

MARINE INVESTIGATION REPORT

M98L0165

GROUNDING

OIL AND CHEMICAL TANKER "JADE STAR"

ENTERING GASPÉ HARBOUR, QUEBEC

24 DECEMBER 1998

The Transportation Safety Board of Canada (TSB) investigated this occurrence for the purpose of advancing transportation safety. It is not the function of the Board to assign fault or determine civil or criminal liability.

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Summary

In darkness and in clear weather, the tanker "JADE STAR" grounded on the south-east shallows of the Presqu'île de Penouille on the north shore of Gaspé harbour. The "JADE STAR" was lightered by her sister ship the "DIAMOND STAR" and refloated with the assistance of the tug "ATLANTIC SPRUCE" two days later. There was no apparent damage to the vessel and no pollution.

Ce rapport est également disponible en français.

Other Factual Information

	"JADE STAR"
Port of Registry	Halifax, Nova Scotia
Flag	Canada
Official Number	814370
Type	Oil and chemical tanker
Gross Tons ¹	6,262
Length	123.7 m
Draught	7.56 m forward / 7.83 m aft
Built	1993, Wismar, Germany
Propulsion	MAN-B&W diesel, 3,700 kW, driving a single, controllable-pitch propeller
Crew	14
Registered Owner	Rigelchem Jade Ltd., Isle of Man

The "JADE STAR" is equipped with all of the regulatory navigating instruments for a ship of her class and size. She is a double-hulled oil and chemical products tanker with the double-hull space serving as ballast tanks when necessary.

The master of the "JADE STAR" had a Master Home Trade certificate of competency and had been acting in the capacity of master on various ships since 1968. He had been master on the "JADE STAR" or her sister ships, the "DIAMOND STAR" and the "EMERALD STAR", for the past two years. Over the years, he had entered and left Gaspé harbour many times without a pilot.

The officer of the watch (OOW) had a First Mate Home Trade certificate of competency issued in 1995. He had entered and left Gaspé harbour at the con many times within the last few years.

At 2336 eastern standard time² (EST) on 22 December 1998, the "JADE STAR" left the port of Québec with two parcels of gasoline and diesel cargo bound for the Sandy Beach wharf at Gaspé, Quebec. Shortly after departure, the receiver/transmitter for the X-band radar (3 cm wavelength) failed. The radars were then inter-switched so that both radar displays, one at each conning position, were using the S-band (10 cm wavelength) receiver/transmitter.

¹ Units of measurement in this report conform to International Maritime Organization (IMO) standards or, where there is no such standard, are expressed in the International System (SI) of units.

² All times are EST (coordinated universal time (UTC) minus five hours) unless otherwise stated.

The rest of the transit towards the port of Gaspé on December 23 and the early morning of December 24 was uneventful. On December 24 at 0400, a routine change of watch occurred. The relieved OOW plotted the ship's position on the chart and passed all relevant information to the relieving OOW. The ship was approximately 7.5 nautical miles from the narrows at the entrance to Gaspé harbour, steering on the ranges that are 307.5° true (T), with the engine control at full ahead, and making good a speed of 12 knots.

At approximately 0420 the master arrived on the bridge. The OOW retained the con of the vessel, as was the practice on board, and was to con the vessel through the narrows at the entrance to Gaspé harbour. At approximately 0427 the OOW instructed the helmsman to revert to hand steering. At or about this time the deck lights were illuminated to assist in preparations on deck for the arrival at Sandy Beach wharf. At this point the vessel was approximately two nautical miles from the narrows at the entrance to Gaspé harbour.

The OOW was conning the vessel according to the passage plan, steering on the ranges and using a radar distance ahead to track the vessel's progress. On radar he had detected the unlit spar buoy HD-9 ahead and to port, as he expected, but the Sandy Beach Bar was not showing up on the radar. Also, no radar indication was showing for the radar transponder beacon (RACON) located on the rear light of the ranges.

At approximately 0437 the OOW had determined, by a radar distance ahead and by a bearing of 270° T clearing the spar buoy HD-9, that the vessel had arrived at the alter-course position, and ordered 10 degrees port wheel. As the helmsman was bringing the wheel over to port, the master, who was sitting at the other conning position and observing the other radar screen, countermanded the order saying it was too early to start the turn. The OOW instructed the helmsman to bring the vessel back onto the ranges.

At this point the master expressed his belief that the radar echo ahead at seven cables was a band of ice and not the shoreline of Presqu'île de Penouille. He put the engine at half ahead. The OOW believed spar buoy HD-9 was approximately 700 feet on the port beam and proceeded to the port side of the bridge to try and find it with the aid of the ship's searchlight. At some point during this period, the vessel's global positioning system (GPS) alarm sounded, indicating that the ship had arrived to the planned alter-course position to steer 270° T.

