

MARINE OCCURRENCE REPORT

GROUNDING

OF THE OIL TANKER "IMPERIAL ST. CLAIR"
OFF BUOY A-22, LAC SAINT-LOUIS, QUEBEC
28 NOVEMBER 1996

REPORT NUMBER M96C0090

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

On 26 November 1996, the Canadian oil tanker “IMPERIAL ST. CLAIR”, loaded with fuel oil, grounded off buoy A-22 on lac Saint-Louis, after experiencing problems with the controllable-pitch propeller system. The next day, the vessel was refloated with the assistance of two tugs. There was no pollution or traffic interruption as a result of this occurrence.

Ce rapport est également disponible en français.

Other Factual Information

Particulars of the Vessel

Name	"IMPERIAL ST. CLAIR"	
Port of Registry	Toronto, Ontario	
Flag	Canada	
Official Number	348195	
Type	Oil tanker	
Gross Tons	8,046	
Length	132.59 m	
Draught (prior to grounding)	Forward: 7.34 m Aft: 7.64 m	
Built	1974, Port Weller, St. Catharines, Ontario	
Propulsion	One MAN diesel engine developing 4,781 kW, driving one controllable-pitch propeller	
Cargo	11,700 tonnes of fuel oil	
Crew	16	
Owners	Imperial Oil Ltd., Toronto, Ontario	

On 26 November 1996, the "IMPERIAL ST. CLAIR" departed Nanticoke, Ontario, bound for Montreal, Quebec. At about 0105 on 28 November 1996, when the vessel was nearing the upstream approach wall of Snell Lock, New York, a wrong-way propeller pitch alarm was heard. The starboard anchor was let go and the pilot advised Seaway Eisenhower of the situation by very high frequency radio. He also asked to have linesmen ready to take the ship's mooring lines. The remainder of the berthing manoeuvres were performed using the engine telegraph and executed directly from the engine-room.

The controllable-pitch propeller system was checked, and several tests were carried out, but no obvious problem was identified. The vessel was authorized to continue her transit. At the time of departure, the master set the main engine to slow ahead, and then to half ahead, but he received no sequential reference on the propeller-pitch indicator. By that time, the vessel had already drifted a fair distance from the approach wall. It was decided to transfer control of the controllable-pitch propeller to the engine-room. The "IMPERIAL ST. CLAIR" entered Snell Lock and awaited the Seaway inspectors. Meanwhile, the engineers cleaned the main filters of the Kamewa system and purged the lines to evacuate any air that may have been trapped in the system. A small quantity of dirt was found in one of the filters; there appeared to be no air in the system.

At 0430, under the supervision of the chief engineer and with two inspectors present, the controllable-pitch system was tested, and at 0530, as it appeared to be operating normally, the vessel was authorized to proceed to Montreal. The vessel exited Snell Lock at 0600.

The "IMPERIAL ST. CLAIR" proceeded through lac Saint-François to Beauharnois, Quebec, passed through the locks and continued her voyage on lac Saint-Louis. At about 1224, when the vessel was making about 13

¹ All times are EST (coordinated universal time (UTC) minus five hours) unless otherwise stated.

knots, the propeller pitch fell to zero and the wrong-way propeller pitch alarm sounded. Full astern was ordered via the engine telegraph. The vessel yawed to port, left the channel, and came to rest outside the channel. The order was given to drop the port and starboard anchors.

As the vessel did not appear to have grounded or struck bottom, it was decided to raise the anchors and manoeuvre the vessel back into the channel. During these manoeuvres, which were difficult because buoy A-22 was very close on the port quarter, it was realized that the vessel was immobilized. No one had felt any jolt suggesting that the vessel had grounded.

At approximately 1245, the master confirmed that grounding had occurred and the pilot reported the grounding to Seaway authorities; the port anchor was dropped. The vessel lay on a heading of 220° (G and T), in position 45°23,8'N, 073°47,4'W. The spring anchor was also dropped.

The ship's owners had in place a detailed plan for risk management and, as soon as it was realized that the vessel had grounded, all necessary arrangements were made to prevent a spill.

Members of the crew were immediately ordered to sound the cargo compartments and tanks. The engine-room personnel sounded the bottom tanks. At 1350, a preliminary report on the soundings confirmed that the hull was intact. At 1410, the tugs "CHARLES ANTOINE" and "HELEN McALLISTER" were under way toward the site of the grounding with a team of divers.

