

SUMMARY IN ENGLISH

The general cargo vessel STERNÖ was loaded with grain and southbound in Göta älv on Friday, 24 February, with pilot on board. When STERNÖ approached Ströms lock, the manning on the bridge consisted of the master and the pilot. The pilot handled the steering of the vessel, and the master handled the operation of the main engine according to the instructions from the pilot. The main engine was so-called reversible, and was driven in different directions of rotation due to the need for forward or reverse drive with the propeller. The vessel was equipped with a propeller nozzle around the propeller that could be rotated in a similar way as a conventional rudder. At 01:39, STERNÖ approached the jetty outside Ströms lock. When the speed was about 4.2 knots, the master initiated astern manoeuvre in accordance with the pilot's directive. The rotation of the main engine for reverse did not start, and thus no astern effect was obtained as desired. STERNÖ's course was changed further to port. The bow now pointed towards the jetty on port side. After first having performed an ahead manoeuvre in order to try to steer clear of the jetty on port side, a new astern manoeuvre was performed. The distance to the jetty was short, and STERNÖ could not avoid driving into the opening that existed in the jetty and thereafter grounded in shallow water and stopped.

As the main engine was still in full astern manoeuvre, and not immediately stopped, the vessel relatively quickly backed out in the channel again. When STERNÖ backed out the hull was struck by a dolphin on starboard side. The dolphin caused a penetration into the hull side below the water line, followed by water filling into the hull. Neither the pilot nor the crew of the vessel discovered the damage. Shortly thereafter, the vessel began to get a starboard list. STERNÖ moored shortly thereafter at 01:53 with port side alongside the jetty with a starboard list of 7–8 degrees.

Thereafter, the alarm was raised via the channel center which alerted, inter alia, SOS alarm and the Transport Agency's inspectorate. In the early stages of the event, the wrong conclusion was drawn that the vessel had water filling in one of the ballast tanks at the bottom on starboard side. Ballast filling in ballast tanks on port side began early in order to counteract the increasing list to starboard. Later, water filling was detected in the hull above the ballast tank deck. The vessel had an estimated list of 15–17 degrees to starboard at the most, and the ballast filling on port side continued as it was a common concern among the involved actors that the vessel would capsize outwards in the channel. Three crewmembers were aboard when the vessel slowly started to get upright and the starboard list decreased. Suddenly, STERNÖ capsized to port and became lying against the jetty with an estimated list about 20 degrees. The crew went ashore unharmed. Later, the vessel capsized even more to port and was at 06:31 in its final position with about 54 degrees list (see Figure 1).

STERNÖ was lying against the jetty and partly hanging in its mooring lines. There was a light oil film on the water as STERNÖ's engine room was filled with water. On Monday, 27 February, collaboration between the most important actors for the event began. The hired salvage company established a salvage plan. The planning meant that the ship would be floating at the end of the coming weekend before the channel was once again scheduled to open on Monday, 6 March, after a pre-planned shutdown. Due to many factors, and the consequences of the event, the salvage process became extended. On Thursday, 16 March, the vessel was raised to about 10 degrees list. Then the unloading of the vessel's cargo commenced to a barge. On Monday, 20 March, STERNÖ had been upright even more and

could then be towed through Ströms lock. Wednesday, 22 March, STERNÖ was towed from Lilla Edet to Gothenburg. The vessel was assessed to be a total loss and was scrapped.

The direct cause for the grounding was that the vessel did not get astern manoeuver in combination with the vessel at the same time altering course to port against shore. A contributing factor was that the vessel's manoeuvring system was not operationally safe. The cause of the water filling into the vessel was that a penetrating hull damage below the water line occurred when the vessel after the grounding backed away from the jetty, and was struck by a dolphin. The cause of the vessel's capsizing against the jetty was that active ballast filling occurred in conjunction with current water filling into the vessel that made it to capsize to port at an angle where the vessel had no positive residual stability.

The investigation reveals that a less serious event in connection with the manoeuvring of a vessel, under the influence of certain circumstances, can rapidly develop into a serious accident with an extended salvage process. The event thus, in addition to the causes to STERNÖ's grounding and capsizing, also highlights a number of issues regarding efforts and actions in connection with a major vessel accident.

Safety recommendations

Södra Bohusläns Räddningstjänstförbund (Rescue services of Southern Bohuslän) is recommended to:

- Clearly define the concept of ship accident in the municipal emergency response program and identify the resources that may be required in case of such an accident (see section 2.11). (*RS 2018:02 R1*)
- Carry out a risk assessment and prepare a specific checklist for action to be taken in case of a ship accident (see section 2.11). (*RS 2018:02 R2*)

MSB (Swedish Civil Contingencies Agency) in cooperation with the County Administrative Board of Västra Götaland County is recommended to:

- Further develop and carry out collaborative exercises for affected actors along the Göta Älv within the municipal emergency services area regarding serious ship accidents (see section 2.11). (*RS 2018:02 R3*)