

Extract from The United Kingdom Merchant Shipping (Accident Reporting and Investigation) Regulations 2012 – Regulation 5:

“The sole objective of the investigation of an accident under the Merchant Shipping (Accident Reporting and Investigation) Regulations 2012 shall be the prevention of future accidents through the ascertainment of its causes and circumstances. It shall not be the purpose of an such investigation to determine liability nor, except so far as is necessary to achieve its objective, to apportion blame.”

NOTE

This report is not written with litigation in mind and, pursuant to Regulation 14(14) of the Merchant Shipping (Accident Reporting and Investigation) Regulations 2012, shall be inadmissible in any judicial proceedings whose purpose, or one of whose purposes is to attribute or apportion liability or blame.

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Fire on board fishing vessel *Ardent II* (INS 127) while alongside in Port Henry Basin, Peterhead 16 August 2016

SUMMARY

At approximately 0500 on 16 August 2016¹, while *Ardent II* was alongside in Peterhead, an electrical fire started in the crew mess room. A short while later one of the crew got out of bed to go to the toilet, smelt and saw smoke, and raised the alarm. All three crew who were on board managed to escape onto the quay before the fire took hold. The fire service tackled the blaze, finally extinguishing it the following day. The vessel was extensively damaged and was later declared a constructive total loss.

The MAIB investigation identified that:

- An electrical fault or failure of a multi-socket adapter in the crew mess room was the most likely cause of the fire.
- There was no smoke detector fitted in the crew mess room and it was fortunate that one of the crew awoke and discovered the fire at an early stage. This alerted the crew to the fire and enabled them to evacuate the vessel without delay.
- The fact the quay offered the crew a safe haven is likely to have influenced their decision to evacuate the vessel immediately, rather than to attempt to contain and extinguish the fire.



Ardent II

¹ All times are UTC+1.

The MAIB has issued a flyer to the fishing industry highlighting the safety issues identified in this report, and endorsing the practice of regular visual inspection and Portable Appliance Testing (PAT) of electrical equipment as an effective means for reducing the risk of electrical fires.

More explicit instruction on which spaces on board similar fishing vessels require a means of fire detection is intended to become mandatory in 2017. No recommendations are made in this report.

FACTUAL INFORMATION

Narrative

On 11 August 2016, the trawler *Ardent II* returned to Peterhead from a fishing trip. The catch was landed, shore power was connected, and the vessel's machinery was shut down. Four crew went home, leaving three crew, who were Filipino and lived on board.

On 15 August, several contractors worked on the vessel conducting weld repairs and servicing the vessel's fire-fighting appliances. The vessel's engineer arrived during the morning to oversee the contractors, conduct routine checks, change the compressor's oil and complete a deep clean of the engine room. The work was in preparation for a pre-guardship duty² inspection which was scheduled to be carried out later in the week.

The contractors completed their work and stood a fire watch over the weld repairs for a further 30 minutes before departing. At approximately 1800, the three crew cooked a meal using an electric rice cooker in the crew mess room and a microwave oven in the galley.

During the evening, the engineer briefly ran the port auxiliary engine to enable him to pump out the fish room bilge. At 2200, two crew went to bed. The third crew man went to bed after 2345 having briefly spoken to the engineer, who told him that he would lock up the vessel when he left.

At 0230 on 16 August, the engineer finished his work and departed the vessel via the wheelhouse door, noting nothing unusual as he passed through the crew mess room. He locked the wheelhouse door with a padlock as he left.

At about 0515, one of the crew exited the accommodation and entered the crew mess room on his way to the toilet/washroom. As he did so, he smelt what he considered to be burning plastic and saw black smoke, but there were no obvious signs of flames or heat. He shouted to alert the other two crew, who then exited the accommodation into the crew mess room, unfastened the watertight door, and passed through the doorway into the aft net drum space and then onto the quay. At the same time, the crewman who had raised the alarm entered the wheelhouse, opened the wheelhouse door window, unlocked the padlock using a key from his pocket, opened the door, and passed onto the aft upper deck and then onto the quay.

The three crew then alerted the crew of a nearby fishing boat and they called the fire service at 0537. Ten minutes after the crew had escaped from *Ardent II*, flames were seen emitting from the watertight doorway between the crew mess room and the aft net drum space.

At 0546, the first fire appliance arrived on scene and another two arrived within the next 20 minutes. At 0611, the fire incident commander reported that the vessel was well alight and was moored by the bow only, as the stern lines had burnt through, and he requested a further three fire appliances be sent to the scene. The fire crews tackled the blaze from the quay as they were unable to board the vessel at that time. By 0620, with the vessel's crew accounted for, arrangements were made to push the vessel back alongside.

