

MARINE INVESTIGATION REPORT
M98L0139

FIRE ON BOARD

GENERAL CARGO SHIP "SOUTHGATE"
GRANDE-ANSE, QUEBEC

26 OCTOBER 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.

Marine Investigation Report

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Summary

On 26 October 1998, early in the afternoon, a fire broke out in one hold of the “SOUTHGATE”. The vessel was moored alongside at Grande-Anse, Quebec, and the stevedores were loading medium-density fibreboard packaged in bundles. During loading operations, the general alarm sounded as the fire spread rapidly between the bundles. The crew fought the fire but eventually closed the hatches. Carbon dioxide was released into the hold. The next day, the hold was opened and the fire rekindled; the fire could not be brought under control with foam and water. The hold was closed once again, and carbon dioxide was then released into it. On November 3, when the hold was reopened, the fire was found to be out. There was no pollution as a result of this accident and only one person is reported to have been affected by the smoke.

Ce rapport est également disponible en français.

Other Factual Information

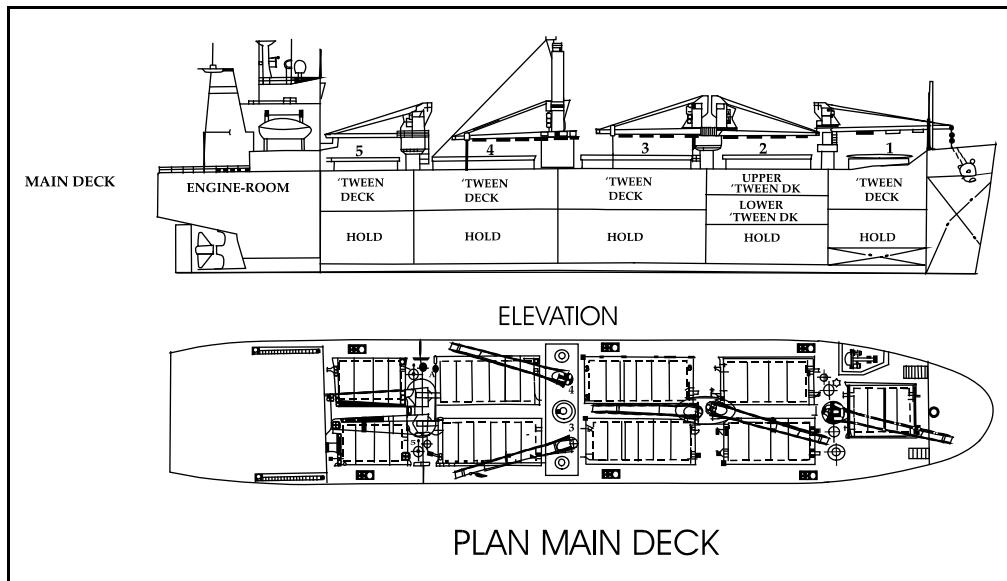
Particulars of the Vessel

“SOUTHGATE”	
Official Number	729543
Port of Registry	Nassau
Flag	Bahamas
Type	General cargo ship
Gross Tonnage ¹	12174
Length	158.87 m
Draught	6.40 m
Built	1985, Varna, Bulgaria
Propulsion	B&W 8090 kW diesel engine
Cargo	1362 m ³ of medium-density fibreboard
Crew	23
Owners	Spencer Navigation, Limassol, Cyprus

The “SOUTHGATE” is a general cargo ship of 16 954 deadweight tonnes with its bridge, accommodation and engine-room located aft of the five cargo holds. The holds are served by seven deck cranes for handling cargo. Access to four holds, excluding No. 1, is by two hatches on the main deck and the 'tween deck. The 'tween-deck hatch covers are operated by electric motors from a switch located on the main deck. There is no cofferdam between hold No. 5 and the engine-room. There was no cargo in hold No. 4. The ballast tanks under hold No. 5 were serving as fuel bunkers at the time of the fire. The vessel is fitted with a fixed carbon dioxide (CO₂) extinguishing system, including 69 cylinders, in one of the deckhouses on the main deck. The vessel also has an extra reserve of five cylinders.

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.



