



Transportation
Safety Board
of Canada

Bureau de la sécurité
des transports
du Canada

Marine Transportation Safety Investigation Report M20P0092

DRAGGING ANCHOR AND SUBSEQUENT COLLISION

Bulk carriers *Golden Cecilie* and *Green K-Max 1*
Plumper Sound, Southern Gulf Islands, British Columbia
30 March 2020

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Description of the vessels

The *Golden Cecilie* is a 198 m long bulk carrier of 34 311 gross registered tonnage. It was built in 2015 and is registered under the Hong Kong, China, flag (International Maritime Organization [IMO] No. 9692662) (Figure 1). At the time of the occurrence, there were 20 crew members on board.

Figure 1. *Golden Cecilie* (Source: Csaba Magyar, Shipspotting.com)



The *Green K-Max 1* is a 229 m long bulk carrier of 44 076 gross registered tonnage, built in 2019 and registered under the Liberian flag (IMO No. 9838058) (Figure 2). At the time of occurrence, there were 19 crew members on board.

Figure 2. *Green K-Max 1* (Source: Captain Peter, Shipspotting.com)



History of the occurrence

On 11 February 2020, the *Golden Cecilie* departed Busan, South Korea, for Vancouver, British Columbia (BC). At 2018¹ on 28 February, the vessel picked up a British Columbia Coast Pilots Ltd. pilot off Victoria, BC, and proceeded to Anchorage C in Plumper Sound, BC, allocated by the Port of Vancouver. At around 2312, the vessel anchored at Anchorage C using its port anchor with 5 shackles² in the water.

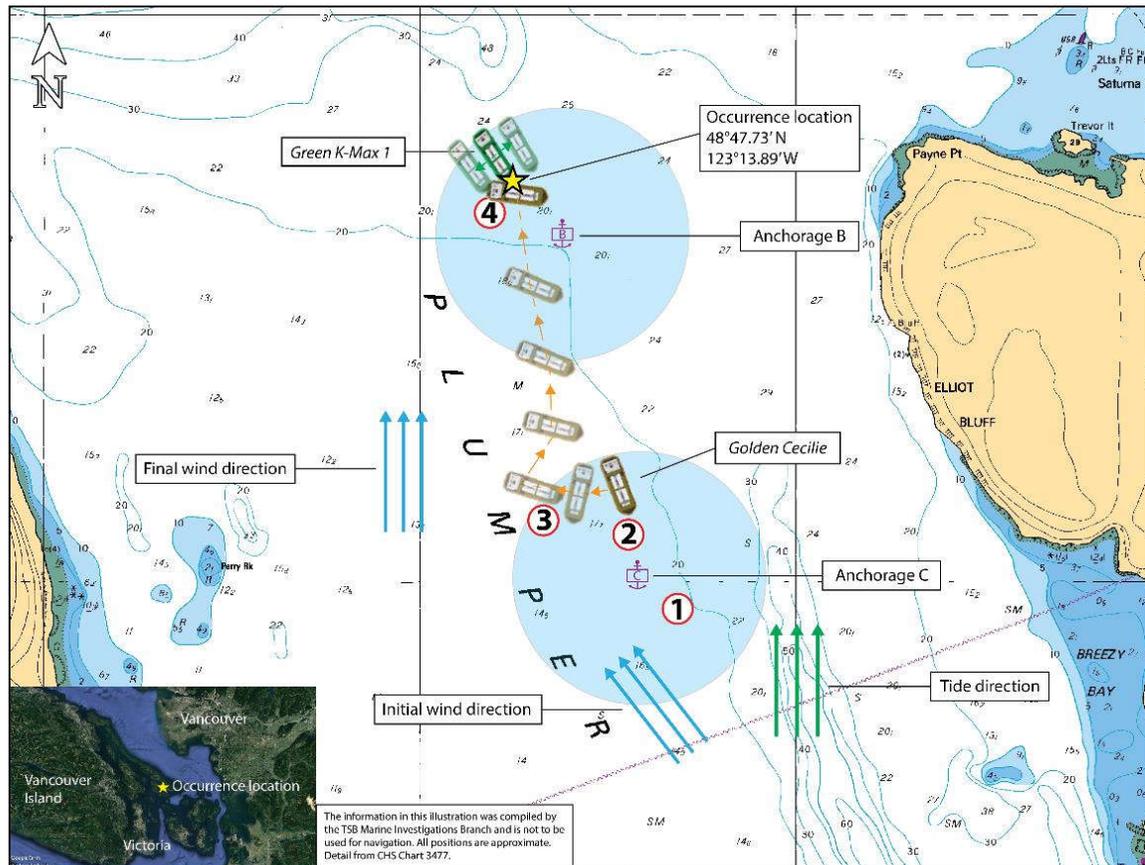
When the *Golden Cecilie* arrived at Anchorage C, the *Green K-Max 1* was anchored at neighbouring Anchorage B³ and had been since 24 February (Figure 3). The distance between the *Golden Cecilie* and the *Green K-Max 1* was about 1280 m. Both of the vessels were in ballast condition and were awaiting berthing instructions as their cargoes were not ready for loading. The *Golden Cecilie* had a draft of 4.63 m forward and 6.77 m aft with a freeboard of 12 m.

