Investigation into the fire

on board the UK registered trawler

***DE KAPER* (GY 269)**

off Hanstholm, Denmark

on 12 February 1999

FILE:MAIB 1/2/131

Marine Accident Investigation Branch
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Extract from
The Merchant Shipping
(Accident Reporting and Investigation)
Regulations 1999

The fundamental purpose of investigating an accident under these Regulations is to determine its circumstances and the causes with the aim of improving the safety of life at sea and the avoidance of accidents in the future. It is not the purpose to apportion liability, nor, except so far as is necessary to achieve the fundamental purpose, to apportion blame.

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GLOSSARY

EPIRB	Electronic Position Indicating Radio Beacon
gt	Gross Registered Tonnage
kW	Kilowatt - unit of power
m	metre - unit of length
MAIB	Marine Accident Investigation Branch
UTC	Universal Co-ordinated Time
V	Volts - unit of electricity
VHF	Very High Frequency

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SYNOPSIS

(all times are UTC)

The accident was notified to the Marine Accident Investigation Branch (MAIB) by Danbrit Ship Management Ltd at 0921 on 12 February 1999. MAIB Inspector Captain Nick Beer, carried out the investigation immediately.

The 31m long beam trawler, *De Kaper* (GY 269) was trawling about 30 miles off the coast of Denmark, when a fire was detected in the engine room. The crew responded immediately, but the fire quickly spread throughout the after part of the vessel because the engine room door had been left hooked open. They were unable to close the door or, due to their location (adjacent to the door), operate the fixed fire smothering equipment or engine room trips.

After approximately half an hour the crew abandoned the blazing vessel, drifting clear in a liferaft. They were taken on board another fishing vessel within minutes and later transferred to the port of Hanstholm.

Firefighting efforts by other vessels, which had gone to the assistance of *De Kaper*, eventually extinguished the fire. She was subsequently towed into harbour.

Lessons drawn from the investigation into this accident include the importance of keeping the engine room door closed when not in use.

SECTION 1 - FACTUAL INFORMATION

1.1 VESSEL AND ACCIDENT INFORMATION

Vessel

Name	:	*De Kaper*
Type	:	Beam Trawler
Official Number	:	B 13827
Fishing Number	:	GY 269
Port of Registry	:	Grimsby
gt	:	273
Length	:	30.87
Built	:	Belgium - 1985
Propulsion	:	Stork Werkspoor Diesel 8 FHD 240
Propulsive Power	:	1200kW
Manager	:	Danbrit Ship Management Ltd 8, Abbey Walk, Grimsby
Crew	:	Skipper and four fishermen

Accident

Type of Accident	:	Fire
Date of Accident	:	12 February 1999
Time of Accident	:	0222 (UTC)
Place	:	North Sea 57° 14.4'N 007° 46.5'E
Weather	:	Wind Force 1-2, good visibility
Sea Conditions	:	Calm
Injuries	:	None
Damage	:	Ship - Constructive Total Loss
Pollution	:	None

1.2 BACKGROUND TO THE ACCIDENT

De Kaper was a Belgian owned beam trawler which was registered in the UK and managed by Danbrit Ship Management Ltd of Grimsby. The vessel was built in Belgium in 1985 and first sailed under the Belgian flag. She transferred to British registry in 1993. The vessel generally operated with a crew consisting of a British skipper and four Belgian nationals, including the owner of the vessel who acted as "fishing instructor".

On 12 February 1999 she was fishing about 30 miles to the west of Hanstholm, Denmark. One crew member was on fishing watch in the wheelhouse, three more (including the skipper), were asleep in the cabin aft and the fishing instructor was asleep in the berth at the back of the wheelhouse.

1.3 NARRATIVE OF EVENTS (All times are UTC)

The engineer had started his bridge watch at 0045, after the nets had been shot and the fish from the previous haul had been cleaned. The next haul was due to start at 0230 and the remaining crew were taking the opportunity to rest.

The watchkeeper checked that it was all clear ahead and went to the engine room on patrol at 0202. He noticed nothing abnormal at that time and, after taking the temperature readings, returned to the bridge at about 0205.