History of Events

After a cargo of steel rolls was unloaded at Sheet Harbour, Nova Scotia, the crew of the "SOUTHGATE" swept the holds and drained the sumps.

On October 21, at 2320 eastern standard time (EST),² the vessel arrived at Grande-Anse terminal, Port Saguenay, in La Baie, Quebec, to take on a partial load for Limassol, Cyprus, and Kalamaki, Greece. The

² All times are EST (coordinated universal time minus four hours), which is the actual time on board the ship.

master received only one message telling him the volume of the cargo to be loaded during the voyage, and no official stowage plan was drawn up for loading.

On October 22, the superintendent of the stevedores explained to the chief mate the stowage method that would be adopted, but a stowage plan was not made. At 0800 loading of the medium-density fibreboard (MDF)³ began simultaneously in holds Nos. 3 and 5, using the vessel cranes. At the end of the day, around 1700, the stevedores finished stowing a second bay of bundles along the aft bulkhead of hold No. 5.

On October 23, loading operations were interrupted because of rain, and postponed for the weekend.

On October 26, loading resumed in hold No. 3 with a crew of stevedores. Around 0845 loading of the hold was completed. Two carpenters remained in the hold to complete the dunnaging, and the rest of the work gang moved to hold No. 5. Loading was completed in the morning round the square of the port hatch, and then some bundles were stowed in the middle of the square. Around 1330 the stevedores stowed a third bay of bundles along the aft bulkhead to starboard. Around 1335 the carpenters completed dunnaging hold No. 3, and moved to hold No. 5. Around 1400, the crew members withdrew for coffee break.

Around 1403, when the superintendent of the stevedores descended into hold No. 5 to conduct his inspection, he detected a burning smell. When he saw whitish smoke, he shouted "fire". The chief mate, who had joined the officer of the watch on the main deck, also detected a burning smell and ordered the mate to inform the master. The whitish smoke turned into black smoke. The cardboard and polyethylene film covering the bundles were in flames, in what appeared to be a surface fire. At 1404 the master sounded the general alarm from the wheelhouse. The superintendent communicated by radiotelephone with the manager and the employees on the wharf and requested extinguishers.

The crew deployed the firefighting equipment. The master descended onto the main deck with an extinguisher while the officer of the watch got extinguishers from the accommodation. The crew hooked up two fire hoses, one to port and the other to starboard. The stevedores discharged the extinguishers onto the flames, but were unable to bring the fire under control. The fire spread horizontally to port and then forward. The master was concerned about the diesel oil and lubricant bunkers adjacent to the aft bulkhead of the hold. Around 1410, when the flames spread to over 4 m in diameter, the master ordered the stevedores and crew members out of the hold.

The crew members fought the flames with two fire hoses with jet nozzles. At 1412 the chief engineer reported that the paint was peeling on the engine-room forward bulkhead and the plating was turning red. The engine-room personnel doused the bulkhead with a fire hose to cool it down. Around 1415 the crew members closed the hatches and, at 1417, CO₂ was released into hold No. 5. The hatches were doused with water to lower the temperature in the hold and, around 1430, the chief engineer reported that the engine-room forward bulkhead appeared to be cooling down.

Around 1440, the fire chief of the Ville de La Baie township fire department arrived on the scene and asked the master permission to come aboard. At 1530 they stopped dousing the hatches on deck and the engine-room forward bulkhead. Around 1600 the temperature of the hatches was found to be back to normal. The crew and

³

This product is known internationally as MDF.

the shore fire department kept continuous watch at the site of the fire. Around 2000 five more cylinders of CO₂ were released into the hold. The shore fire department left the ship.

On October 27, around 0800, two crew members descended into the hold to inspect the scene. No fire source was observed in the smoke and, around 0900, the hatches were opened. Again smoke and then flames were seen coming from the square of the starboard hatch. The fire department sprayed foam on the cargo. However, they exhausted their supply of foam. The bundles were doused with water, but still the fire could not be brought under control; the master ordered that the hatches be closed again. The crew kept close watch over the atmosphere and temperature in the hold with probes.

On October 28, CO₂ was pumped into the hold from a truck.

On November 2, the refilled CO₂ cylinders were loaded on board the vessel.