¹ All times are Pacific Daylight Time (Coordinated Universal Time minus 7 hours).

² One shackle is equivalent to 27.5 m.

³ There are 5 anchorage spots in Plumper Sound. The distance from the centre of Anchorage C to the centre of Anchorage B is approximately 750 m. According to Canadian Hydrographic Service Chart 3477, the depth at Anchorage C is approximately 17 m and the depth at Anchorage B is approximately 20 m. The radius of the swinging circle is 407.44 m at Anchorage C and 425.96 m at Anchorage B, as indicated by a Pacific Pilotage Authority Notice to Industry regarding the Southern Gulf Island anchorages and the Plumper Sound area issued on 15 January 2019 (Notice 01/2019).

Figure 3. Area of the occurrence (Main image source: Canadian Hydrographic Service, with TSB annotations; inset image source: Google Earth, with TSB annotations)



Legend

- 1 Initial anchored position of the *Golden Cecilie* on 28 February
- 2 New anchored position of the *Golden Cecilie* on 19 March after changing anchors
- 3 Anchor dragging alarm activates on the *Golden Cecilie*
- 4 The *Golden Cecilie* collides with the *Green K-Max 1*

On 19 March, the *Golden Cecilie's* crew obtained permission from Marine Communication and Traffic Services (MCTS) in Victoria to change over from its port anchor to its starboard anchor to prevent deposits from accumulating on the anchor as mentioned in the *Golden Cecilie* safety management system (SMS) manual.⁴ The crew deployed 2 shackles of chain for the starboard anchor, heaved up the port anchor, and then deployed 3 more shackles of chain for the starboard anchor. During the changeover, the crew used the vessel's main engine to manoeuvre approximately 370 m from its initial position and re-anchor closer to Anchorage B (Figure 3). The distance between the *Golden Cecilie* and the *Green K-Max 1* was then approximately 910 m. After shutting down the main engine, *Golden Cecilie's* master placed the main engine on "20-minutes notice," meaning that the main engine should start within 20 minutes from the time the bridge notifies the engine room or the duty engineer.

⁴ SeaTeam Management, Health Safety Quality & Environmental Management System: HSQE System Manual (01 January 2020).

During the time at anchor, the *Golden Cecilie's* bridge watch officers relied on NAVAREA warnings from Inmarsat C and NAVTEX that relay the local weather forecast. On 29 March at 1400, the 2nd officer on the *Golden Cecilie* recorded in the bridge log book that the barometric pressure was 1007 millibars (mb)⁵ and the winds were southerly at 7–10 knots (force 3 on the Beaufort scale). The *Golden Cecilie's* master left the bridge for the night at around 1700. The master's usual night orders referred to bridge instructions⁶ for the bridge watch officers to follow. The vessel's anchoring and anchor watch checklist⁷ specified that the master was to be notified if the wind speed reached 28–33 knots (force 7 on the Beaufort scale) and that the master, the duty engineer, and the forward station crew were to be called at the first sign of anchor dragging.