The fire alarm sounded on the bridge at 0222 indicating a fire in the engine room. The watchkeeper started towards the engine room to check the situation but was unable to get down the internal stairs from the bridge due to thick black smoke. He woke the fishing instructor, slowed the engine, and attempted to get to the cross alleyway from the external door on the starboard side of the main deck. He opened the external door, saw smoke and flames and closed the door again.

The fishing instructor, on being woken, tried to get to the engine room via the open port side door from the external main deck to the cross alleyway. He could see the open engine room door, which was just inside the cross alleyway on the port side, but could not get close because of flames. He returned to the bridge which was now full of smoke to send a distress signal. He did get in however, but found the port side Very High Frequency (VHF) radio set without power. He picked up the Electronic Position Indicating Radio Beacon (EPIRB) and handed it to the engineer who had returned to the bridge.

The skipper and other two crew who had been woken by the fire alarm, attempted to get forward through the galley to the cross alleyway but were unable to do so. They went out on to the main deck through the after starboard door where they met the engineer. All four then went forward out of the smoke and flames. Two of them tried to fight the fire from the port side main deck with the deck wash hose and extinguishers while the others prepared the liferaft.

Despite their efforts, they were unable to get close to the engine room door. All power was soon lost and, with the fire quickly spreading upwards to the wheelhouse, the crew

Photograph 1

***De Kaper* in Hanstholm**

gathered in the fore part of the vessel. The liferaft had been launched, the EPIRB activated, and three distress rockets, which had been retrieved from the wheelhouse, were set off. The instructor had been unable to transmit a distress message from the wheelhouse and the VHF radio, which he had brought from the wheelhouse, was damaged.

The Danish fishing vessel *Tourmalet* (HM 122) had seen the fire and the distress signals and approached to give assistance. The heat on board *De Kaper* was so intense that the wheelhouse windows exploded. The crew were concerned that two propane cylinders, which were stored on the open after deck, might explode. On seeing that rescue was on hand the crew abandoned the vessel and boarded the liferaft in which they drifted towards *Tourmalet*. The time was about 0300. They safely boarded *Tourmalet*.

Full details of the distress message were given by radio to the coast radio station while *Tourmalet* took the survivors to Hanstholm where they were landed at 0615.

The Danish fisheries inspection vessel *Nordsoen* and the rescue vessel *C.B.Claudi* had gone to the scene. They fought and eventually extinguished the fire on board *De Kaper* and she was later towed into Hanstholm by a salvage vessel. On her arrival, she was inspected by the MAIB inspector.