² Guardship duty is when a vessel is contracted to guard an offshore installation such as a pipeline or oil rig.

By 1209, the fire on *Ardent II* was believed to be extinguished. However, flames were later seen in the accommodation and further fire-fighting was necessary (**Figure 1**). The fire service continued damping down until the following afternoon, at which time there were no further hot spots or signs of smoke.



Figure 1: *Ardent II* on fire on 16 August 2016

Although still afloat, *Ardent II* was extensively damaged by the fire and was later declared a constructive total loss.

Crew

Ardent II's skipper held a Class 2 Fishing Vessel Certificate of Competency, which he had obtained 18 years prior to the accident. All the crew had either completed the necessary sea survival, first-aid, fire-fighting and safety awareness courses in the UK or, in the case of the Filipino crew, possessed recognised equivalent qualifications.

All three Filipino crew had completed at least two contracts on UK fishing vessels, the contracts varying between 8 and 10 months in length. They had also spent a minimum of 6 months on *Ardent II*, and lived on board the vessel.

All the crew were smokers apart from the skipper. Smoking was permitted in the crew mess room, but not in the accommodation.

Vessel layout

The central living area of *Ardent II*, situated on the weather deck, housed the galley, crew mess room, the toilet/washroom and a skipper's cabin (**Figure 2**).

The galley was equipped with an electric cooker, fridge and freezer, microwave oven and kettle. A portable electric hob was available in the galley for use when the vessel was connected to shore power as the electric cooker drew sufficient current to trip the shore connection when other electrical appliances were also in use.

The crew mess room provided seating at two tables. It was equipped with a television and a satellite box, located forward of the exhaust trunking, that were usually left on stand-by. There was also a freezer on the starboard side forward of the engine room access hatch. The freezer was plugged into a multi-socket adapter located adjacent to it. Other electrical appliances, including a rice cooker and the crew's mobile phones, were plugged into the adapter when required. No such appliances were plugged into the adapter at the time of the accident.

The accommodation incorporated seven bunks and was fitted with an escape hatch to the aft net drum space on the port side. Normal access to the accommodation was via a vertical ladder from the crew mess room. A separate vertical ladder from the crew mess room gave access to the engine room.

The wheelhouse, which incorporated a fire detection and alarm system panel, was accessed from the crew mess room via a stairway with a door fitted at the top. An aft door provided access from the wheelhouse to the aft upper deck.