At 2200, the wind was recorded as southeasterly at 11–16 knots (force 4 on the Beaufort scale). At 2232, the NAVAREA weather forecast indicated an approaching gale 636 miles from the *Golden Cecilie* with southeasterly winds at 25–35 knots (force 6–7 on the Beaufort scale). The Environment and Climate Change Canada (ECCC) weather forecast indicated that strong winds of 20–33 knots were expected to occur in the Plumper Sound area. At 0000 on 30 March, the 3rd officer recorded the barometric pressure as 1002 mb and the wind speed as increasing to 17–27 knots (force 5–6 on the Beaufort scale) in the same southeasterly direction in the bridge log book.⁸

Soon after, the 2nd officer arrived on the bridge and relieved the 3rd officer. At 0200, the wind was recorded as southerly at around 28–33 knots in the bridge log book and the barometric pressure was recorded as 995 mb. At about 0310, the 2nd officer on the bridge observed that the vessel was yawing due to wind gusts.

At 0310:47, the dragging anchor alarm activated on the electronic chart display and information system (ECDIS) alarm logger. The 2nd officer also noticed that the vessel's position on the radar had changed and that the vessel was drifting towards the *Green K-Max 1*. The 2nd officer asked the duty able-bodied seaman to proceed to the bow and check the anchor.

The 2nd officer then informed the master and the duty engineer⁹ that the vessel was dragging anchor and asked the duty engineer to prepare the main engine. The duty engineer immediately proceeded to the engine room and alerted the 2nd engineer and chief engineer who joined him.

At 0320, the master arrived on the bridge. He ordered the able-bodied seaman to prepare the port anchor for deployment and asked the anchor team, consisting of the chief officer, the bosun, and a deck cadet, to proceed to the anchor station immediately. At 0325, the master ordered them to deploy the port anchor. The team tried to drop the port anchor, but it would not deploy. While attempts to deploy the port anchor continued, the anchor team paid out an additional 2 shackles on the starboard anchor chain, as per the master's orders, in an attempt to prevent the vessel from drifting further. While the team was still attempting to deploy the port anchor, the *Golden Cecilie* was

⁵ The nominal barometric pressure at sea level is 1013.25 millibars (mb) absolute or 14.696 psi absolute.

⁶ SeaTeam Management, STP-005 – Bridge Instructions, February 2010. These instructions did not specify to call the master if the wind speed reached 28–33 knots.

⁷ SeaTeam Management, BDC – 008 Anchoring and Anchor Watch Checklist.

⁸ The drop in barometric pressure and increase in the wind speed indicated deteriorating weather conditions.

⁹ At night, the engine room is unmanned and the duty engineer remains in his cabin where he can receive phone calls or engine room alarms.

drifting toward the *Green K-Max 1* at a speed of about 1.4 knots under the influence of the wind on its high freeboard.

Meanwhile, the *Green K-Max 1*'s officer of the watch noticed on the radar that the *Golden Cecilie* had changed position. He contacted the *Golden Cecilie*'s bridge crew to determine if the vessel was dragging anchor. Upon receiving confirmation, the *Green K-Max 1*'s officer of the watch informed the *Green K-Max 1*'s master, who came on the bridge. The master ordered the *Green K-Max 1*'s anchor team to proceed to the anchor station to pay out more starboard anchor chain so that the vessel could move away from the *Golden Cecilie*. The anchor team paid out a total of 11 shackles in the water and the *Green K-Max 1* drifted about 185 m northwest of its original location (Figure 3).¹⁰ The *Green K-Max 1*'s main engine was on a 10-minute notice, but the *Green K-Max 1*'s master did not call for it to be started.

At 0326, as the *Golden Cecilie*'s anchor team were still having difficulties releasing the port anchor, the master ordered the starboard anchor to be paid out more. At about 0327, the starboard anchor was paid out 2 additional shackles to a total of 7 shackles in the water. Shortly afterwards, the anchor team managed to release the port anchor from its stowed position and deployed about 12 shackles. At 0328, the engineers started the main engine. The master ordered both anchors to be heaved up and used the main engine in an attempt to move away from the *Green K-Max 1*. The *Golden Cecilie* continued drifting toward the *Green K-Max 1* at a speed of about 1.4 knots. At 0330, the *Golden Cecilie*'s port mid-section collided with the starboard bow area of the *Green K-Max 1*.