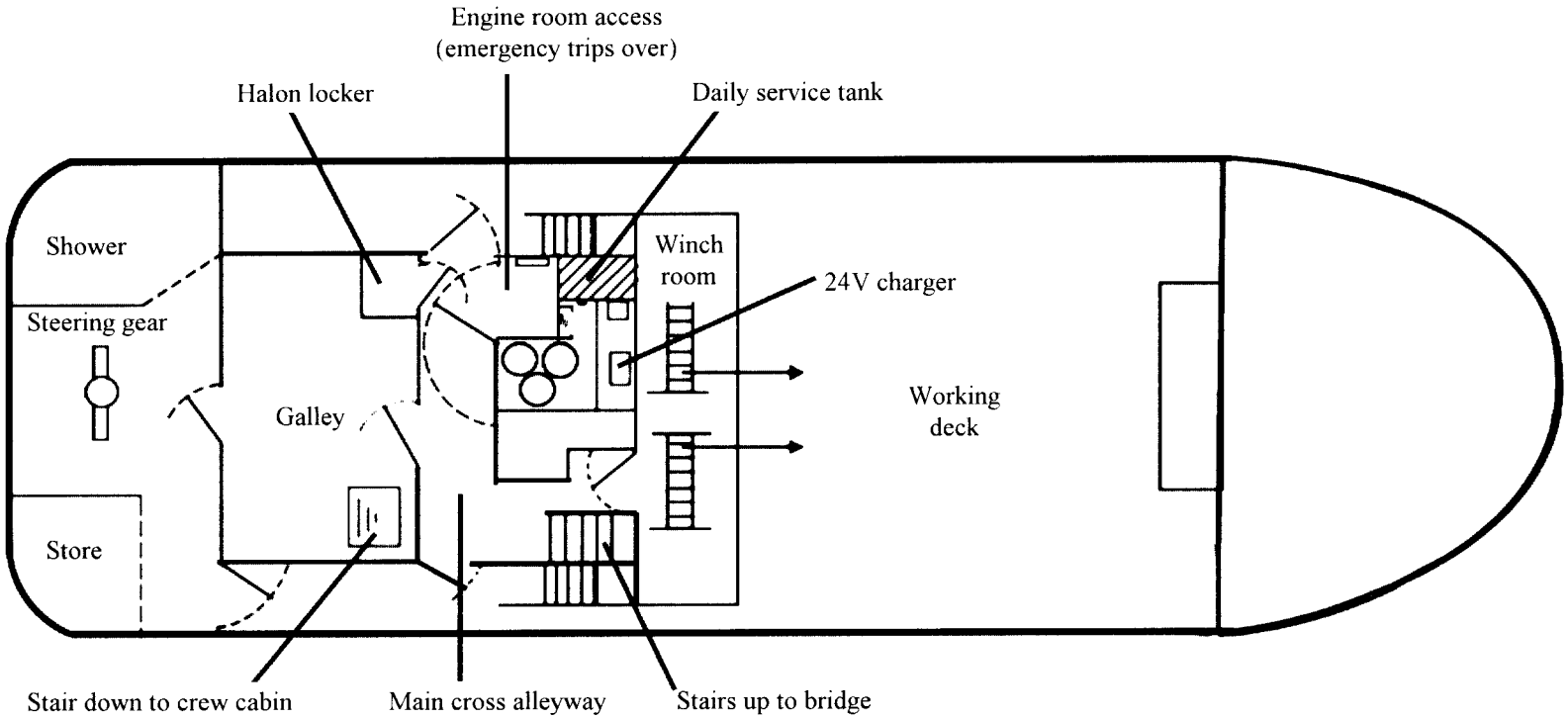
1.4 THE VESSEL (See Figure - Main Deck Arrangement)

De Kaper was designed with the main working deck forward and a superstructure housing aft. The superstructure contained accommodation, galley, stores and winch room on the main deck and the bridge one deck higher. The engine room and crew cabin were situated beneath the superstructure. The fish hold was sited within the hull, forward of the engine room. The main working deck extended aft into external alleyways either side of the superstructure housing. A gantry forward supported two derricks which were used to deploy the beams and nets.

Access to the engine room was by a single steel door situated within the accommodation cross alleyway on the main deck level. From the cross alleyway a passage led forward to the winch room and, by a stairway and wooden door, up to the bridge, which was located one deck higher. Another wooden door led from the cross alleyway directly aft into the galley which extended the whole width of the housing. The crew cabin was beneath the galley. The area aft of the galley on the main deck contained a shower room, the steering gear and a storeroom. The main cross alleyway could be entered directly from outside by steel doors on the port and starboard sides.

The steel engine room door hinged into the port side of the cross alleyway. The alleyway was only just wide enough for this heavy door to swing through 90° so that it could be hooked back against the forward bulkhead **(see Photograph 2)**. The lack of space made it awkward to handle the door, so it was usually left hooked open. Opposite the engine room entrance, on the after bulkhead of the cross alleyway there was a locker containing halon fire smothering equipment serving the engine room. Eight wire operated emergency valve trips connected to port and starboard bunker tanks, port and starboard tunnel tanks, the

De Kaper main deck arrangement
(not to scale)



Photograph 2

The engine room door open at 90°

daily service tank and the lube oil storage tank were led into the cross alleyway just above the engine room door. Each trip was fitted with a plastic operating handle.