On November 3, hold No. 5 was opened again in the presence of the crew and firefighters from the fire department of the Ville de La Baie and the Canadian Forces Base at Alouette, Quebec. Environment Canada took samples of the atmosphere, which revealed no formation of hydrocyanic or formaldehyde gas. Upon issuance of a Tank Entry Permit by an independent chemist, the crew and firefighters descended into the hold and found that the fire was out.



On November 8, the "SOUTHGATE" sailed from Grande-Anse to Montreal, Quebec, with the contaminated water and the damaged cargo of MDF, which were discharged at Montreal and Kalamaki, respectively.

Injuries to Persons

The superintendent of the stevedores was affected by the smoke, but he managed to reach the main deck by himself. He then lost consciousness momentarily and was taken to a local hospital by ambulance and released

the next day.

MDF Material Safety Data Sheets

The *Canadian Dangerous Goods Shipping Regulations* do not class MDF as dangerous goods and do not require that MDF be specially labelled. MDF is an unregulated product.

Manufacturer's safety data sheets for the use of industry describe MDF as being normally stable, flammable in the presence of naked flames, sparks or heat and that MDF may polymerize at increasing high temperatures. Decomposition products may include: CO, CO₂, aldehydes (including formaldehyde), hydrogen cyanide. MDF does not entail any fire or explosion hazard but cutting, sanding and milling may produce wood dusts which may constitute an explosion hazard if the dust concentration comes into contact with an ignition source. The data sheets state that the measures for fighting a wood-composite fire are well known, that water, CO₂ and sand should be applied and that a Class A extinguisher should be used.

Stowage of the MDF

To protect the MDF from the elements, the main-deck hatches were closed every night and on rainy days. Reportedly, the crew did not operate the 'tween-deck hatch covers during the call at port. However, it could not be confirmed whether the electrical system of the 'tween-deck hatches remained under power.

There are no regulations governing inspection of a ship before loading general cargo. However, around 0720 on October 22, the superintendent of the stevedores visited the vessel holds and noted that they were in satisfactory state to receive a cargo of MDF. Stevedores operated the vessel cranes. In each hold there was a crew chief, a forklift operator, slingers and dunnaging carpenters. The officer of the watch oversaw the loading from the main deck. An able seaman on the 'tween-deck signalled to the stevedores any damaged bundles requiring makeshift repairs, and noted the work done.

MDF panels were packaged in bundles by the manufacturer. Each bundle had an approximate volume of 2.5 m³ and was wrapped in polyethylene film under cardboard on five surfaces. The panels rested on MDF braces. The panels, packaging, and braces were held in place by metal straps.

In each hold, the bundles were stowed on the tank top along the forward bulkhead, then along the sides, and finally along the aft bulkhead. The superintendent oversaw the stevedores on the wharf and on board the ship. The ship ventilation system was not used.

Ignition Point

The Art and Science of Fire Investigation lists the following temperatures as the ignition points of these materials:⁴

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John N. Cardoulis, *The Art and Science of Fire Investigation*, St. John's: Breakwater Books, 1990, Table 3-11.

Material	Ignition Point (degrees Celsius)
Fibreboard	218° - 246°C
Polyethylene	349°C

According to this source, a cigarette that has been aspirated (smoked) burns at a temperature of 427°C.

Inspection of Holds Loaded with MDF after the Fire

It was not possible to preserve the continuity of the investigation site, i.e. hold No. 3, but a brief inspection revealed the presence of 12 cigarette butts, two cigarette papers and an empty cigarette package, among other things.

Access to hold No. 5 was restricted by toxic gases which were the products of combustion, and hold openings were controlled with seals in order to preserve the continuity of the investigation site. Inspection of hold No. 5 revealed the presence of five cigarette butts; three were on the 'tween-deck (two were on bundles), among other things.

Electrical wires were hanging under the aft starboard 'tween-deck in way of the seat of the fire. Three seats of fire were observed in the hold. The first seat of fire was in the second bay from the aft bulkhead, between the second and third rows from the starboard side, under the second tier of bundles from the top. This first seat of the fire had burned the bundles above and below and showed charring in the form of furrows. A second seat of fire was located in the second bay from the aft bulkhead, in the middle of the hold in way of the second tier of bundles from the tank top. A third seat of fire was located in the third bay, in the fifth starboard row under the 'tween-deck in the second tier from the top. Charring was prominent between the bundles in the aft port corner of the square of the starboard 'tween-deck hatch.