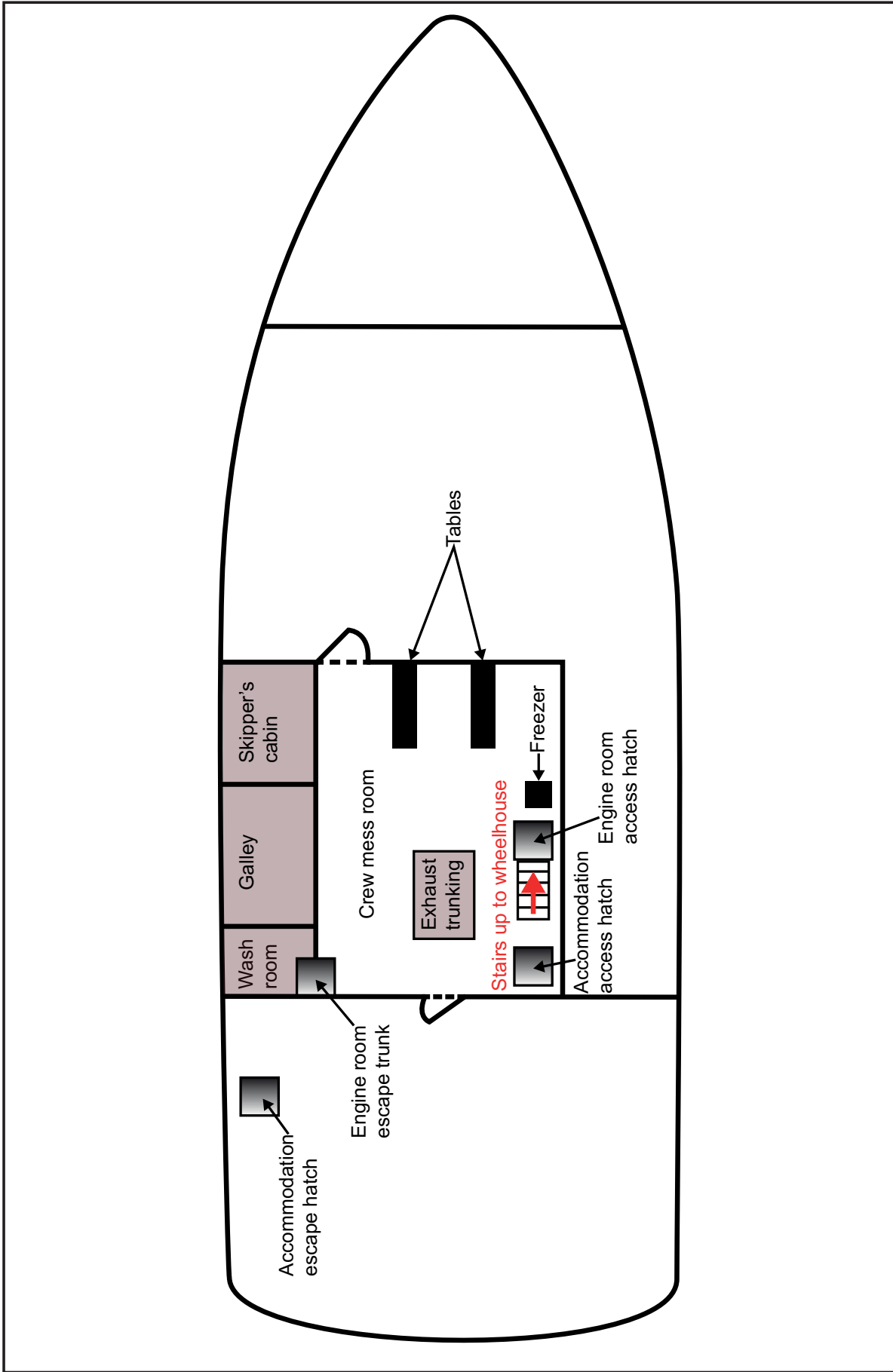


Figure 2: Ardent II layout

Fire protection, alarms and fire-fighting appliances

Fire protection fitted to *Ardent II* was limited to the galley boundary. The galley was separated from the crew mess room by a fire door, but this was normally secured open, its auto-closure having been disconnected previously (**Figure 3**).



Figure 3: Galley fire door with auto-closure disconnected

A fire detection and alarm system was fitted to the vessel. The system was connected to smoke and heat detectors in the engine room, a heat detector in the galley and a smoke detector in the accommodation. The fire alarm, which sounded in both the wheelhouse and accommodation, was last tested in May 2016.

Eight portable fire extinguishers were positioned throughout the vessel. These included 9-litre water extinguishers in the accommodation and crew mess room, and a 4.5kg dry powder extinguisher in the galley. The engine room was fitted with a CO₂ fixed fire-extinguishing system, which could be activated from the aft net drum space. Two electrically driven pumps in the engine room could also be used as fire pumps, which fed fire hoses located on the main deck. A manual fire pump was located inside the main deck shelter.

Maintenance, survey and inspection

Ardent II was partly-owned by Grampian Sea Fishing Ltd, who provided general vessel management services. This included organising contractors for repairs and servicing, and arranging vessel inspections and surveys.

The vessel was last surveyed by the Maritime and Coastguard Agency (MCA) on 2 March 2016. On the basis of this survey, an International Fishing Vessel Certificate and a Load Line Exemption Certificate were issued, valid until 28 May 2017 and 2 March 2017 respectively.

On 11 May 2016, a pre-guardship duty inspection was conducted by the Scottish Fishermen's Federation. All identified deficiencies were closed out by 19 May 2016.

Regulations and guidance

Ardent II was built in 1986 in Campbeltown and was 24.36m registered length. When constructed, the vessel was certified against the requirements of The Fishing Vessels (Safety Provisions) Rules 1975 (1975 Rules), which include specific requirements for vessels under 24.4m registered length.

Under the 1975 Rules, neither an automatic fire detection and alarm system nor a fixed fire-extinguishing system for machinery spaces was required for steel vessels of less than 24.4m registered length. However, *Ardent II* was fitted with a fixed fire-extinguishing system and a fire detection and alarm system for the engine room, which exempted the vessel from the requirement for the divisions separating the engine room from the accommodation, service spaces and control stations to be insulated to the 'A60 standard'³. In 2005, the MCA published Marine Guidance Note (MGN) 291 (F) - Fire Detection and Alarm Systems on Fishing Vessels, which specified that fishing vessels over 24m registered length should have a fire detection and alarm system protecting the accommodation, service spaces and control stations. In 2008, the fire detection and alarm system on *Ardent II* was extended by connecting a heat detector in the galley and a smoke detector in the accommodation. As a result of a harmonisation of standards, *Ardent II* was later required to meet regulations for vessels over 24m registered length, resulting in an International Fishing Vessel Certificate being issued.

