

The Example of the Astro Nembus in the Southern Gulf Islands: What Are the Risks of Cargo Ships Losing Engine Power in Confined Spaces?

The catastrophic collapse of Baltimore's Key Bridge in March 2024 was caused by only moments of power failure on the container ship Dali.

Loss of propulsion by cargo ships is more common than generally assumed. It may have just happened to the Astro Nembus in the Southern Gulf Islands in August 2024.

Reported marine incidents reveal hundreds of such cases in recent years, both for the U.S. and for Canada. What are the risks of out-of-control cargo ships in the narrow passages in the ecologically sensitive marine ecosystems of the Gulf Islands, and what can be done in response?

EXECUTIVE SUMMARY:

Astro Nembus, a 200 m long bulk carrier with a capacity of loading about 64,000 tonnes, left the Port of Vancouver on August 9th 2024, possibly loaded with potash. Close to Saturna Island the speed dropped, possibly due to a lack of propulsion, and the ship engaged in a U-turn and very slowly moved or drifted another 4 km.

About 2.5 hrs after the ship suddenly started to drop in speed, a tugboat arrived and brought the cargo ship into anchorage at Plumper Sound B in the Southern Gulf Islands.

The response time raises questions whether timely assistance is possible at remote anchorages away from port infrastructure. A large ship adrift in the narrow passages of the Southern Gulf Islands could cause massive damage to the marine environment from grounding and fuel leakage.

Official records reveal that temporary systems failures on ships such as loss of propulsion and navigability are not rare. In the last 3 years almost 500 similar incidents for solid cargo ships were reported to the Transportation Safety Board of Canada, with an average of 170 per year. This suggests that the next incident of an out-of-control ship is waiting to happen, possibly in a narrow passage where even moments of system failure may render an accident unavoidable.

Options for preparedness are limited. Potentially hazardous materials should not be allowed into the Southern Gulf Islands. Infrastructure for sufficient preparedness may only be possible in port near terminals, thus ruling out remote anchorages for daily port operations as a viable long-term option.

Reported Incidents: How Common Are Out-Of-Control Cargo Ships?

The catastrophic collapse of Baltimore’s Key Bridge in March 2024 with loss of life raised serious questions about safety in the shipping industry.

On April 16th, the *Washington Post*¹ reported interviews with experts and their analysis of U.S. Coast Guard records: “[...] 424 cargo ships longer than 600 feet reported losing propulsion — meaning the engines were shut down — in U.S. waters over the past three years. About a quarter of the incidents occurred near a port, bridge or other infrastructure, the analysis found.”

The Transportation Safety Board of Canada publishes annual statistics of the mandatory reports of “marine occurrences”, which are defined as any situation or condition that the Transportation Safety Board has reasonable grounds to believe could, if left unattended, induce an accident or incident².

Not including actual accidents, there were 793 marine incidents reported in 2023. In recent years, the majority (approximately 80%) of reportable incidents involved the “**total failure of any machinery or technical system**” (Table 1).

Cargo ships are the second most affected category (after fishing vessels).

In the three most recent years, almost 500 such incidents were reported by large cargo ships in Canadian waters.

Table 1 gives a breakdown of these numbers, with 139 incident reports of total failure of any machinery or technical system for cargo ships in 2023, and an average of 170 such incident reports over the past 4 years.

Table 1: Extract from the annual reports by the Transportation Safety Board of Canada².

Transportation Safety Board Records	2023	2022	2021	2020	Average
Total marine incidents reported	793	968	855	925	885
Total failure of any machinery or technical system	632	792	730	756	728
Total failure for solid cargo vessels	139	182	168	189	170

Southern Gulf Islands: What Happened to the Astro Nembus on August 9th, 2024?

Note: The following is a preliminary summary based only on public sources. Any final interpretations and conclusions are pending verification and additional evidence. It is currently unknown if the Transportation Safety Board will initiate an investigation.

The chronology of events below is based on the Automatic Identification System (AIS), which is an automatic tracking system that uses transceivers on ships and is publicly accessible through vessel traffic websites (e.g. myshiptracking.com), with additional information made public by the Pacific Pilotage Authority.