Apart from the fire and smoke damage, the hold was in a satisfactory state of cleanliness for the cargo loaded, and the electrical equipment showed normal wear and tear for the vessel's age.

Responses

In the first response, the decisions were made by the crew, as the shore fire department did not arrive on the scene before the hatches were closed. The crew and the stevedores initially used extinguishers and then fire hoses with jet nozzles. According to the 1974 *International Convention for the Safety of Life at Sea*, the "SOUTHGATE" was not required to be fitted with an approved dual-purpose type (i.e. spray/jet type) nozzle incorporating a shutoff, as it was constructed before 1 July 1986. The crew could not contain the flames, and the hatches were closed. The hold was injected with CO₂.

The second response, the next day, was the result of consultation between the crew and the fire department of Ville de La Baie. The firefighters had to familiarize themselves with the vessel firefighting equipment, fixed CO₂ system, and the vessel's fire-pump capacity. The crew and the firefighters initially used foam, but, lacking an adequate supply, they then used the vessel fire hoses, this time fitted with spray-type nozzles. The fire was still not brought under control, and the hatches were closed. The fixed CO₂ fire-extinguishing system was activated using five more cylinders of CO₂ not stored in the masthouse on the main deck.

The Ville de La Baie municipal fire department called in the fire department of the Canadian Forces Base at Alouette, Quebec, because of their expertise on board navy ships. The third response was deferred until the CO₂ cylinders on board the vessel had been recharged. Before the hold was entered in the third response for a brief inspection of the cargo, the air was expelled from the hold by forced ventilation using a new portable system. The firefighters of the two fire departments and the crew were ready to respond, but they did not have to fight the fire, as it was extinguished.

Water Supply System

The municipal water supply system was known to have trouble maintaining a constant flow for the local port facilities for long periods.

On October 27, as a precaution, the port authority asked the Ville de La Baie fire department to conduct a test to determine whether the supply and pressure of the municipal water supply system met firefighters' requirements.

The test, conducted on October 30, found that in the event of low pressure, emergency crews would have to hook up an additional pump to ensure the right flow and an additional pump was brought to the scene for the third response.

Introducing an additional pump solved the problem.

Emergency Plan

The port manager of the Port Saguenay facilities is responsible for contacting the main responders and for directing emergency operations.

In this instance, the port manager, the director of Emergency Preparedness Services for Ville de La Baie and the master of the "SOUTHGATE" were the persons responsible for conducting firefighting operations on board the vessel. Members of the response group did not know who was in charge. The Port Saguenay emergency plan, which had been issued on October 2, details the tasks of the on-scene commander and resource agencies, but does not stipulate who has primary authority on board the vessel in the event of fire.

No Smoking

Crew members were allowed to smoke in their cabins and in a designated smoking mess; smoking was prohibited elsewhere on the vessel. Stevedores had permission to smoke in their cafeteria, but smoking was punishable by fine in all prohibited areas, such as the wharf, the warehouse, and on ships. The shipowner and the stevedoring company had issued orders and posted signs prohibiting smoking.

There were reports that some stevedores and members of the crew were smoking in prohibited areas but the smokers were not reported to supervisory staff.

Statistics

The TSB contacted six classification societies that inspect the majority of the world fleet to learn of fires involving MDF. Only one classification society reported a fibreboard fire (200 tonnes). The cause of the fire was not spontaneous combustion.

The insurance company that had insured the MDF manufacturer since April 1994 reports that this occurrence was the first of its kind to be reported. Early in the MDF manufacturing process, the wood dust sometimes catches fire before being mixed with the urea formaldehyde.

Firefighting in Canadian Ports

Within Canadian ports, the responsibility for providing an emergency response plan, including firefighting assistance for vessels in port, generally rests with the port management. These plans often rely on municipal fire departments for firefighting support, many of which do not have personnel properly trained to fight shipboard fires.

