

MARINE OCCURRENCE REPORT

FIRE ON BOARD

THE RO/RO CONTAINER SHIP "ASL SANDERLING"
ST. JOHN'S, NEWFOUNDLAND
15 SEPTEMBER 1997

REPORT NUMBER M97N0129

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 late evening hours of 15 September 1997, a fire broke out in the container cargo forward on the weather deck of the “ASL SANDERLING”. The vessel was sailing in fog conditions approximately 20 nautical miles south of St. John’s, on passage to Corner Brook, when the fire was discovered and a MAYDAY signal was broadcast. An empty container overstowing a portable generator set on deck had been ignited by the hot exhaust gases from the generator’s diesel engine. The fire quickly spread to other containers, but was extinguished by the crew. No one was injured.

Ce rapport est également disponible en français.

Other Factual Information

	“ASL SANDERLING”
Port of Registry	St. John’s, Newfoundland
Flag	Canada
Registry/Licence Number	809070
Type	Ro/Ro Container Ship
Gross Tons ¹	22,777
Length	178 m between perpendiculars (BP)
Draught	Forward 7.2 m, Aft 8.1 m (at the time of fire)
Built	1977, Sasebo, Japan
Propulsion	MAN 13,976 kW controllable-pitch propeller (CPP)
Number of Crew	22, plus one supernumerary
Number of Passengers	None
Registered Owners	Oceanex Inc., Montreal, Quebec

The “ASL SANDERLING ”is designed for the carriage of containers and/or vehicles on the upper (weather) deck. Ramp access is also provided to lower decks solely for the stowage of roll-on/roll-off vehicles. In preparation for the voyage from St. John’s to Corner Brook, only containers were stowed by crane on the weather deck, with trailers and automobiles arranged on the other vehicle decks. The total amount of cargo (vehicles and containers) on board was approximately 2,903 tonnes.

On this voyage a greater number of refrigerated containers were expected to be loaded at Corner Brook for discharge at Halifax. The refrigerated containers taken on deck at St. John’s had been filled earlier with crabs, claws, capelin and shrimps.

The “ASL SANDERLING” has 56 electrical power outlets on the weather deck to service refrigerated cargo. Because the combined number of refrigerated containers to be delivered to Halifax was said to have exceeded 56 (the actual number was 64), a portable diesel-driven electrical generator set was taken on board in St. John’s, to provide power to 17 of the refrigerated containers.

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.

The portable generator set designated OCEA 230 325, was manufactured by Caterpillar and identified as a model 3306B DI (direct injection combustion chamber), serial number 85Z04984, arrangement number 7W9760. The generator was rated as 1800 rpm/60Hz and 231 kW. The generator had arrived on board the vessel, been removed to confirm levels of fluids and lubes and subsequently reloaded, non-operating, on the vessel at approximately 1620 hours. It was reported that the generator was started on board at approximately 1630 hours on September 15, before it was overstowed, and used continuously on board the “ASL SANDERLING” to approximately 1930 hours that same day.²

For ease of stowage, the portable generator set was secured to an open-sided, open-topped, 20-foot container frame, complete with a dedicated 250-gallon steel fuel tank. Also, three 30-gallon steel drums and two 35-gallon plastic drums of additional diesel fuel were secured to the unit. This provision was a means to avoid having to refuel the generator set from the ship’s engine room via a remote fitting on the weather deck in the area of the accommodation.

The generator/container frame assembly was placed on the weather deck in position “315,” i.e., the 3rd bay from forward, on the 1st or bottom level and at the 5th position from the port side of the ship. It was overstowed in position “325” by an empty, steel-sided 20-foot container with a 3/4-inch plywood floor. (See Appendix A showing photographs of the fore deck and partial deck cargo.)

No formal pre-loading/stowage plan had been arranged in St. John’s between the vessel’s officers and the stevedore responsible for the loading. Reportedly, there had been occasions in the past when a temporary generator set had been needed on board and used successfully during similar voyages. With the stevedores being employees of the ship’s owner, a harmonious working relationship had developed over the years. However, complacency had set in with regard to cargo-operating procedures.

