MARINE INVESTIGATION REPORT

M99C0019

GROUNDING

OF THE BULK CARRIER “HOPE I”

OFF MORRISBURG, ONTARIO

3 JUNE 1999

Marine Investigation Report

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Report Number M99C0019

Summary

On 3 June 1999 the bulk carrier "HOPE I", loaded with 19,016 tons of wheat and under the conduct of a pilot, was proceeding downbound in the St. Lawrence Seaway. In the vicinity of Canada Island, the vessel experienced a loss of electrical power. The vessel left the channel and grounded in front of the government wharf at Morrisburg, Ontario. There were no injuries or pollution as a result of the grounding.

Ce rapport est également disponible en français.

Other Factual Information

	"HOPE I"
Official Number	3838 (IMO No. 8024076)
Port of Registry	Valletta
Flag	Malta
Type	Bulk carrier
Gross Tonnage[1]	17,152
Length	188.14 m
Draught	Forward: 7.98 m Aft: 7.98 m
Built	1982
Propulsion	One Sulzer 5RND76M slow-speed marine diesel, 8948 kW
Number of Crew	21
Registered Owner	Sun Maritime, Split, Croatia
Managers	Split Ship Management, Split, Croatia

History of the Voyage

On 31 March 1999 the "HOPE I" departed Surabaya, Indonesia, with a full cargo of structural steel products. The vessel arrived at Montreal on May 10 where she discharged part of her cargo and underwent inspection by the St. Lawrence Seaway and Lloyd's Registry before proceeding into the Great Lakes. Cargo was discharged at Windsor, Chicago and Milwaukee before the "HOPE I" arrived in Thunder Bay, Ontario, to load 19,016 tons of wheat. After departing Thunder Bay on May 30, the "HOPE I" had a routine passage downbound through the Great Lakes and St. Lawrence Seaway, stopping at Port Colborne, Ontario, to load 10 tonnes of diesel fuel. The vessel was to proceed to Montreal for bunkering and then to Port Cartier where the vessel was to be loaded to full draught.

At 1145 eastern daylight time on June 3, the vessel arrived at Iroquois Lock in the

[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.

St. Lawrence Seaway.[2] After locking through, speed was gradually increased until full ahead was ordered as the vessel passed Canada Island at 1230. At 1234, as the course was being altered to port, the vessel experienced a "blackout," following which the emergency generator started automatically. The master immediately sent the second officer to have the bosun and chief officer drop the anchors. Two anchors were dropped at 1238; however, by this time the vessel was sheering to port out of the channel. At 1240, the vessel grounded at position 44°53.53' N, 075°10.74' W in front of the government wharf at Morrisburg.

The master immediately ordered the sounding of all tanks, which revealed that the No. 1 port lower hopper ballast tank and the forepeak tank were taking on water. Subsequent inspection by divers confirmed that the vessel was damaged on the port side between frames 224 and 230, 2 m above the bottom in the lower hopper tank, and at frame 237, 3 m above the bottom in the forepeak tank.