- (1) The Astro Nembus arrived at Neptune Terminal 2 on 03-Aug and left 09-Aug at approx. 01:15. This terminal is used for loading of potash³. Since the draught of the outgoing ship was deep at 13.5m, it is likely that the ship had been loaded with potash.
- (2) At ~05:30 Astro Nembus was close to Saturna Island at a regular travelling speed of ~12 knots.
- (3) Something happened shortly after. At ~05:40 Astro Nembus had slowed down to ~9.5 knots and kept slowing down, steering a more or less straight course alongside Saturna Island (Figure 1).
- (4) The ship further slowed down to about 4 knots and then at ~06:15 seemed to have taken a 180 degree tight U-turn, then moved or drifted sideways as shown in the ship's position in Figure 1, while slowing down to ~0.9 knots and covering a stretch of about 4 km in about 1.5 hrs.

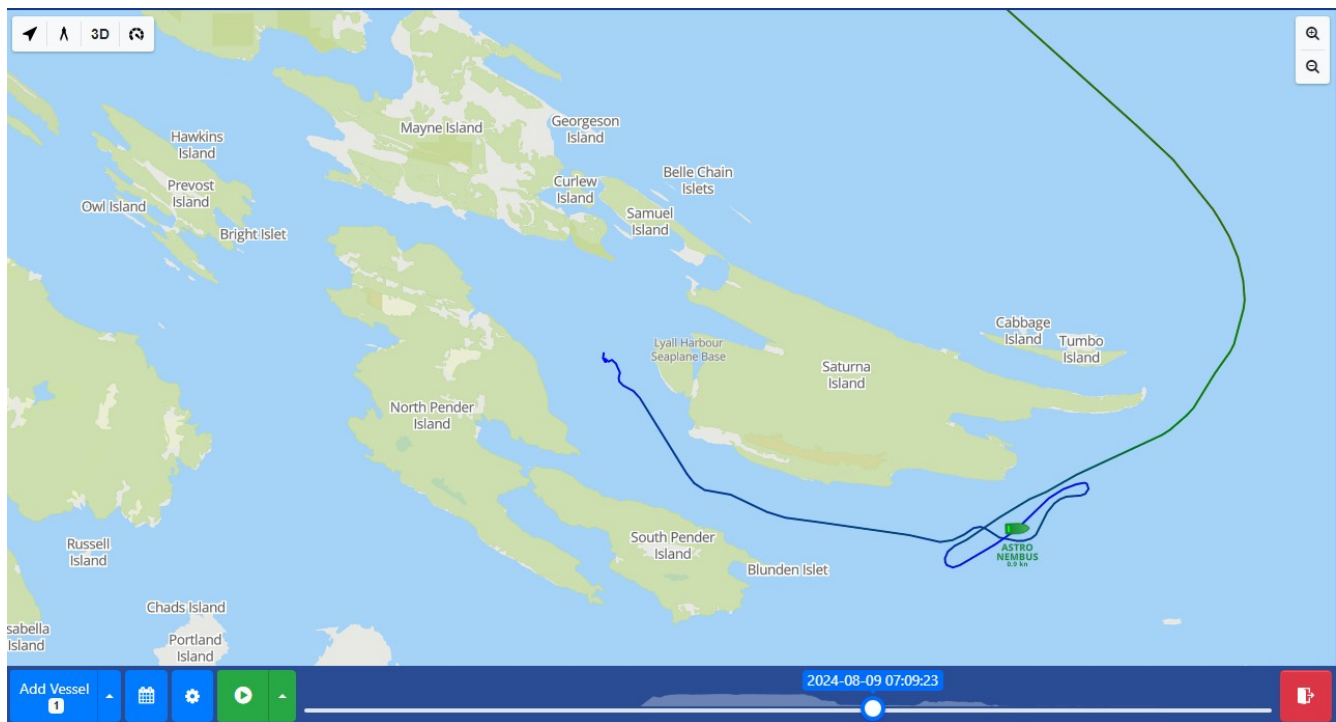


Figure 1: Track of the bulk carrier Astro Nembus in the morning of August 9, 2024. [Source: AIS via myshiptracking.com].

