIB (UK) report 5/2023
https://tinyurl.com/MARS202421

➔ A dredger was being transited to winter quarters after a season of dredging, with only two crew members remaining on board.

In the early morning hours, and in darkness, the dredger entered a Traffic Separation Scheme (TSS) at a speed of about six knots. The lone OOW was on the bridge while the other crew member was asleep in his cabin.

Meanwhile, a loaded bulk carrier was also proceeding in the TSS in the same direction as the dredger, but was about 8nm behind and to port. The bulk carrier's OOW was sitting in the navigation chair and using his tablet computer to engage on a video chat site. At one point the OOW even turned on the interior lights of the bulk carrier's bridge to show his surroundings to the person on the other end of the chat. He continued to chat sporadically with various individuals until 02:02 when he altered course while continuing with his online chat.

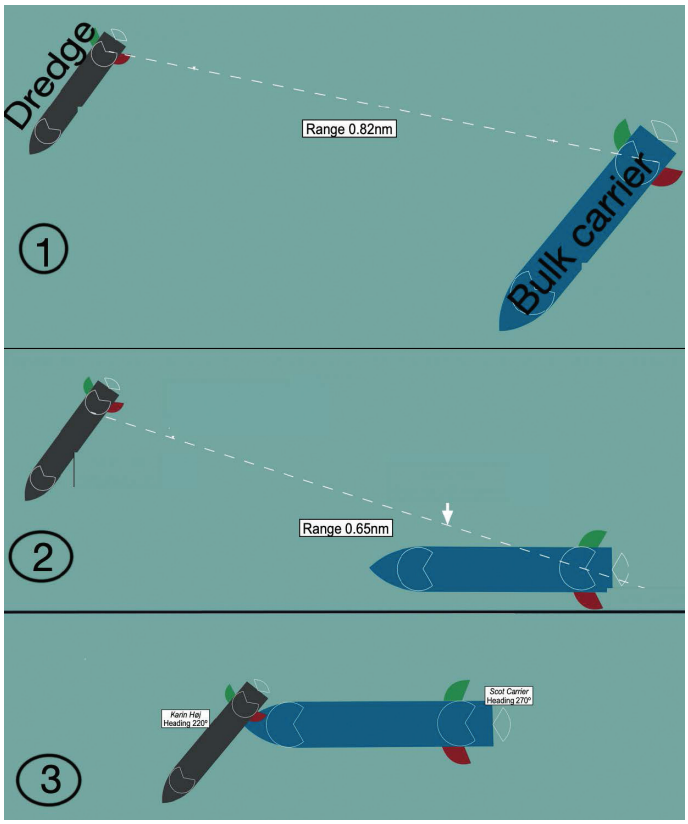
Shortly afterwards, he switched on the searchlight to show a chat user the ship's deck and cargo on the hatches forward. He then continued to engage with several individuals on the chat site. At 03:03, the bulk carrier's AIS registered the dredger as a dangerous target 2.2 nm ahead on the starboard bow, with a closest point of approach (CPA) of 0.88nm and a time to CPA of nearly 20 minutes. About 18 minutes later, with the vessel close to a course alteration waypoint, he told the chat user that he needed to alter course and adjusted the autopilot to 270 degrees. The dredger was now bearing 289 degrees at 0.82nm range (see picture 1).

Three minutes later, both vessels exited the TSS and entered a precautionary area. The OOW on the bulk carrier once again connected with a chat user and conversed with them while altering course. Now, the bulk carrier was steering 270 degrees with the dredger on a steady bearing of 298 degrees and a range of 0.6nm (picture 2). Very soon after, the OOW was heard to exclaim 'Wait, wait, wait!' He then pulled back the main engine propeller pitch control lever, switched on a second steering motor and disengaged the autopilot. Fifteen seconds later, he moved the telegraph to full astern.

Notwithstanding these last minute attempts, the bulk carrier collided with the port side of the dredger at a relative speed of 8.7kts (picture 3). The bulk carrier's Master awoke when he felt a bump; assuming it was a large wave hitting the bow, he did not consider it unusual and tried to resume sleep. The collision caused the dredger to roll over and capsize in as little as 20 seconds. Neither of the two crew members survived.

Following the collision, the bulk carrier's OOW did not immediately call the Master or raise the alarm, but returned the ship to its original course and speed. The dredger's automatic emergency radio beacon (EPIRB) transmission alerted local authorities and they determined that the two ships might have collided. Only after queries from shore authorities and about 15 minutes after the accident did the OOW call the Master and explain they might have collided with another vessel.