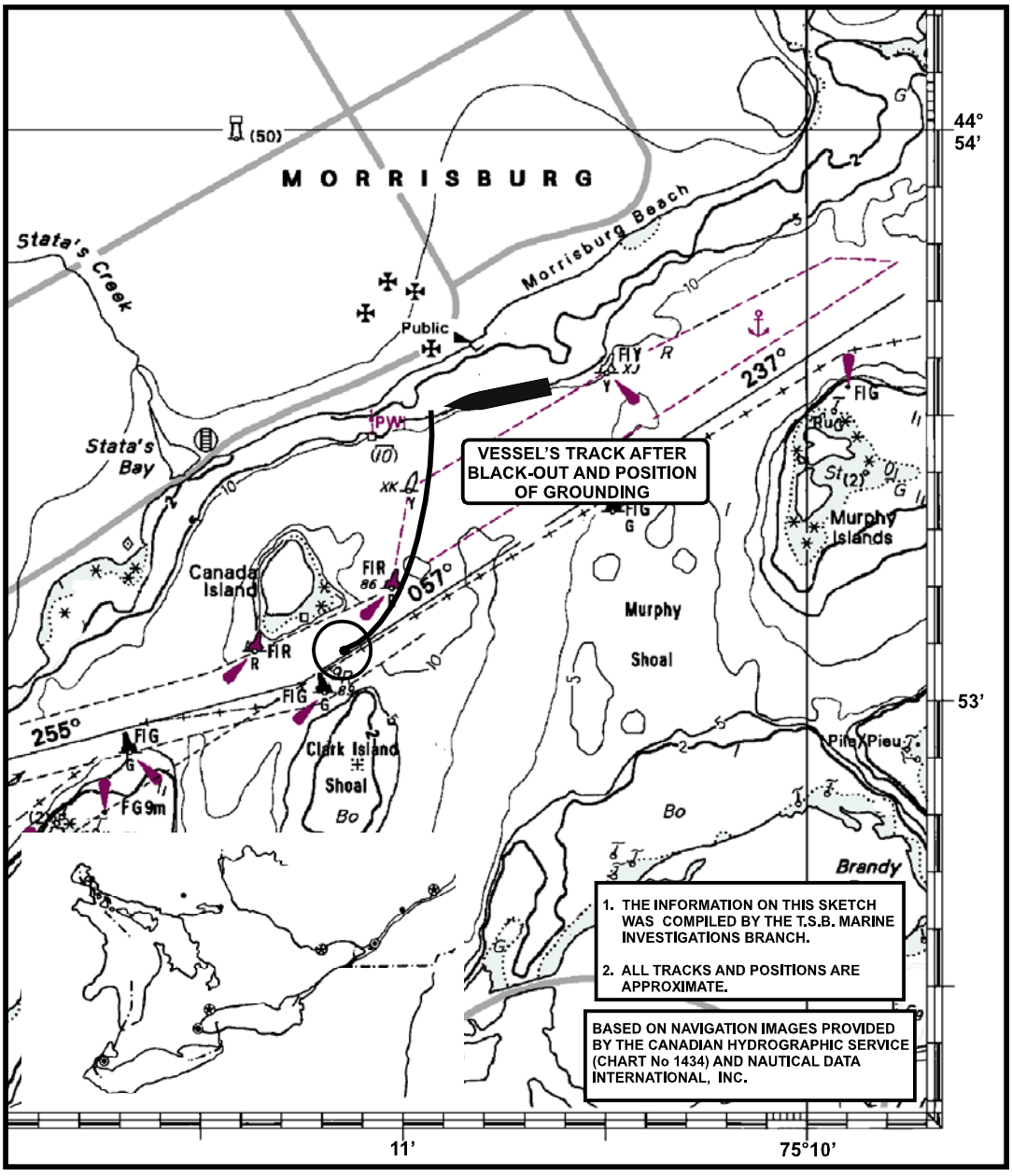
[2] All times are eastern daylight time (coordinated universal time minus four hours).

The vessel was refloated on June 5. The vessel was lightered of 410 tons of cargo to bring the ship to Seaway draft. She was cleared on June 7 to proceed to Montreal for repairs and thence to Québec, Quebec, for dry-docking.

Weather

Winds were from the northwest at 10 to 15 knots. The weather was clear with visibility greater than five miles.

Certification



The "HOPE I" was properly certified in accordance with international regulations, was classed with Lloyd's Registry of Shipping, and certified for unmanned engine-room (UMS) operation. In accordance with the International Safety Management (ISM) Code, the vessel had been issued a Safety Management Certificate by Bureau Veritas on 20 March 1997.

The officers and crew were properly certified in accordance with international regulations. The chief engineer had 15 years' experience in the capacity of chief engineer. A normal work/vacation rotation for the chief engineer would have been four months on the vessel, followed by three months' vacation; however, at the time of the occurrence, he had been on board six and a half months. He was due to be relieved in Montreal on June 5, and a relief chief engineer was already on board.

Generators

The vessel was equipped with three Allen generator sets, each rated at 493 kW, with an average fuel consumption of two tonnes of fuel per day. It is reported that no problems were experienced with the vessel's generators during the preceding voyage.

As part of the vessel's UMS classification, a standby generator was required to be capable of starting automatically in the event of an anomaly with the generator in service. At the time of the occurrence, the No. 2 generator was selected as the standby unit. However, because the
No. 2 generator shared a common fuel supply with generators No. 1 and No. 3, it did not start when the vessel "blacked out."

A 12.5 kW Lister emergency generator was available to supply power to the vessel's emergency lights; however, because the vessel was built prior to 1984, there was no statutory requirement that the emergency generator be capable of powering the steering gear in the event of a blackout. The emergency generator started automatically following the blackout.

Fuel

In order to load maximum cargo, the vessel had not taken a full load of marine diesel oil when she stopped at Port Colborne on the downbound passage. Instead, the vessel took only 10 tonnes and continued on her voyage with a total of 32 tonnes of diesel fuel on board. The intention of the chief engineer was to fully bunker the vessel in Montreal.
The vessel's fuel records indicate that two days before the occurrence the generator service tank contained 10 tonnes of fuel oil. Approximately 12 hours before the occurrence, as the vessel was crossing Lake Ontario, the second engineer, who was standing the 0000–0400 watch, became aware of a low level alarm from the generator service tank. He informed the chief engineer and third engineer, whose duty it was to transfer fuel. The chief engineer did not believe that the level could be that low, and soundings were taken at 1000 which indicated a sounding of 0.19 m in the generator service tank. The low fuel level alarm was still on at this time.