Inside the entrance to the engine room at main deck level there was a small platform and stairs which led down to the bottom plates and the main engine space. A smoke detector head was sited above the platform and was connected to the ship's fire detection and alarm system control panel in the wheelhouse. The daily service tank was sited immediately aft of the platform. At the time of the accident the daily service tank was nearly full and the tank was fitted with a sight gauge (glass or plastic) which had an automatic closing valve **(see Photograph 3)**. To starboard of the oil tank there was an electric converter (not in use) and a 24V charging unit (bought new two months before the fire). An electrical junction box was sited just inside the door on the port bulkhead. The main engine exhaust trunking ran vertically to starboard of the platform.

The main engine room air intakes were sited on bridge deck level either side of the funnel casing **(see Photograph 4)**. In the event of a fire they were designed to be closed using steel sliders which were stored in a nearby locker located in the funnel casing on bridge deck level. The locker door was open at the time of the fire.

De Kaper was fully certificated in accordance with national and international regulations.

1.5 THE CHANGE IN REGISTRY

De Kaper transferred to British registry in 1993. At this time, despite being constructed in 1985, she could not comply with all the provisions of the Fishing Vessel (Safety Provisions) Rules 1975. Accordingly, she was given exemptions from several requirements on the same basis that an existing United Kingdom ship would have been made exempt when the rules came into force. The normal basis for granting these exemptions is that it is unreasonable to expect the owners to make major modifications to the vessel.

The exemptions granted to *De Kaper* included:

- complying with the provision for bulkheads and decks separating machinery spaces from accommodation, service and control spaces being A60 construction;
- internal stairways being constructed of steel and within enclosures of steel;
- bulkheads, linings, ceilings and the support grounds being constructed of non-combustible material;
- deck coverings within accommodation, service and control spaces being of a type that will not readily ignite;
- bulkheads, ceilings, panellings and linings and the paints and varnishes used in accommodation, service and control spaces being resistant to spread of flame;
- subdivision and draught stops being fitted in spaces behind linings etc;

Photograph 3

Daily service Tank

Photograph 4

Bridge Deck

- insulation being non-combustible; and

- exposed insulation around pipes etc in the engine room being made impervious to oil.

In addition to these exemptions, during the survey on change of registry, the owners were instructed to remedy many other areas of non-compliance. Actions arising from this included fitting a self-closing appliance on the engine room door.

1.6 THE DAMAGE (see Photograph)

Examination of *De Kaper* revealed that the fire had been confined to the after part. Fish in the hold was still packed in ice and in a marketable condition.

The bridge, galley and cross alleyway had been completely gutted by fire **(see Photograph 5)**. No fittings or linings remained intact in these spaces. The steelwork of the housing had been deformed by the heat. Although the crew cabin was damaged by fire and smoke, some lining and fittings remained. Personal effects belonging to the crew which had been left in this space, were retrieved after her arrival in Hanstholm.

The equipment and machinery located in the area of the engine room inside the access door at main deck level were severely damaged **(see Photograph 6)**. Aluminium exhaust trunk sheathing and platform fittings had melted. The daily service tank was empty; its sight gauge was missing. Examination of the tank gauge automatic closing valve could not establish whether it had operated correctly **(see Photograph 7).** The copper plates within the 24V charger unit had melted and fused and all electrical wiring in the vicinity had been destroyed.

Although the engine space below the main deck access point was smoke blackened in places, it did not appear to be substantially damaged. Some plastic deckhead fittings had been severely affected by the heat **(see Photograph 8)**.

On the external bridge deck, one liferaft had been burnt in its rack, the deck was buckled but the after "A" frame appeared undamaged. The funnel casing and after bulkhead of the bridge were buckled. The storeroom in the funnel casing was burnt out **(see Photograph 4)**.