Following the fire on board the bulk carrier "AMBASSADOR" in the port of Belledune, New Brunswick (TSB Report No. M94M0057), the Board recommended that "the Department of Transport conduct a special audit of fire-fighting facilities at Canadian ports and harbours under its jurisdiction to ensure that there is adequate year-round capability to contain shipboard fires." Subsequently, the Canadian Association of Fire Chiefs (CAFC), with the help of Transport Canada (TC) circulated a short questionnaire to assess firefighting capabilities of municipal fire departments responsible for fighting fires in Canadian ports.

In July 1998 the CAFC received a limited response to the survey and found the answers poor and relatively insignificant. Most of the municipal fire departments surveyed are not members of the CAFC and did not feel compelled to respond. However, the CAFC found that the survey provided enough information to raise concerns that the firefighting services available in municipalities with public ports may not be adequate to provide firefighting services in the event of a fire on board a vessel. The CAFC indicated that they are interested in working with TC to pursue research in this area.

Following the explosion and fire aboard the petroleum tanker "PETROLAB" and the subsequent destruction of the government wharf at St. Barbe, Newfoundland, on 19 July 1997, (TSB Report No. M97N0099), the Board requested TC Marine Safety and the CAFC (via TSB Marine Safety Advisory No. 03/98) to expedite their safety audit and review of risks and contingency measures in Canadian ports and harbours that contain oil terminals and where the installations are more susceptible to catastrophic damage should a fire break out on board a vessel at the dock.

To date, policy or programs intended by TC to promote the training of firefighters in municipalities with public ports have had limited effect.

Analysis

Toxic Products of Combustion

MDF has been determined to be a product not dangerous to transport and is not considered dangerous goods. The manufacturer does not have to provide the carrier with a material safety data sheet.

Like other non-dangerous goods, however, when this combustible solid burns, it releases toxic gases. To inspect the cargo before the second response, the responders took the precaution of wearing self-contained breathing apparatus. The responders were not aware that hydrogen cyanide is given off when MDF burns. After the second intervention, the responders chose to use sensors to monitor the cargo hold.

The IMO *Dangerous Goods Code* does not list, nor was it intended to list, products not hazardous to transport which, like most materials, give off toxic gases when burning.

Extinguishing the Fire

A burning smell was the first sign of a fire in the cargo. The first response was fast because both the stevedores and the crew members advised the resource persons. Good seamanship was observed in sounding the general alarm before fighting what, at first, appeared to be a minor fire.

As set out in the MDF material safety data sheet, it is recommended to extinguish fires fed by wood, cardboard, and plastic by lowering the temperature of the fire area with water. Foam and dry chemical may also be used as smothering agents.⁵

As the scope of the fire was unknown, it was decided that extinguishers be used initially. Although the extinguishers were charged with dry chemical powder for various classes of fire, dry chemical powder has the property of smothering combustible solids. The seat of the fire was between two tiers of bundles; there was, therefore, no direct access. It was probably impossible to spread dry chemical powder over the whole surface of the fire area to smother the flames. The cardboard and polyethylene were flammable substances and, being exposed to the open air and heat in the space between the bundles, they were subject to rapid oxidation. Extinguishers have a limited discharge capacity, and they did not stifle the oxidation. The flames then spread between the bundles.

Hoses with jet nozzle were used, but only approximately 10 percent of the water can absorb the heat of the fire. For this method to be effective and reduce the heat, the jet of water has to be directed right onto the source of the flames. Access to the centres of the fire was still restricted, and the fire probably spread to the point where it was impossible to cover the flames with two jet nozzles. A spray nozzle would have sprayed the water in a mist, which would have decreased the amount of oxygen sufficiently to prevent combustion from continuing.

Unable to control the fire, the crew decided to isolate the cargo by closing the hatches and ventilation shafts,