Following the blackout, the second engineer, upon finding air in the fuel systems of generators Nos. 1 and 3, immediately opened the valve to supply the system from the main engine diesel oil service tank, which reportedly contained 11 tonnes of fuel. Diesel oil flowed by gravity from the main engine service tank to the

generator service tank and, approximately 20 minutes later, the low level alarm light for the generator service tank extinguished.

Once fuel was supplied from the main engine diesel oil service tank, the generators were started and normal power was re-established to the vessel. Subsequently, no other source of air entry into the generator fuel system could be found.

Generator Service Tank Fuel Piping and Alarm

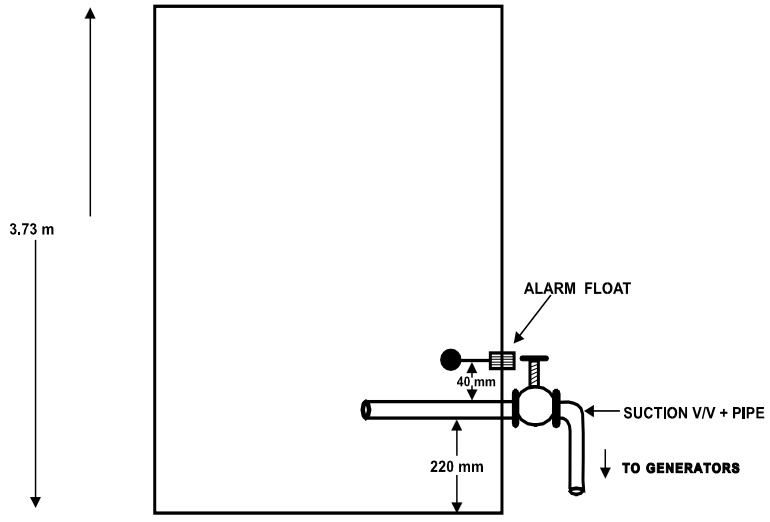
The engine-room staff were unaware that the generator fuel suction pipe arrangement in the service tank was such that the pipe extended straight into the tank on a horizontal plane, 220 mm from the bottom of the tank. Because of this arrangement, the last 1.8 tonnes of fuel in the tank was unusable. The float for the low level alarm was located 40 mm above the fuel suction pipe.

Besides the low level alarm, there was no provision in the engine-room for determining the level of fuel in the generator service tank. Instead, a crew member had to leave the engine-room and sound the tank from a location on the main deck forward of the accommodation.

Log Book Records

Soundings were taken two and a half hours before the occurrence and recorded in the engine-room log book showing 1.3 tonnes in the tank. Subsequent to the occurrence, it was discovered that the quantity of fuel in the generator service tank, as recorded in the engine-room log book, had been altered. Analysis of the log book by the TSB Engineering Laboratory indicates that the alterations had increased the amount of fuel in the tank, as recorded at 1000, by 3 tonnes, to read 4.3 tonnes.

Analysis



Generator Fuel Usage

In order to load maximum cargo in Great Lakes ports, ocean-going vessels often forego bunkering until they reach deep-water ports such as Montreal. The "HOPE I" loaded cargo to maximum Seaway draught in Thunder Bay with the intention of topping off cargo at Port Cartier. As a result, the vessel had only a modest amount of diesel oil on board when she departed Thunder Bay, and could only take 10 tonnes when she stopped for fuel in Port Colborne two days before the occurrence. Records indicate a total of 32 tonnes of diesel oil on board following bunkering.

Two days before the blackout, at 0900 on June 1, the generator service tank contained 10 tonnes of diesel fuel. It is reported that between then and the time of the blackout, no fuel was transferred to this tank. Given an average fuel consumption of two tonnes a day for each generator, approximately eight tonnes would have been used between 0900 on June 1 and 0900 on June 3, leaving little usable fuel in the tank just prior to the occurrence.

While supplying fuel to the generators after the blackout, diesel oil was allowed to flow by gravity from the main engine diesel oil service tank to the generator service tank. When the level in the generator service tank rose to the float level, the low level alarm light went out. This fact and subsequent tests conducted by the TSB indicate that the low level alarm for the generator diesel oil service tank was functioning properly at the time of the occurrence.