1.7 THE CREW EMERGENCY RESPONSE

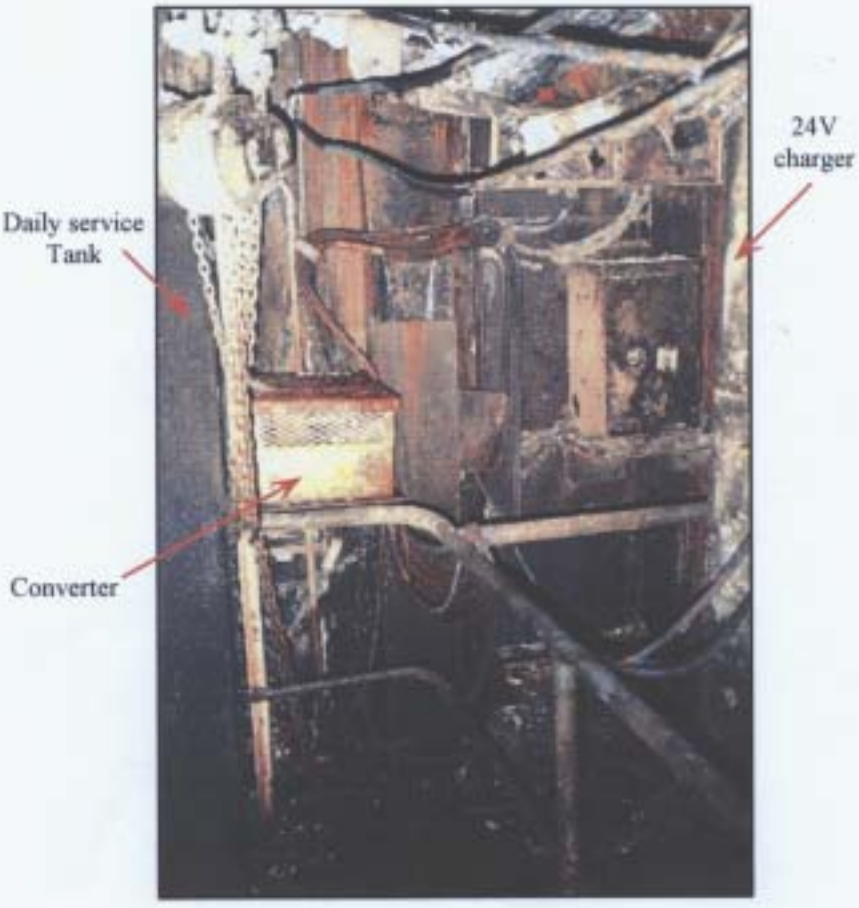
De Kaper was manned in accordance with national and international regulations.

The fire detection and alarm system worked efficiently. All crew members were awake and aware of the fire within seconds of the alarm sounding. Initially, the crew acted individually on their own initiative but, after a few moments, the fishing instructor/owner started to take charge and allocate responsibilities.