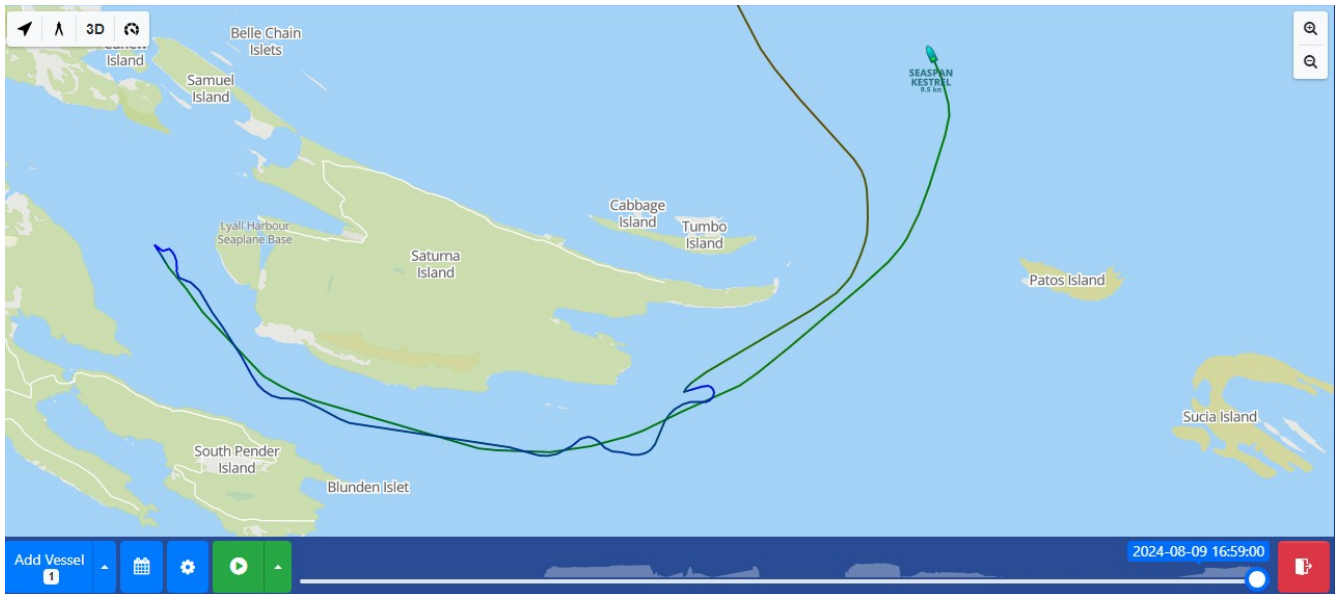


Figure 2: Track of the tugboat Seaspan Kestrel in the morning of August 9, 2024 until 16:59 on the same day. [Source: AIS via myshiptracking.com]

(5) At ~07:55 the tugboat Seaspan Kestrel met with Astro Nembus (Figure 2). Initial preparations took about half an hour, then Seaspan Kestrel brought Astro Nembus at ~5 knots to anchorage "Plumper Sound B" between Saturna and North Pender Island (arrival ~10:17). During that time, the status of Astro Nembus at AIS was listed as "Not under command". This travel path was more wobbly than during normal operation, as exemplified by the smooth return route by the tugboat Seaspan Kestrel in Figure 2 (departed from anchorage ~15:38).

(6) It took the tugboat approximately 2.5 hrs to arrive on scene after the bulk carriers speed started dropping. It took approximately 3 hrs in total after the incident occurred until the tugboat was able to start bringing the bulk carrier away.

(7) Circumstances of the Seaspan Kestrel: It appears that this tugboat had been working near or at Coal Harbour during the night. After 4 am it appears to have moved over to the adjacent BC Ferry Terminal and docked in the vicinity. It left only at ~06:30, or almost an hour after the incident occurred. It then travelled at about 14 knots and the voyage took almost 1.5 hrs to the accident site.