The supervisor of the stevedores responsible for loading the containers on the weather deck on September 15 was normally employed in the loading of (roll-on/roll-off) cars, trucks and trailers on a lower deck, and he was more familiar with that operation. It seemed that he did not have the knowledge or foresight to realize the potential danger of overstowing a container with a wooden floor in close proximity to the exhaust pipe of the generator engine. The generator set and the overstowed container were both loaded and secured during the 4–8 watch kept by the first mate, who checked neither unit. After the portable generator set was placed on board, the unit was started by one of the crew of the “ASL SANDERLING”. Reportedly, however, it was not checked by the ship’s electrician or by any of the mates.

When the vessel departed St. John’s at approximately 2130 hours on September 15, the first mate was on the fore deck, as he usually was upon entering and leaving port. Reportedly, he walked past the position of the portable generator but neither examined it nor ordered any of the forward mooring party to do so.

The third mate kept the 8–12 watch and, at approximately 2145 hours, the master went to the bridge to write up his orders for that night. These night orders are quoted in their entirety as follows:

We will go on max. E/R [maximum Engine Room] Pitch to-nite circumstances permitting.

² All times are ADT (coordinated universal time minus three hours), i.e., times used on board the vessel.

Give all traffic a good safe berth obeying the Int [International] Rules.
Check all Cargo & Seals and log both checks.
Use large scale charts where available.
Remove any list on the V/L after each watch end.
Call me if you have any concerns over any traffic or for any other reason
which might affect our safety. Otherwise call me at 0730.

Upon issuing these orders at approximately 2150 hours, the master retired to his room, one deck below the navigating bridge.

At that time the weather was reported to be winds southwesterly at 10 knots, with a slight sea, air temperature 13.5°C and visibility 2 to 3 cables. The ship was on a southerly course at a speed of approximately 15 knots.

At 2302 hours the third mate entered in the deck log book: "Cargo checked and secure: Seals intact." The master later confirmed that the entry applied to underdeck cargo but not to the container cargo on the weather deck. The master was reluctant to send men out on the weather deck during the winter months; however, this practice had continued through to the fall.

After the 8-12 watchman, who was also the helmsman and lookout man, had completed his rounds of the lower decks and returned to the bridge, he and the third mate noticed that a red/orange coloured diffused glow had appeared on the weather deck forward toward the starboard side of the vessel. Upon being sent on deck to investigate, the watchman was met by burning oil flowing aft toward him. The vessel at that time was trimmed by the stern 0.9 m.

The third mate was notified of the fire at approximately 2310 hours. He then rang the general alarm bells and called the master, who assumed the conduct of the vessel and adjusted course and speed as he considered necessary. Fire parties of crew were organized to fight the fire with water directed from fire hoses on both sides of the ship. Although burning diesel oil was flowing in patches on deck, the source of the fire was established as being the portable generator.

At approximately 2330 hours, the master transmitted a MAYDAY at ship's position 47° 14'N, 052° 34'W, which was received by Rescue Coordination Centre (RCC) Halifax. In response to the captain's distress call, the following units were tasked but not utilized: 413 Squadron, Hercules R314 and a Labrador helicopter R304, two Canadian Coast Guard Ships (CCGS), two offshore supply vessels and two fishing vessels.

Concurrent with these efforts, the No. 1 ballast tanks, which were already full, were pressed-up to overflow through their air pipes onto the weather deck. Although this aft flowing water provided boundary cooling to the deck, it also carried with it burning diesel oil which caused damage to more containers in bays 3, 4 and 5. A later examination revealed that there was no damage to the weather deck plating, with only slight smoke and singeing damage to the paint on the ship's starboard side rails and air pipes.

It is company policy for all officers and ratings to have undertaken training in Marine Emergency Duties (MED) and it was this training which stood the firefighters in good stead. The third mate initiated the use of drums of high-expansion foam on board which, when introduced, rapidly overcame the fire.