At approximately 0440, 50 minutes before high water, the "JADE STAR" grounded in sand in approximately 5.5 m of water, 1.8 cables south-east of Presqu'île de Penouille, still on the ranges and with the engine at half ahead. At this time the master reversed the pitch to give 100 per cent reverse thrust, but the vessel did not move.

After transferring 1,500 tonnes of cargo to the "DIAMOND STAR" and with the help of the tug "ATLANTIC SPRUCE", the "JADE STAR" was refloated on December 26. There was no apparent damage and no pollution as a result of this occurrence.

Analysis

While pilotage services are not compulsory to enter Gaspé harbour, they are usually available and used by foreign-going ships arriving and departing this port. Canadian coastal traders such as the “JADE STAR” rarely if ever take pilots to enter Gaspé harbour, as their crews are well versed in the local knowledge necessary to execute these manoeuvres.

It was the master’s practice to maintain full speed if the conditions permitted because the ship’s manoeuvrability was enhanced at higher speeds. No reduction in speed was planned for the entrance into Gaspé harbour. At the moment the master countermanded the port helm order, he placed the engine control at half ahead.

Approximately two and a half minutes later the vessel grounded. Given the momentum of the vessel, there would have been minimal reduction in the speed of the vessel during that period. Good seamanship dictates that speed be adjusted according to the prevailing conditions of light or darkness, sea room, traffic, weather conditions, available navigational aids and other restrictions.

Given that:

- the narrows at the entrance to Gaspé harbour are approximately 2.5 cables wide and a major change of course is necessary at this point;
- in winter months the two lighted buoys at the narrows are replaced by one unlit winter spar buoy;
- the RACON was not operational;³ and
- certain key radar targets such as Sandy Beach Bar were not visible on radar;

it is reasonable to conclude that a speed of 12 knots was excessive under these conditions.

At a speed of approach of 12 knots, the bridge team had two and a half minutes to resolve an ambiguous situation before the grounding. At 6 knots, the team would have had five minutes to plot the vessel’s position and take appropriate action.

Both the OOW and the master reported that the range lights were very bright. Their night vision was further affected by the illumination of the deck lights some minutes before arrival in the narrows.

To determine the alter-course position at the narrows, the OOW had set up an electronic bearing marker (EBM) for the next course to steer of 270°T, and a variable range marker at 0.7 nautical mile from the small point of land ahead. This allowed 650 feet advance for a 37-degree course alteration and was within the manoeuvring characteristics of the vessel. By remaining on the ranges until the alter-course distance was achieved, and having the EBM clear the port hand buoy HD-9 as confirmation, he was ready to execute the course alteration. This is consistent with good conning practice, but is not complete in itself. The last plotted position of the vessel was at 0440, 40 minutes before the grounding. Although most other aspects of the passage plan seem to have been well planned and executed, the fact that the

³ The RACON is a dual X- and S-band beacon, and should have been painting two long pulses followed by a short pulse (- - •) on the radar displays.

vessel's progress was not adequately monitored (by positively fixing the position on the chart at more frequent intervals during the approach) increased the possibility of a grounding.

At about 0437 the master had assumed *de facto* con of the vessel by countermanding the OOW's port helm order. He relied on the fact that Sandy Beach Bar was not showing up on the radar, indicating to him that the vessel must not have been as far advanced as the OOW thought. The fact that the X-band radar was not functional may have had an effect at this juncture. An X-band radar is generally better at picking up low-lying objects and it might have indicated Sandy Beach Bar, had it been operational.

The master did not believe the radar echo to port was buoy HD-9. Additionally, he assumed the radar echo ahead (at about six cables) to be a band of ice and not the shore of Presqu'île de Penouille, believing that another point of land, approximately five cables north-west of the rear range light, was this feature.

Once a hypothesis is formed, it is resistant to change. Having made certain assumptions, the master became susceptible to what is termed "confirmation bias" or "hypothesis locking." He chose to interpret the information available to him in a manner that confirmed the assumptions made; the other, equally valid information available (the radar echo of buoy HD-9 and the GPS alarm) was not taken into account.⁴ The effect of hypothesis locking is so great that it may take the intervention of another person with contradictory information to overcome it. In this instance, however, the OOW did not challenge the master's intervention and immediately relinquished the con of the vessel to the master.