At 0331, with the *Golden Cecilie*'s engine running slow ahead, the master attempted to move away from the *Green K-Max 1*, but was unsuccessful. The gusty wind caused the *Golden Cecilie*'s abaft port mid-section to collide with the starboard bow of the *Green K-Max 1* a second time, causing damage to both vessels. At some point during this sequence of events, the *Golden Cecilie*'s port anchor became entangled with the *Green K-Max 1*'s port anchor chain.

At 0332, the *Golden Cecilie*, with its engine at half ahead, managed to clear a distance of about 370 m from the *Green K-Max 1*. However, because the *Golden Cecilie*'s port anchor was still entangled with the *Green K-Max 1*'s port anchor chain, the *Golden Cecilie* was pulling the *Green K-Max 1* at about half a knot. At 0342, the *Golden Cecilie*'s crew heaved up the starboard anchor. While attempting to heave up the port anchor, they became aware that it was entangled with the *Green K-Max 1*'s port anchor chain and stopped. The masters on both vessels requested pilots and assist tugs.

By 1030, pilots had boarded both vessels and untangled the anchor from the chain. Escorted by tugs, the *Golden Cecilie* re-anchored at Anchorage C and the *Green K-Max 1* re-anchored at Anchorage B.

Damage

The contact between the vessels resulted in a 30 cm diameter hole in the *Golden Cecilie*'s port hull about 3 m below the deckline in the No. 5 top side water ballast tank, as well as a rectangular dent in the port hull in way of the No. 4 top side water ballast tank. The *Green K-Max 1* had minor damage to its starboard bow in way of its No. 1 starboard ballast tank. The damage to both vessels was above the waterline. There was no pollution.

¹⁰ According to the *Green K-Max 1*'s automatic identification system signal.

Environmental conditions

At the time of the occurrence, it was dark and raining and the visibility was 10 nautical miles. The wind was south-southeasterly at around 22–27 knots (force 6 on the Beaufort scale) with gusts of wind at about 41 knots. The current direction was toward the north with a swell height of 2.5–4 m.

ECCC's historical data shows that, in March and April, the wind speed around the area can reach 45–55 knots (force 9–10 on the Beaufort scale). On 21 January 2018, the wind speed was recorded as 59 knots (force 10 on the Beaufort scale), which was the maximum recorded wind speed in the previous 5 years.

Weather broadcast by Marine Communications and Traffic Services

Environmental conditions information disseminated by ECCC can be collected by various authorities, such as the Pacific Pilotage Authority (PPA) and the Port of Vancouver, which can further direct MCTS to distribute this information to crews. For vessels anchored in Vancouver Harbour, Constance Bank, and Prince Rupert Harbour, MCTS have procedures in place to issue weather broadcasts when the wind speed is more than 25 knots. The weather broadcasts also advise crews to keep their main engine(s) on stand-by and the second anchor ready to be deployed. These procedures were put in place on behalf of the PPA, the Vancouver Fraser Port Authority, and Prince Rupert Harbour.

MCTS does not have any procedures in place to issue weather forecasts for vessels anchored in the Plumper Sound anchorages. Transport Canada is responsible for vessels anchored in Plumper Sound, but leaves it to individual crews to contact MCTS directly for updated weather forecasts in the area.

Managing the risk of dragging anchor

Between January 2015 and March 2020, a total of 102 dragging anchor occurrences along the BC coastline were reported to MCTS. When a vessel drags anchor, it can result in a collision, a grounding, or other emergency situations.