The engine-room staff was not aware that the internal arrangement of the generator service tank was such that the fuel below the suction pipe was unusable, the tank sounding tables did not indicate that this was the case, and reliance was placed on soundings which showed that there were about two and a quarter tonnes of fuel remaining in the tank. These factors combined to influence the engineer's decision to ignore the low level alarm. However, the combination of the known average fuel consumption and the low level alarm, reinforced by the 1000 sounding, should have provided ample warning that the level of fuel in the generator service tank was critically low.

ISM Code Application

The application of the ISM Code to bulk carriers such as the "HOPE I" resulted from a growing number of marine occurrences that were clearly due to a lack of good management systems and shipboard practices. In applying the ISM Code, shipping companies minimize the range of poor human performance-based decisions that may lead to an accident. The provision of adequate policies and procedures enables the ship's crew to be better equipped to make correct decisions of a day-to-day operational nature.

Fuel handling is one of the most critical operational routines on board any vessel. Twelve hours before the blackout on board the "HOPE I", the generator service tank low level alarm gave an indication that the level in the tank had dropped to a minimum acceptable level.[3] Notwithstanding the altered log book entries, the chief engineer and the engine-room watch-keepers were aware that the alarm was on and that the tank level might be

[3] Approximately 2.7 tonnes based on the position of the alarm float.

low; however, no shipboard safety management procedures were in place to ensure that an adequate level of fuel was maintained or that fuel was transferred to the tank. As a result, even though the alarm continued to give an indication of low fuel level up to the time of the occurrence, no decision was made to transfer fuel, resulting in fuel starvation to the generators and loss of power to the vessel. Such actions were not consistent with the engine-room procedures contained in the vessel's safety management system. These procedures were general in nature and not specific to the "HOPE I"; as a result, they did not help to ensure that conditions and activities on board that affected safety were planned, executed and checked.

Emergency Power to Steering Systems

Navigating in confined waters demands special vigilance by staff and the security derived from redundant systems on board; however, many vessels transiting confined waters in Canada are not designed or equipped with emergency power supplies to their steering systems. Prior to 1984, international regulations did not require that emergency power be available to steering systems.[4] As a result, vessels (other than tankers) which were built before this time are "grand-fathered" from the more stringent current steering gear regulations.

In a previous occurrence investigated by the TSB, the Liberian-registered bulk carrier "CHRISTOFFER OLDENDORF" experienced a blackout and subsequently grounded in Lake Saint-Pierre, Quebec.[5] The investigation revealed that the vessel was not equipped with an emergency power supply to the steering gear.

At the time of the blackout on the "HOPE I", the emergency generator started immediately and supplied power to the emergency lighting throughout the vessel. However, the emergency power system was not designed to supply power to the steering gear, nor was it required to be. With the rudder to port and no emergency power available to restore steering control, the vessel continued to swing to port and grounded outside the channel.

Findings

1. The vessel was transiting the Seaway with a modest supply of diesel oil on board.

2. The low level alarm for the generator service tank activated 12 hours prior to the occurrence.

3. There was no appropriate means of determining the amount of diesel oil in the generator service tank from inside the engine-room. The engine-room staff were not aware that the internal arrangement of the generator service tank was such that the last 1.8 tonnes were unpumpable.

4. The engine-room staff did not transfer diesel oil to the tank.

5. No formal procedures were in place regarding fuel transfer operations.

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[4] SOLAS 1978 (International Convention for the Safety of Life at Sea)

[5] TSB Report No. M94L0027, 12 September 1994

6. Generators No. 1 and No. 3 stopped due to fuel starvation.

7. The emergency generator started immediately after the blackout.

8. The emergency switchboard was not designed to be connected to the steering gear, nor was it required to be.

9. With no steering control, the vessel sheered to port and grounded near Morrisburg, sustaining hull damage.

Causes and Contributing Factors

The "HOPE I" grounded as a result of a blackout due to fuel starvation of the generators. Contributing to the occurrence were the inadequate means of determining the amount of fuel in the generator service tank from inside the engine-room, the inadequate fuel transfer procedures, the fact that the engine-room staff did not transfer fuel to the generator service tank and were unaware of the amount of unpumpable fuel in the tank, and the lack of an emergency power supply to the steering gear.

Safety Action

Subsequent to the occurrence, a low fuel level notation was added to the Alternator Service Tank sounding tables on board the vessel.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board authorized the release of this report on 8 August 2000.

Appendix A - Photographs


'99 6 4


GENERATOR SERVICE
TANK SUCTION VALVE
GENERATOR SERVICE
TANK LOW LEVEL ALARM


'99 6 18