The passage plan, as indicated on the vessel's chart (number 4416), showed buoys HD-8 and HD-9 as being in position at the entrance to Gaspé harbour. On 9 October 1998 the Canadian Coast Guard broadcast NOTSHIP L-2350 announced the lifting of summer buoys and the mooring of winter spar buoys in the Laurentian Region. Mariners were requested to contact the appropriate marine communications station for detailed information on the progress of the work. As of 7 December 1998 Coast Guard radio stations were in possession of a report indicating that buoy HD-8 had been lifted for the winter season and buoy HD-9 had been replaced by an unlit winter spar.

This information was available to any mariner who requested it. If vessels' masters and navigating officers are to assume pilotage duties in non-compulsory pilotage areas, a proper and complete passage plan is necessary. The fact that no note had been made on the chart or elsewhere to indicate to the bridge team the special status of buoys HD-8 and HD-9 created ambiguity and confusion at a critical moment. Specifically, the OOW believed a winter spar to be present in place of buoy HD-9, whereas the master believed that both buoys had been removed for the winter.

Although the GPS alarm sounded, announcing the vessel's arrival at the alter-course position to steer 270°T, the alarm was silenced without realizing the importance of this signal, verifying its validity, or announcing this to the master, who now had the con. This indicates less-than-adequate bridge resource management (BRM).

A characteristic of good BRM is a balance between the authority of the master (or pilot) and the assertiveness of the bridge team—and, in particular, of the OOW. In this instance the OOW was thrown into doubt the minute

⁴ R.G. Green, et al. *Human Factors for Pilots* (Aldershot: Avebury Technical, 1991), p. 60.

the master countermanded the port wheel order. It was later determined that the master had countermanded the order on the basis of incomplete information. Unable to confirm the vessel's position with the electronic aids at his disposal, the OOW tried to find, visually, winter spar buoy HD-9 with the aid of the ship's searchlight. His preoccupation with this task may have contributed to the lack of importance placed on the GPS alarm. This again indicates less-than-adequate BRM.

Another element of good BRM is the judgment and decision-making ability of the master and bridge team. Among other things, the master must assess the quality of information being used by the rest of the bridge team. In this instance the master did not correctly assess the accuracy of the radar information being used by the OOW while the vessel was approaching the alter-course position.

Findings

1. Shortly after the "JADE STAR" departed from the port of Québec for Gaspé, the X-band radar failed and was inter-switched to the S-band receiver/transmitter for the rest of the voyage.
2. During the approach to Gaspé harbour, some key navigational aids at the entrance to the harbour had been replaced for the winter season or were inoperative; buoy HD-9 had been replaced by a winter spar, buoy HD-8 had been removed for the winter, and the RACON placed on the rear range light of Presqu'île de Penouille was not operational.
3. No note was made on the chart to indicate these changes to the charted information, nor were these changes brought to the attention of the master.
4. The night vision of the bridge team was adversely affected by the brightness of the range lights on Presqu'île de Penouille, which were close together, and by the ship's deck lights.
5. The "JADE STAR" entered the narrows at the entrance to Gaspé harbour in darkness, at full speed and under the con of the OOW.
6. During the approach, the vessel's progress along her intended route was not monitored by regularly plotting positions on the chart at appropriate intervals.
7. The master did not correctly assess the accuracy of the radar information being used by the OOW as the vessel was approaching the alter-course position.
8. On the basis of his differing interpretation of the radar information being used by the OOW, the master countermanded a helm order given by the OOW, and also reduced speed.
9. When the master countermanded the OOW's helm order, the OOW immediately relinquished control of the vessel to the master.
10. The GPS alarm, which had been set to sound when the vessel arrived at the alter-course position chosen for the original passage plan, sounded shortly after the master took the con of the vessel. The alarm was silenced without the members of the bridge team discussing it.
11. After relinquishing the con, the OOW did not challenge the master's actions but engaged in an action of secondary importance, an attempt to find the spar buoy visually with the aid of the ship's searchlight.
12. As there was no BRM regime in place, the OOW was not comfortable challenging the master's actions, and he did not do so.

Causes and Contributing Factors

The "JADE STAR" ran aground when, on scanty and erroneous information, a critical course alteration was delayed.

Contributing factors were the speed of the vessel under the prevailing circumstances and the lack of a recent fix to positively determine both the vessel's position and her progress along the intended track. The absence both of a BRM environment (such that the OOW would have been comfortable challenging the master's actions) and of a complete, pre-determined passage plan also contributed to the grounding. Other contributing factors were: during a critical manoeuvre the superior performance of the X-band radar was unavailable; the bridge team's night vision was less than optimal; and certain navigational aids (the fixed RACON and buoy HD-8) were not available to the bridge team.