The *Golden Cecilie* had an SMS manual that included guidance and recommendations on how to mitigate the risk of dragging anchor:

- While at anchor, the vessel's crew should observe weather, tidal, and sea conditions and ensure the state of readiness of the main engines and other machinery as per the master's instructions. The crew should also notify the master if the vessel drags its anchor and undertake all necessary measures.¹¹
- Weather forecasts should be used as much as possible to assess the weather conditions on arrival at the anchorage and while at anchor.¹²
- To prevent anchor dragging, the crew should use sufficient chain length and take into consideration the prevailing and anticipated weather, tide, current, and draft conditions.¹³

¹¹ SeaTeam Management, Health Safety Quality & Environmental Management System: Operations Manual (01 January 2020), Part A: Bridge and Deck Procedures, Section 2.0: Bridge watch, Subsection 2.3: Duties of The Officer of The Watch, p. 15.

¹² Ibid, Section 4.0: Safe navigation, Subsection 4.3.6.2: At Anchor, p. 17.

¹³ Ibid, Subsection 4.3.2: Anchoring – Generic Guidance, p. 15.

- The master and the bridge team should discuss the anchoring position, the holding ground, the water depth, the expected height of swell, the vessel draft, the duration of stay at anchor, the traffic situation, and the number of vessels at anchor and their proximity.¹⁴
- When adverse weather is expected, the master and the bridge team should undertake a risk assessment to decide whether to remain at anchor or proceed at sea.¹⁵

In this occurrence, the crew did not collect the daily local weather forecast for the day of occurrence from the very high frequency radio, weather fax, medium frequency-high frequency broadcast, nor did the crew obtain an up-to-date weather warning from local authorities such as ECCC or MCTS. As a consequence the crew did not follow established procedures to ready the vessel and crew for impending adverse weather conditions. As well, factors that impact dragging an anchor had not been taken into consideration as per the SMS, and the emergency preparedness to respond to adverse weather was inadequate.

TSB Watchlist

The Watchlist identifies the key safety issues that need to be addressed to make Canada's transportation system even safer. Safety management is one of these issues and, in the marine sector, TSB investigations have found that, even when formal processes are present, they are often not effective in identifying hazards or reducing the risks. The *Golden Cecilie's* SMS was certified and audited by an approved authority. However, the investigation identified gaps in the effectiveness of safety management relating to the vessel's preparedness for adverse weather.

Safety action taken

Following the occurrence, the *Golden Cecilie's* operator, SeaTeam Management Pte Ltd., took the following safety action:

- The anchoring and anchor watch checklist was amended on 01 May 2020 to indicate that the master should be informed immediately if the barometric pressure drops by 3 mb during watch or if the wind speed exceeds 21 knots (force 5 on the Beaufort scale). In such circumstances, the engines are to be placed on standby and the deck watch is to monitor the anchor position.
- The checklist was also amended to specifically indicate the engine notice period as per the master's instruction.
- A notice was sent to the vessels informing them that they should be documenting the engine notice period, the state of readiness, and the position of the second anchor in the bridge log book.
- A "Safety Flash" bulletin was circulated to all vessel crew members stressing the importance of proper anchor watches and compliance with the SMS.
- Bridge resource management refresher training was arranged for bridge watch officers.

Safety messages

When vessels are at anchor, crews need to collect weather forecasts from all available sources in a timely manner; be aware of the risk factors that can lead to dragging anchor, in particular excessive

¹⁴ Ibid, Subsection 4.3.6.2: At Anchor, p. 17.

¹⁵ Ibid, p. 18.

freeboard and inadequate ballasting; and ensure that the main engines, anchors, and deck machinery are ready so that corrective action can be taken at the first sign of dragging anchor.

This report concludes the Transportation Safety Board of Canada's investigation into this occurrence. The Board authorized the release of this report on 27 January 2021. It was officially released on 08 February 2021.

Visit the Transportation Safety Board of Canada's website (www.tsb.gc.ca) for information about the TSB and its products and services. You will also find the Watchlist, which identifies the key safety issues that need to be addressed to make Canada's transportation system even safer. In each case, the TSB has found that actions taken to date are inadequate, and that industry and regulators need to take additional concrete measures to eliminate the risks.

ABOUT THIS INVESTIGATION REPORT

This report is the result of an investigation into a class 4 occurrence. For more information, see the Policy on Occurrence Classification at www.tsb.gc.ca

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