Photograph 5

The bridge

Photograph 6

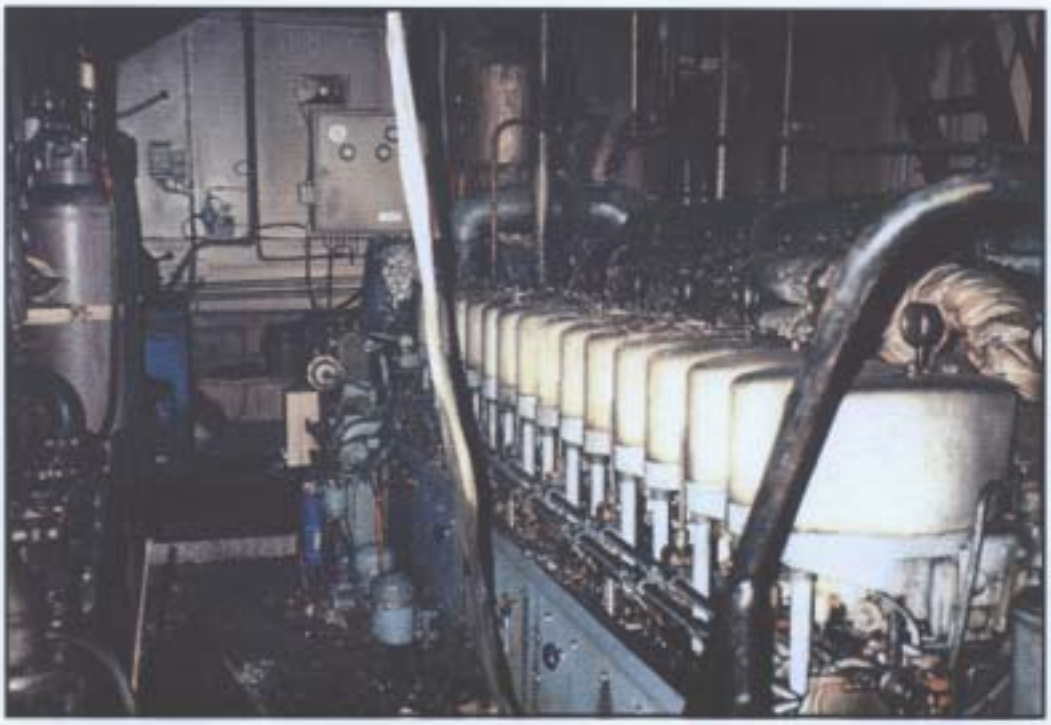


Engine room entrance

Photograph 7

Tank contents gauge

Photograph 8



The Engine space below main deck

By the time the first person reached the engine room access door, which was only seconds after the initial alarm, the fire was out of control and spreading into the cross alleyway. The crew were unable to close the door; unable to get access to the halon fire smothering equipment and unable to operate the emergency trips. Quickly they got the deck hose operational and, using this and extinguishers, attempted to fight the fire and reach the door. This was unsuccessful. No attempt was made to close the engine room ventilation in the funnel casing.

The crew tried to make a distress call, but were unsuccessful as the fire had spread rapidly to the wheelhouse and electrical power had been lost. The EPIRB was activated and a portable VHF radio retrieved, but this was later found to be inoperable. One liferaft was launched, made ready and used effectively to transfer the crew safely to *Tourmalet*.

SECTION 2 - ANALYSIS

2.1 THE CAUSE OF THE FIRE

Based on the examination of the damaged areas and witness statements, the seat of the fire was within the engine room at main deck level in the vicinity of the daily service tank.

The fire was out of control within seconds. It was fed by an inexhaustible supply of fresh air through the open engine room access door and the adjacent open external door and through open ventilators on the bridge deck. The instantaneous ferocity of the fire indicated a ready source of fuel. This was probably fuel oil from the daily service tank situated in the immediate area of the seat of the fire.

Although the ignition source could not be determined with certainty, it was likely to have been from electrical equipment. The only other potential heat source near the seat of the fire was the main engine exhaust trunking, which was well lagged and, although damaged by the fire, gave every indication of having been close to, rather than right at, the seat of the fire. Of the electrical equipment in the vicinity; the converter was not operational at the time and can be discounted; the distribution box was not in the worst fire damaged area and is not considered a likely ignition source; the 24V battery charger, however, was newly acquired, in the area of the seat of the fire and severely damaged internally. It is therefore most probable that a fault in the 24V battery charger provided the initial ignition source.

It is impossible to be precise about the events that caused the fire to spread and get out of control. One possible hypothesis is that a small electrical fire in the battery charger spread quickly to the adjacent area in the vicinity of the daily service tank. The fire damaged the tank contents gauge, along with its faulty or damaged closing valve, then allowed the remaining contents of the tank to feed the fire. The fire then readily spread out of the engine room and throughout the accommodation as wooden doors and linings fed the flames.

2.2 FIRE PROTECTION ON *DE KAPER*

De Kaper was equipped to detect, contain and extinguish an engine room fire but, in the circumstances that prevailed on 12 February, most of the relevant equipment was unusable because the fire spread so rapidly. All modern engine rooms are built so as to contain a fire within the space and *De Kaper* was fitted with equipment that would extinguish a fire that had been so contained. The fact that the engine room access door was left hooked open destroyed this fundamental safety feature, and dramatically reduced the time the crew had available to gain control of the fire. The fire started in the immediate vicinity of the door, which reduced the time still further. Once the fire had reached the open door, not only was it impossible to close it, but the emergency trips and halon equipment were also inaccessible. In other circumstances the proper use of the halon fire smothering gas combined with effective ventilation control would probably have allowed the fire to be extinguished safely within the engine room.