The CCGS “LOUIS M. LAUZIER” escorted the “ASL SANDERLING” back to St. John’s, where she re-berthed at approximately 0430 hours on 16 September 1997.

TSB Engineering Branch examination of the heat-affected equipment and material that were, or had been, present in the fire-damaged area on deck, revealed the following salient facts:³

- The generator diesel engine was extensively heat damaged together with all of the electrical wiring for monitoring and control of the engine, but **there was no evidence of leakage in fuel lines to injectors.**
- The electrical compartment containing the bus bars and circuit breakers for the extension cord connections to the refrigerated containers was destroyed by heat. The majority of the electrical extension cords used from the generator electrical panel to the containers had their insulation burned off. Two 12-volt DC batteries, used to start the engine, were extensively heat damaged, with only the lead cells remaining. The insulation on the cabling from the battery to the engine starter was destroyed. However, **electrical components showed no evidence of arcing damage.**
- The three empty 30-gallon steel fuel drums, which were originally secured to the port side of the generator fuel tank, were observed loose on the deck and showed signs of heat damage, having had expanded and partially ruptured along their seams. **The two plastic fuel drums, which had been originally secured in the same location, had been consumed in the fire.**
- The empty steel cargo-container originally positioned directly over the generator set was extensively oxidized from heat exposure with one side buckled, the steel floor beams twisted and **the wooden floor was eradicated.**

The actual load imposed on the generator is unknown and would depend upon the demand required by the 17 refrigerated containers. However, the exhaust temperatures were considered to have been in the 900°F range, with temperatures at the wooden floor in the 800°F to 900°F range. (Rapid pyrolysis of wood occurs above 540°F, leading ultimately to spontaneous combustion.)

It was evident that the area of most intense heat was concentrated at the generator set, the empty container located directly above it and the two refrigerated containers located immediately to the starboard side of the generator set. The intensity of the fire and the difficulty in bringing it under control indicated that it was fuel fed.

The TSB Engineering Branch report also concluded that:

- The fire originated on the portable generator platform located on the forward deck.

³ Engineering Report No. 147/97 is available on request.

- The probable cause of ignition was the direct impingement of hot exhaust gases onto the wooden floor located 13 inches above the exhaust stack outlet.
- The reported presence of the two plastic drums of diesel fuel contributed to the propagation of the fire.
- The Caterpillar portable generator, model 3306B, was not marine rated.

Analysis

The “ASL SANDERLING” is on regularly scheduled voyages, with each one similar to the last, and is dealt with mainly by the same personnel at her ports of call. Consequently, a certain degree of trust had developed between the ship’s crew and the stevedores. Few orders were given because “everyone knew what to do.” Apparently, complacency had set in, leading to irresponsibility and poor judgement.

Traditionally the first mate is directly responsible for the proper loading, stowage and securing of cargo, and is aided by the other mates. It was said that a portable generator set providing additional power to containers had been carried successfully on previous voyages. On this occasion, however, the ship’s officers had assumed, wrongly, that the loading gang knew what they were doing, and did not question the ability of the supervisor on the weather deck. Had the mate and ship’s electrician carried out proper inspections when the unit was initially loaded (and tested) on board, it is likely that the potential danger of combustion of the wooden floor of the overstowed container would have been recognized.

The extra diesel fuel drums, and those of plastic construction, were accepted without scrutiny, although the use of these drums close to a heat source during the voyage contradicted acceptable marine standards and safe working practices.

Although the master’s standing orders were explicit and read, “check all cargo,” the weather deck cargo was excluded from this procedure. The master’s main reason for this exclusion was that he feared for the safety of the seamen on the exposed weather deck in the winter. This fire occurred in mid-September. More-frequent checks, made during proper watch keeping and fire patrols, may have lead to the identification and early detection of the fire hazard.

The master’s night orders also state, in part, “obeying the Int. Rules.” That is taken to mean the *International Regulations for Preventing Collisions at Sea*, which state, in part, under Rule 5 “Every vessel shall at all times maintain a proper lookout by sight and hearing.” On the night of September 15/16 there was no dedicated lookout posted. Had there been such, the glow from the fire might have been seen earlier.