(8) Departure of Astro Nembus: Left anchorage 10-Aug ~00:45 after about 14 hours around Saturna Island in direction English Bay (arrival ~06:58). Left English Bay about 4 hours later at ~11:19 and steered at regular travelling speed of approximately 12 knots into the open Pacific.

What Are the Risks of Out-Of-Control Cargo Ships in the Southern Gulf Islands?

The example of the Astro Nembus raises serious concerns regarding safety of the marine ecosystems and local communities in the Southern Gulf Islands, particularly regarding the consequences if similar events happen in more confined passages in these islands.

The described incident of the Astro Nembus occurred within a core habitat of the protected Southern Resident Killer Whale Population. The ship's course was within or adjacent to subarea 18-5 of the protection measures, and at times within about a kilometer of sanctuary zones where any boating and vessel traffic is excluded⁴.

It is important to emphasize that the described observations from public sources do not allow any conclusions whether this incident of the Astro Nembus posed any real danger of harm to human life or marine ecosystems at any time, without additional information or an investigation that would suggest any such danger in this case.

In contrast, the example of the Astro Nembus raises the question of how safe the marine ecosystems in the Southern Gulf Islands are when similar incidents will happen in the future in other passages that may be less forgiving in the specific circumstances.

Given the limited information at this moment, the scope of the following questions and issues can only be preliminary.

What would happen if a cargo ship loses control in a narrow passage in the Southern Gulf Islands?

There are several passages and turns in these islands where ships travel only a few hundred meters from rocks or other ships at anchor. At the common speed of 14 knots it would take less than a minute to grounding or collision, and even if control was regained earlier, the question arises how likely the course could still be corrected before impact?

What would happen if fuel and hazardous material were spilled in the confined waters among islands? The example of the ZIM Kingston demonstrated how hazardous materials can go overboard or catch fire⁵. Even cargo that is usually not considered hazardous could have devastating effects on sensitive marine ecosystems. For example, potash is a mineral fertilizer that could disturb the local water chemistry, cause massive algal blooms, and lead to ecological dead zones because dying algae cause a lack of oxygen and light. Or what would coal and coal dust do to marine life in confined spaces?

What infrastructure and what response times would be necessary to avoid future disasters?

The official investigation into the ZIM Kingston accident revealed significant shortcomings in preparedness for marine accidents in B.C. waters⁵. The response time of an arriving tugboat in the example of the Astro Nembus was over an hour and may have been up to 2.5 hours. If the Astro Nembus was adrift for 1.5 hrs and shifted 4 km, what would have happened if this had been inside the group of islands? American maritime experts stated that the frequency of propulsion loss points to a risk that must be better managed, and that tugboats should routinely help cargo ships in confined spaces¹. But in the case of the Gulf Islands, would such measures not be too expensive and furthermore add unwanted noise and pollution?

Are the risks (and necessary costs for preparedness) proportional to commercial benefits of using remote anchorages in the Southern Gulf Islands? There is no infrastructure for accident avoidance and for accident preparedness in the Southern Gulf Islands. Does it really make sense to have industrial daily port operations sent into remote anchorages – far away from the necessary infrastructure available in port to assist vessels when needed? Several less costly and less risky alternatives have been suggested by experts^{6,7,8}, for example a more efficient vessel scheduling system with just-in-time arrival at port, and new techniques and locations closer to port and terminals such as Single Buoy Moorings (SBM), which would also allow denser packing of waiting ships at port and better decarbonization of port emissions than the current use of remote anchorages.

Until long-term solutions are applied to eliminate the use of anchorages in the Southern Gulf Islands, preparedness regarding hazardous materials should be enacted immediately. Cargo ships loaded with hazardous materials or materials potentially harmful to these sensitive and important marine ecosystems should not be allowed into the Southern Gulf Islands.

References:

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- ⁴ Fisheries and Oceans Canada (DFO): Map of management measures in the Gulf Islands to support Southern Resident killer whale recovery. Release date: May 2024.
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