The investigation found, among other things, that the bulk carrier's OOW had reduced situational awareness due to unnecessary distractions; he had not seen the dredger until the last moment. The tablet had been almost constantly in use for over two hours, during which no interaction with navigational equipment such as target acquisition on the radar or target interrogation on the ECDIS was recorded on the Voyage Data Recorder (VDR). Additionally, the bridge equipment was not set optimally, and the alarms designed to warn of dangerous situations had been disabled, silenced or switched off. The investigation also found that, subsequent to tests after the accident, the OOW had been under the influence of alcohol at the time of the tragedy.



Lessons learned

- Time and again the lack of an adequate lookout has contributed to vessel collisions. In this case, both vessels had a lone OOW in darkness.
- Poor situational awareness due to distractions is a common theme in collisions.
- Following a collision at sea it is every mariner's duty not only to ensure the safety of their vessel and crew but also that of the other vessel. Any other reaction is not only unethical and unprofessional but probably criminal.
- Danger alarms on navigation instruments such as AIS, RADAR and ECDIS are safety features that, under almost all circumstances, need to be activated while underway.
- Alcohol does not mix with work. Not only are reaction time and coordination affected, but also overall judgment. For example, in some road vehicle 'hit and run' accidents where the driver has been under the influence of alcohol, it has been shown that they have deliberately decided not to stop to help the victim. This seems to have been the case in this accident as well.

MARS 202422

Hatch cover crush fatality

As edited from Marine Department (Hong Kong) report published October 2022

➔ A bulk carrier in ballast was underway for the next port of loading. The deck crew were coating the vessel's holds with lime in preparation for cargo. Some crew were in the hold applying the lime while others, in support, were on deck. An officer was on deck in an overall supervisory role.

In the late afternoon the hold coating operation work was nearing completion. The officer in charge needed to take photos of the coated holds, as required by the charterer. He slipped in between the partially open hatch cover and the hatch coaming to take the pictures. The crew members in the cargo hold heard the sound of the hatch cover moving and a loud yell.

The crew members working in the cargo hold came out to the main deck and asked why the hatch cover was closed. The deck crew replied that no one was operating the hatch cover at the time; they had not closed it. The officer was then found caught between the now closed hatch cover and the coaming. A return hydraulic oil hose for the hatch cover operation had ruptured and the hydraulic oil spilled on deck. This had caused the closure of the hatch by gravity.

The victim was killed instantly. His body was recovered from the scene as soon as the hatch cover control was repaired. Two days later, upon arrival at port the victim's body was delivered to shore authorities.

The investigation found, among others, that the hatch cover hydraulic lines and fittings were not incorporated into the vessel's planned maintenance system (PMS) so that the manufacturer's recommendations for use, maintenance and inspection could be correctly employed.

Lessons learned

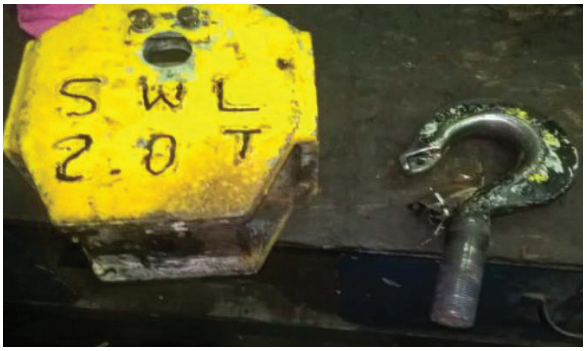
- The victim probably did not realise he was putting himself in a dangerous position – only the hydraulic pressure was keeping the hatch cover open. When this pressure was released due to a line failure the hatch cover quickly closed by gravity.
- Keeping hatches slightly open using only hydraulic pressure is a dangerous practice. Any deficiency in the hydraulic line can cause the hatch to quickly close without warning.
- Shipboard safety management system (SMS) procedures and the PMS should incorporate manufacturer's recommended operation, maintenance and inspection intervals.

MARS 202423

Engine room gantry hook defective

➔ A vessel was in dry dock and crew were engaged in various maintenance tasks. In the engine room, the gantry crane was being used to lift the main engine. The supervisor noticed that the crane's hook was not able to rotate under load. Work was stopped, the load relieved, and the hook was disassembled to permit investigation.

It was found that the inner mechanism of the hook was in poor condition. The thrust bearing was damaged and the threads of the hook were in poor condition.



Hook dismantled

Trust bearing found damaged

Lessons learned

- A stop work initiative is always advisable if a dangerous situation arises or if something seems out of the ordinary or not 'normal'.

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The PTC Group
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