By the morning of 29 November 1996, preparations were in progress to refloat the tanker. Booms and other pollution control equipment were in place. The main engine and bow thruster were tested. The compartments most vulnerable to damage were checked.

The tugs tasked to assist the "IMPERIAL ST. CLAIR" were in place. A briefing on the manoeuvring procedure was given to the persons involved, and Seaway authorities were informed of the procedures. Some 160 m³ of fuel oil was transferred from No. 1 port and starboard tanks to No. 6 centre tank to trim the vessel so as to facilitate refloating. At about 1330, manoeuvres were initiated, and, after several attempts, the vessel was refloated at 1445 with no damage or pollution.

The vessel proceeded toward the anchorage downstream from the Beauharnois locks at reduced speed with the assistance of the tugs. On arriving there, the divers started inspecting the hull. After a few hours of diving, it was determined that the damage consisted only of a few scratches to the hull.

After the vessel was refloated, an expert from Kamewa thoroughly inspected the controllable-pitch system. It was decided to bring the vessel to her destination with the assistance of two tugs to avoid further incidents. After the vessel arrived at Montreal, another inspection of the controllable-pitch system indicated that the tanker should be dry-docked. This decision was made so that the propeller shaft and its mechanism could be completely overhauled.

The propeller pitch can be controlled from the bridge or from the control room in the engine-room. A switch in the engine-room is used to transfer control from the bridge console to the control room in the engine-room.

On 20 December 1996, when the vessel had just come out of dry-dock and was undergoing routine checks, the wrong-way propeller pitch alarm was tested in the presence of representatives from Kamewa, Transport Canada

Marine Safety, a TSB investigator, and the ship's officers. It showed that whether the Kamewa system is controlled from the bridge or from the control room in the engine-room, the wrong-way propeller pitch alarms (visual and audible) are activated simultaneously in both locations when a wrong-way propeller pitch is simulated. This test was performed to clear up some doubts regarding the operation of these alarms in all the conditions described above.

Analysis

As soon as it was noticed that the propeller pitch indicator did not correspond to the manoeuvring order, the engine-room personnel were immediately advised to take charge of the controllable-pitch operation. The prompt reaction of the crew helped prevent more serious consequences.

Inspection of the system in dry-dock revealed that certain parts, including the seals in the propeller hub, were dry and worn. The components of the mechanism inside the shaft that controls the propeller pitch evidently had not been replaced since the vessel was put in service in 1974.

The controllable-pitch propeller of the "IMPERIAL ST. CLAIR" is a category S2 model (Kamewa). A unique feature of this model is that it operates at high pressure and the seals inside the propeller hub are made of rubber instead of steel as on other models.

Although Kamewa did not provide the TSB with servicing information on these seals, the recommended replacement interval is not mentioned in Kamewa servicing information obtained from another source. In practice, these components are apparently inspected every 10 years. However, it was not determined why the seals had not been replaced in 22 years or were expected to last that length of time.

Seal effectiveness can be verified without dismantling the propeller shaft. However, that procedure does not indicate the wear or flexibility of the seals.

Findings

1. The propeller pitch began to show signs of malfunctioning at the Snell Lock.
2. The yaw to port was caused by the propeller pitch falling to zero and was aggravated by the application of astern power.
3. After the first two incidents, checks and tests failed to reveal the cause of the problem. It was decided to dry-dock the vessel for a propeller hub inspection.
4. The loss of propeller pitch was caused by wear of the components in the mechanism of the Kamewa system.
5. The oil seal rings and some components of the propeller pitch control mechanism had not been

replaced since the vessel was put in service in 1974.

6. The prompt reaction by the crew and the implementation of strict directives helped to limit damages.

Causes and Contributing Factors

The oil tanker "IMPERIAL ST. CLAIR" grounded because of a loss of thrust from the controllable-pitch propeller while the vessel was being operated in the confined waters of the Seaway at full ahead power. The controllable pitch of the propeller fell to zero because of a drop of pressure in the Kamewa system caused by excessive wear of some components of the mechanism.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board, consisting of Chairperson Benoît Bouchard and members Maurice Harquail, Charles Simpson and W.A. Tadros, authorized the release of this report on 10 June 1998.