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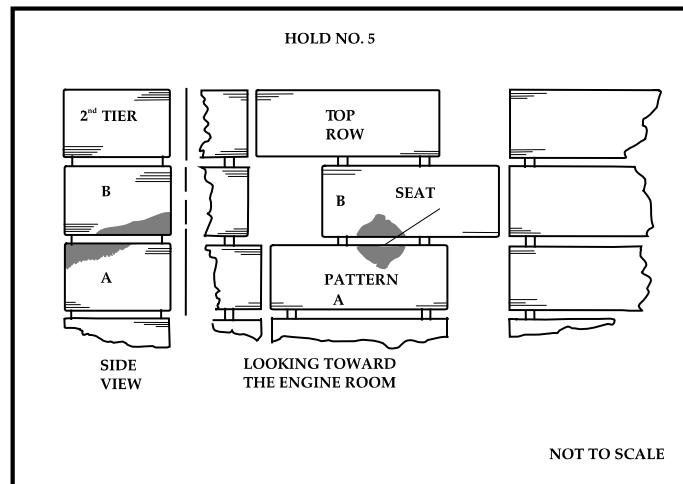
Robert J. Brady Co., *Marine Fire Prevention, Firefighting and Fire Safety*, Maritime Training Advisory Board, 1980.

and injecting CO₂, which is the safest and most effective extinguishing agent for hold fires. Water is less effective, as it can destabilize the vessel and damage cargo. CO₂ acts as a blanketing and oxygen-diluting agent; as it is slow-acting, the user has to be patient. However, the hold was opened again the next morning. The physical and chemical action of the CO₂ on the cargo and the ambient air lasted only about 19 hours. This length of time proved insufficient to cool and smother the blazes. When the cargo was exposed to the open air, the centres of fire were exposed to a sufficient amount of air to kindle the fire.

As the space between the bundles was hard to get at, foam was a wise choice as an extinguishing agent for the second response because it can be dispersed in such open spaces and cover the whole cargo. By covering the fuel, the foam isolates it from oxygen. In this instance, the firefighters may not have completely covered all of the fire areas when they exhausted the supply of foam, since the fire was not brought under control at that time. The responders then used fire hoses with spray nozzles. The water, however, dispersed the foam and, as the fire could still not be brought under control, the hold was closed again. The slow but effective action of CO₂ over more than five days stifled the blazes.

Origin of the Fire

Observers of the fire agree that the first orange flames were noticed in the second bay from the aft bulkhead between the second and third tiers from the top. A centre of fire was found there. The second centre of fire was under the first centre of fire, but near the tank top. The second centre of fire near the tank top and the third centre of fire in the third bay were probably the result of secondary fires. The whitish-coloured smoke was probably actually light grey, and the subsequent black smoke was probably a dark-brown colour. These colours of smoke and flame are associated with burning wood.



Water and air can sometimes generate a chemical reaction with MDF, but the polyethylene film packaging made the MDF impervious to the elements, and no loading had been done on rainy days. Combustion may result in chemical interaction between two or more substances. Medium-density wood fibre, cardboard, and polyethylene film are substances not at all likely to react violently together. The cargoes on the vessel's previous voyages reportedly did not leave any hydrocarbon deposits, and the tank top had been swept satisfactorily. The probability of a chemical reaction having initiated combustion is small. Had this been the case, the flames would have been discovered among the first tiers at the bottom of the hold.

The electrical equipment on board the vessel is affected by potentially corrosive salt sea air or potentially damaging ship vibrations. In contact with the steel hull, the electrical wiring may cause short-circuits, overheating or arcing capable of setting fire to nearby flammable substances. The fact that the 'tween-deck hatch-cover motors were not operated reduced the possibility of arcing over the bundles. A spark could have ignited a gas, but there was no explosion. Moreover, as the first centre of fire was noticed under the second tier of bundles from the top, the possibility that a spark worked its way between the bundles is small. The state of the electrical wiring after the fire was the result of fire damage to the equipment.

For a combustible solid to ignite, it has to pass into the gaseous state. In a fire, this transformation usually occurs as a result of the initial heat. The fire was not the result of improper stowage. There was no friction-inducing shifting of the bundles producing a heat source. If a heat source in the engine-room had heated the hold aft bulkhead, heat transfer by radiation would have caused a fire in way of the first bay adjacent to that bulkhead. However, no centre of fire was discovered in that bay.

Some materials not usually subject to spontaneous combustion may ignite of their own accord under certain conditions. Wood is one of them, but the cargo concerned here was a wood product. MDF is a very dense material, and it had been manufactured into panels. Solid materials take hours or even days to burn. On the day of the fire, the crew and the stevedores were present throughout the day around the cargo, and the burning smell and smoke were detected quickly. The beginning of combustion did not go unnoticed. Some factors conducive to spontaneous combustion are poor ventilation and a high ambient temperature as in an enclosed space. In this instance, the hold was wide open and hence fully ventilated, and the temperature of the ambient air was that of a temperate Canadian fall. Statistics do not show any case of spontaneous combustion. The elements and prevailing conditions were not conducive to spontaneous combustion.

