

**MARINE OCCURRENCE REPORT**

**GROUNDING**

**OF THE CANADIAN TANKER "DIAMOND STAR"  
PORT OF QUÉBEC, QUEBEC  
25 NOVEMBER 1994**

**REPORT NUMBER M94L0035**

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**

During the manoeuvre to swing the tanker "DIAMOND STAR" around for an approach astern, port side to the inner berth at Ultramar oil refinery dock in Lévis, Quebec, the vessel grounded on the south shore approximately 125 m from the end of the dock. The vessel was under the conduct of a harbour pilot and assisted by a tug. The double-hulled tanker sustained minor damage, but there was no pollution as a result of this accident.

Ce rapport est également disponible en français.

**FACTUAL INFORMATION****Particulars of the Vessel**

Name	"DIAMOND STAR"
Port of Registry	Halifax, Nova Scotia
Flag	Canadian
Official Number	814363
Type	Liquid chemical carrier
Gross Tonnage	6,262
Crew	15
Length	118.16 m
Draught	Forward: 5.35 m Aft: 6.68 m
Built	1992, Wismar, Germany
Propulsion	Diesel, 3,700 kW
Owners	Rigel Chem Elbe Limited Isle of Man, United Kingdom
Managing Owner	Rigel Shipping Canada Inc. Shediac, New Brunswick

On 25 November 1994, the "DIAMOND STAR", in winter ballast condition, was proceeding up the St. Lawrence River bound for berth No. 86 in the port of Québec. While the vessel was proceeding in the centre of the river at 0706<sup>1</sup>, the headway was gradually reduced from a speed of approximately seven knots to approximately four knots with the controllable-pitch propeller. Tidal current conditions called for the vessel to approach the berth stern first. Midway between the marina in Lévis and the oil refinery dock, the helm was put hard-to-port and the vessel began veering toward the south shore. The tug "LEONARD W." was ordered to moor at the break of the forecastle, on the starboard side. The tug "DONALD P." was requested to stand by until the vessel was swung around. When the vessel was perpendicular to the shoreline, the helm was turned to midships. At 0714, as the distance between the ship's bow and the end of the refinery dock decreased, half-astern followed immediately by full-astern thrust was applied. The "LEONARD W." completed making fast to the tanker as the bow of the "DIAMOND STAR" cleared the end of the dock. Full bow thrust was applied to port and, before the accommodation came in line with the dock, the "LEONARD W." was ordered to push. The vessel did not veer but maintained her heading perpendicular to the shoreline, drifting neither upstream nor downstream. The vessel's headway could not be stopped and, at approximately 0715, the bow grounded.

As a result of the grounding, the "LEONARD W.", which was made

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<sup>1</sup> All times are EST (Coordinated Universal Time (UTC) minus five hours) unless otherwise stated.

fast forward on the tanker, damaged her starboard propeller when it struck the bottom. Thereafter, the "DONALD P." was made fast on the starboard side of the vessel forward of the accommodation and, at 0729, the vessel was refloated. The vessel was moored at berth No. 86 without further incident.

According to the *Canadian Tide and Current Tables*, low water was predicted to occur at 0550 on 25 November 1994 off Quebec City. Approximately one hour after slack water at the oil refinery dock, the flood tide starts to make itself felt along the south shoreline and sets toward berth No. 86, but the ebb tide which persists off berth No. 87 can be felt up to two hours after low water.

Off berth No. 86, there are no day aids to navigation to indicate the deep water limit which is far from the shoreline. There is a private set of range lights, which is not in accordance with the Canadian Aids to Navigation System, but it was not used during the approach.

The counter-clockwise controllable-pitch propeller causes the bow to break to starboard when astern thrust is applied at reduced speed. The bow thruster is reported to lose its efficiency at speeds above three knots. Response from the controllable-pitch propeller to produce astern thrust was satisfactory.

The navigation personnel neither asked for nor were they given a full explanation by the pilot concerning the exact manoeuvres to be performed while docking.

## **ANALYSIS**

Because the flood tide sets toward berth No. 86 one hour after slack water, the berth is approached stern first and the vessel is moored port side to the inner dock. The vessel must not be stopped off the end of the oil dock because the ebb stream will set the vessel downstream.

The manoeuvre consists in approaching the shoreline with the bow as close as possible to the deep water limit, then swinging the vessel to port with a tug made fast forward and the use of the bow thruster (if fitted) to position the vessel at a small angle and close to the deep water limit with the bow downstream. Thereafter, the vessel drifts in the flood stream toward the inner berth. The angle of approach of the vessel is controlled by a bow thruster and/or forward tug and an after tug. The usual practice calls for the second tug to be moored to the vessel's side once the vessel is turned around and ready to be pushed toward berth No. 86.

Evidence suggests that the vessel's headway was reduced in

accordance with the prevailing conditions and circumstances as the vessel proceeded upriver toward the oil dock. However, as the vessel made her final approach toward the shoreline, the engine was not put astern in time to stop the vessel in the distance available. The additional water ballast added to meet the winter ballast condition affected the vessel's stopping capability.

The vessel's headway reduced the bow thruster's efficiency. After mooring to the vessel, the "LEONARD W." initially drifted parallel to the vessel. When the tug was ordered to push, she did not have enough time to place herself in a position to effectively push athwartships the vessel.

Had the master known the exact manoeuvre to be performed, he might have been able to recommend to the pilot an appropriate reduction of speed.

#### **FINDINGS**

1. The personnel available to establish a bridge resource management regime was not used to maximum advantage.
2. Astern thrust was not requested in ample time for the stopping distance available.
3. The tug did not have enough time to place herself in a position to effectively push the vessel athwartships.
4. The speed of the vessel reduced the bow thruster's efficiency.
5. There are no adequate aids to navigation to indicate the limit of the deep water south-east of berth No. 86.

#### **CAUSES AND CONTRIBUTING FACTORS**

The "DIAMOND STAR" grounded while making her final approach off the Ultramar oil refinery dock in Lévis because the manoeuvres to slow down and swing the vessel into the flood tide were not carried out in ample time. The navigation personnel neither asked for nor were they given a full explanation by the pilot concerning the exact manoeuvres to be performed while docking.

#### **ACTION TAKEN**

##### **Teamwork on the Bridge**

Ineffective teamwork and inadequate communication between the

pilot and the ship's officers allowed unsafe conditions to persist leading to this occurrence. The Board recently published a *Safety Study of the Operational Relationship Between Ship Masters/Watchkeeping Officers and Marine Pilots* in which deficiencies were identified with teamwork on the bridge, including communications between marine pilots, masters and watchkeeping officers. In its study, the Board recommended that the Department of Transport require that, when a pilot commences duty in compulsory pilotage waters, there be a formal exchange of information between the master and the pilot with mandatory briefing elements for planned navigational procedures, local conditions and ship's characteristics (Recommendation M95-06 issued in October 1995).

### **Aids to Navigation**

Following the occurrence, the Canadian Coast Guard (CCG) and Ultramar Canada Inc. surveyed the site, including the lights and aids to navigation installed and maintained by Ultramar Canada on its property. The CCG recommended, inter alia, that all private lights be marked on nautical charts and be included in the Transport Canada publication, *List of Lights*. It was also recommended that marine leading lights be used for the range which marks the inshore safe limit.

*This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board, consisting of Chairperson, John W. Stants, and members Zita Brunet and Maurice Harquail, authorized the release of this report on 19 December 1995.*