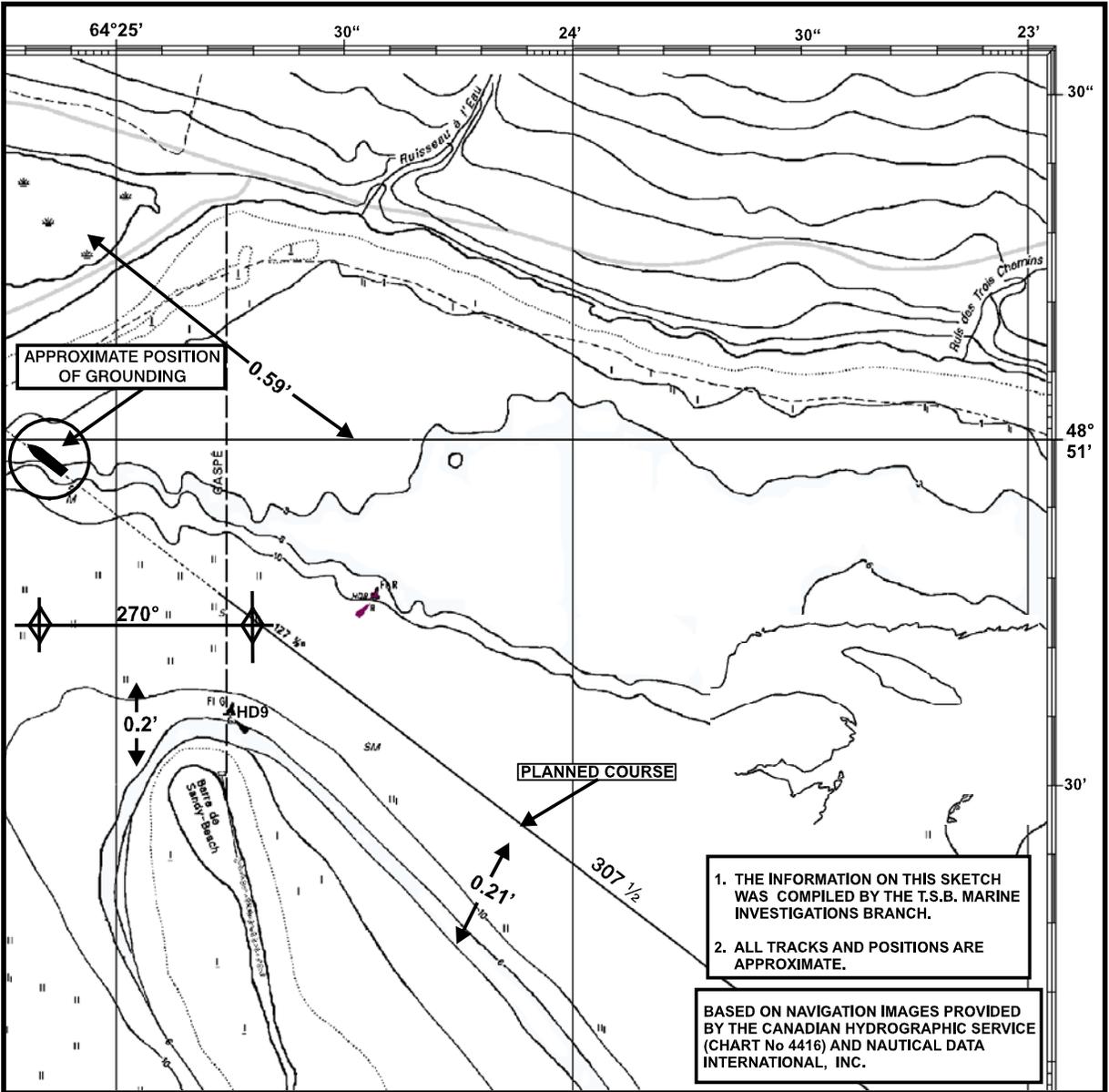
Safety Action

The owners of the "JADE STAR" are reviewing the need for formal BRM training for their deck officers and masters. Additionally, the owners have revised the company's bridge standing orders, and company circular G-93-04, emphasizing the need to obtain position fixes (to monitor accurately a ship's progress) and requiring that a safe vessel speed be determined taking into account the following factors: restricted waters, darkness, and the adequacy of the navigational aids available.

As a result of this grounding, the Canadian Coast Guard will re-examine the level of service for Gaspé harbour with respect to fixed and floating aids to navigation.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board authorized the release of this report on 27 January 2000.

Appendix A - Sketch of the Occurrence Area





WHEEL-HOUSE VIEW AMIDSHIPS



THE "JADE STAR" AGROUND ON SHORE OF PRESQU'ÎLE DE PENOUILLE
48°50.97'N, 064°25.15'W HEADING 302° (G)

Appendix B - Photographs