An inspection of holds Nos. 3 and 5 revealed several smoker-related items even though there were orders prohibiting smoking, and offenders were subject to penalties. This indicates that some people smoked in the holds.

The information found suggests that a smoker-related item, probably a cigarette butt, was thrown in way of the first centre of fire while preparations were under way to stow the third bay. This would have occurred after lunch, around 1330. As the ignition point of a cigarette butt is higher than that of polyethylene, cardboard, and fibreboard, in the half hour before the discovery of the fire, the butt would have burned and then set fire to the cardboard, the polyethylene film, and eventually the MDF. A butt some 20 mm long would have burned for about 4 or 5 minutes, which is long enough to transfer heat by conduction to the cardboard and polyethylene film. The space between the bundles was conducive to combustion, the materials were all combustible, there was enough air, and the area was sheltered from the wind.

Role of the Supervisory Staff

MDF is an unregulated product and is not classified as dangerous goods. It therefore does not require any special handling precautions. The crew paid attention to stability and stowage as for all general cargo, but the crew members and stevedores paid no special attention to fire hazards.

Everyone has a role to play in accident prevention. Supervisors are responsible for enforcing fire safety policy. Creating awareness among stevedores and crew members about cigarette-smoking related hazards can certainly improve safety in the workplace, especially safety in enclosed spaces.

Supreme Authority on Board

The master of a foreign vessel is the supreme authority on board, but must comply with Canadian legislation. A foreign merchant vessel is not considered sovereign territory and, accordingly, an official of the Government of Canada can board a vessel to conduct departmental duties. To avoid delays in decision making, emergency plans should specify to the main responders the areas for which they have primary responsibility within a unified command structure.

Findings as to Causes and Contributing Factors

1. It is probable that a cigarette end was discarded in the space between the bundles of MDF where orange flames were seen in what was later determined to be the seat of the primary fire.
2. The fire was probably started between the bundles of MDF by a lit cigarette end transferring heat by conduction to the cardboard and polyethylene film which wrapped the MDF.
3. The other two centres of fire discovered were probably the result of secondary fires.
4. The extinguishers discharged by the crew in the first response had a limited discharge capacity and did not stifle the flames which were spreading amongst the bundles.
5. The jet nozzles used by the crew in the first response proved ineffective because the water jet could not be played directly onto the flames to reduce the heat.
6. Although the hold was closed and carbon dioxide gas (CO₂) released, the hold was re-opened before the CO₂ had time to smother the fire.
7. Further attempts by the crew and professional firefighters to extinguish the fire with a limited supply of foam and by water spray were unsuccessful, and the hold was resealed.

8. A further supply of CO₂ was released into the hold and its slow but efficient action stifled the fire after five days.

Findings as to risk

1. Smoking was prohibited in the work area but effective enforcement of this rule was lacking.
2. MDF has been determined to be a product not hazardous to transport. It is not listed as dangerous goods in neither the IMO *Dangerous Goods Code* nor *Canadian Dangerous Goods Shipping Regulations*.
3. The manufacturer did not have to provide the carrier with a material safety data sheet, and the crew and the firefighters learned of the MDF material safety data sheet only after the second response.
4. To date, policy or programs intended by TC to promote the training of firefighters in municipalities with public ports have had limited effect.

Safety Action

Action Taken

Following the accident, Port Saguenay purchased a portable fire pump to offset the inadequate flow provided by the Ville de La Baie water supply system.

In February 1999, the municipality of Ville de La Baie revamped its municipal emergency plan on the model of the Emergency Preparedness Canada publication. In the event of a response on board a ship, the plan states that a coordination team—consisting of the master, a representative of the agency concerned, and the head of the fire department—will draw up a joint response plan. The plan states that, legally in Canada, in a marine occurrence the concerted actions of these three responders have the authority on board a ship.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board authorized the release of this report on 18 April 2001.