Poor design led to the practice of leaving the engine room door hooked open using a hook and eye arrangement. The door was heavy and awkward to manage, especially when the vessel was moving in a seaway. To hook the door back it needed to be swung though 180°, just scraping the opposite bulkhead as it swung through 90°. If the doors of the halon store or other storage locker on the opposite bulkhead were not properly closed or even hooked open the engine room door would foul them.

A deficient safety regime on board *De Kaper* allowed the danger of permanently hooking the engine room door open to go unrecognised.

The siting of the halon fixed fire smothering equipment immediately outside the engine room door and the emergency trips immediately above the engine room door, were poor design features of the vessel.

Other key design features of *De Kaper* that allowed the fire to spread rapidly were the linings, doors, ceilings and draught stop arrangements which did not meet the requirements of a British fishing vessel built in 1985. This should not have been the case on a modern British ship and only existed on *De Kaper* because of exemptions granted at change of registry.

The acceptance of modern vessels on to the UK register by using the exemption system is a questionable practice. It was originally designed for ships built before the safety provision regulations came into force; accepting vessels built since then increases the risk to safety of life at sea. It is recommended that the MCA should reconsider the practice.

2.3 THE RESPONSE

The crew response to the emergency was immediate and quickly co-ordinated but was hampered by the open engine room door. Early attempts were made to close the door but the fire was already out of control in that area. No attempt was made to close other engine room ventilation but it is considered that, with the engine room door and the adjacent door to the external deck open, the effect of such action would have been minimal. Concerted action to close all outside doors and ventilation would have slowed the spread of fire. However, it is unlikely that this action would have allowed the fire to be brought under control.

Early attempts were made to transmit a distress message; the EPIRB was activated; the liferaft was launched and prepared in a position of relative safety. The attempts to transmit a distress call were frustrated by the speed with which the fire spread, causing loss of electrical power and the wheelhouse to be abandoned. These attempts might have been helped by more effective actions to slow the spread of fire.

SECTION 3 - CONCLUSIONS

3.1 FINDINGS

1. *De Kaper* transferred to British registry in 1993 at which time she was granted exemptions from some of the structural fire protection requirements of the Fishing Vessel (Safety Provision) Rules 1975. [1.5]

2. *De Kaper* suffered an engine room fire at 0222 on 12 February 1999 which, despite the efforts of the crew, quickly spread out of control. [1.1]

3. At the time of the fire the weather was good; the visibility clear and the wind was force 1 - 2. [1.1]

4. At the time of the fire *De Kaper* was fully certificated and appropriately manned according to national and international rules. [1.4, 1.7]

5. Fire damage was confined to the after part of the vessel, the wheelhouse and accommodation were burnt out and the upper levels in the engine room were severely damaged. [1.6]

3.2 THE IMMEDIATE CAUSE

The immediate cause of the fire cannot be identified positively, but is likely to have been a fault in the 24V battery charger. A small initial fire quickly escalated when the contents of the daily service fuel tank emptied, due to a faulty closing valve in the tank's contents sight gauge. [2.1]

The fire spread quickly out of control because the engine room door had been hooked open. [2.2]

3.3 OTHER FACTORS AND UNDERLYING CAUSES

Poor design of the vessel led to the crew's practice of hooking the engine room door open. [2.2]

A deficient safety regime on board *De Kaper* allowed the danger of hooking the door open to go unrecognised. [2.2]

Despite the severity of the fire, it is probable that it could have been brought under control effectively with the equipment on board had the engine room door not been hooked open. [2.2]

Although the main thrust of the fire fighting effort was directed at closing the engine room door, the benefit of closing all other ventilation to the superstructure seemed to go unrecognised. [2.3]

The first priority in an emergency is to preserve life. This was achieved in a reasonably controlled manner. [2.3]

De Kaper had a level of structural fire protection inferior to that of an equivalent vessel built under British regulations. [2.2]

SECTION 4 - RECOMMENDATIONS

1. The **Maritime and Coastguard Agency** is recommended to:

Reconsider the extent to which exemptions from structural fire protection requirements in the Fishing Vessel (Safety Provisions) Rules 1975 are granted to vessels built since these rules came into force.