The boundary cooling effect provided by the water from the overflowing ballast tanks was effective but helped the aft flowing burning diesel to accelerate, spread, and cause damage to other containers. However, prompt and correct firefighting measures were instigated and the value of MED training was evident when the third mate initiated the rapid knock-down features of high-expansion foam.

Notwithstanding the actions or inactions of the master and crew in this instance, the shipowners could have taken precautions in advance of this or similar voyages to alleviate such risk to life, ship and cargo. The portable generator set was not an integral part of the vessel's machinery or equipment and as such would be excluded from the normal ship inspection, approval and certification procedures required by Transport Canada (TC). Also this portable unit would not have come under the normal survey of a recognized classification society.

The generator set was not built to marine standards, but it was used as an auxiliary unit to supplement the ship's main electrical machinery, and it had to be operated and fuelled at sea. When such a change in ship operations was anticipated, it was the responsibility of the shipowners to request regulatory authorization to have an approved, temporary generator installation arranged and operated such as to ensure that an appropriate level of safety was maintained throughout the voyage. The usual procedure is to contact the local or regional Marine Safety office.

In this instance, it would appear that the *Marine Machinery Regulations (MMR)*, the Ship Safety Electrical Standards (SSES) and accepted marine practice were contravened.

Portable/temporary machinery and electrical equipment fitted on board vessels is to be installed and operated in compliance with the same regulations and standards that govern fixed and permanent installations.

Since this occurrence, management has put in place a more formally structured regime in cargo-handling procedures and has arranged for the supply of marine-compatible portable generators.

Findings

There was no pre-planning regime in place to establish a safe loading plan for the weather deck containers and an appropriate portable generator set.

1. The non-marine type portable generator was loaded and secured on the weather deck by stevedores, under a supervisor who was less familiar with loading in this area and unsupervised by the ship's personnel.
2. The generator set was overstowed with an empty 20-foot, wooden-floored container, the bottom of which was approximately 33 cm (13 inches) above the end of the generator's exhaust pipe.
3. Two 35-gallon plastic and three 30-gallon steel drums full of diesel oil were secured to the base of the generator for refuelling it (the heat source) at sea.
4. The generator unit was not inspected or tested by the officer of the watch, or by the ship's electrician, and there was no formal instruction in place to do so.
5. The generator assembly had been running on board under load and unattended for approximately three hours before the fire was discovered.

6. Although the actual load imposed upon the generator by the 17 refrigerated containers is unknown, it was considered to be sufficient to produce exhaust temperatures hot enough to cause rapid pyrolysis and ultimate ignition of the wooden container floor.
7. The presence of two plastic drums of diesel oil contributed to the propagation of the fire as they were in close proximity to the heat source and were eventually consumed in the fire.
8. MED training, as required by regulation and the mandatory standards of the STCW Convention and the STCW Code, was of value to those engaged in extinguishing the fire.

Causes and Contributing Factors

The "ASL SANDERLING" experienced a fire within container cargo on the weather deck forward as a consequence of the dangerously arranged stowage of a non-marine type portable generator such that hot exhaust gases from its engine likely ignited adjacent combustible and highly flammable materials.

The complacent attitude of the ship's officers and shore crew; the lack of foresight of the supervisor in deck cargo stowage; and the lack of proper supervision/watchkeeping and fire patrols concerning the special stowage and safe operation of the generator set all contributed to a fire hazard being created and unrecognized by the ship's personnel.

Inaction by the shipowners to obtain advanced approval from regulatory authorities—for the safe installation and operation of an appropriate auxiliary generator set—increased the possibility of having a fire on board.

Safety Action Taken

Following this occurrence, the shipowners put in place more formally structured cargo-handling procedures and arranged for the supply of marine-compatible portable generators.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board, consisting of Chairperson Benôit Bouchard, and members Maurice Harquail, Charles Simpson and W.A. Tadros, authorized the release of this report on 15 January 1999.

Appendix A - Photographs