In 2014, the MCA published MGN 501 (F), announcing a voluntary code of practice for fishing vessels of 24m registered length and over. In respect of fire detection and alarms systems, the Code requires such a system to be:

'...installed and so arranged as to detect the presence of fire in all accommodation spaces and service spaces except those which afford no substantial fire risk, such as void spaces and sanitary spaces.'

The Code is intended to become mandatory in 2017, replacing, among other legislation, the 1975 Rules.

Regulation 14 of The Merchant Shipping and Fishing Vessels (Provision and Use of Work Equipment) Regulations 2006 states:

'The employer shall ensure that all ship's electrical equipment and installations are so constructed, installed, operated and maintained that the ship and all workers are protected against electrical hazards.'

Similar accidents

In 2008 a fire broke out in the galley/mess area of the fishing vessel *Vision II*⁴, while alongside in Fraserburgh. The three crew, who were living on board, all died as a result of the fire. Contributing factors to this accident were the disabling of the fire detection and alarm system and an inability of the galley fire door to self-close.

³ So insulated where necessary with suitable non-combustible materials such that, if the division is exposed to the standard fire test, the average temperature of the unexposed side of the division will rise not more than 139°C above the initial temperature nor will the temperature at any one point, including any joint, rise more than 180°C above the initial temperature within 60 minutes.

⁴ MAIB Report No 8/2009.

In 2010, as a result of this and other accidents, the MCA published MGN 413 (F) - Voluntary Code of Practice for Employment of Non European Economic Area (EAA) Fishing Crew, and MGN 425 (M+F) – Assessment of Risks for those sleeping on “Dead Ships”. MGN 413 (F) highlighted the voluntary code that had been produced by the SFF to highlight the social and practical responsibility of employing non-EEA fishing crew. The following extracts are relevant to this accident:

- *‘Do the alarms sound loud and clear in the accommodation and sleeping cabins? Consider fitting supplementary smoke detectors.*
- *Are fire doors self-closing or kept closed?*
- *Have heaters and cooking appliances been checked and are they safe to use in the accommodation?*
- *Are all electric appliances safe, with correct wiring, fuses (e.g. radios, TVs, toasters, kettles, phone chargers etc)?’*

The following extracts of MGN 425 (M+F) are also relevant to this accident:

- *(3.1) It is recommended that all vessels should have fire (smoke) and bilge alarms fitted with at least two independent power sources. The alarm should be so fitted that it can be heard within the accommodation in areas where crew may be sleeping.*
- *(3.3) It is strongly recommended that the alarm systems be capable of detecting, not only smoke and high bilge levels but noxious and flammable gases.*
- *(4.2.6) Are fire doors self-closing or kept closed (Note: unapproved holdbacks should be removed only electromagnetic holdbacks linked to the fire detection system are acceptable)?*
- *(7.1.10) Are all electric appliances safe, with correct wiring, fuses (e.g. radios, TV’s, toasters, kettles, phone chargers etc.)?*

ANALYSIS

Source of the fire

A detailed examination of the fire damage was undertaken to try to establish the source of the fire. The fire patterns and other evidence indicated the likely source of the fire was in the crew mess room. This ruled out it being a potential consequence of welding work carried out the day before the accident. Although the galley area was heavily damaged, the extent to which items had survived in this compartment also eliminated the possibility of the fire having originated there.

Given that the crew were smokers and were permitted to smoke in the crew mess room, a discarded cigarette was considered as a possible source of ignition. However, based on the physical post-accident evidence of the scene and the time at which the fire was discovered, a discarded cigarette was considered to be an unlikely source.

On excavation of the fire scene (**Figure 4**), it was apparent that the seat of the fire was at deck level in the gap between the freezer and the seating in the crew mess room (**Figure 5**). An aluminium plinth edging in this area had melted, there was heavy charring of the wood structure, and remnants of the multi-socket adapter (**Figure 6**), with the freezer plugged in, were found in the debris. A section of the fridge compressor electric cable was found intact, suggesting that the freezer itself was not the source of the fire. In light of this evidence, it is concluded that an electrical fault or failure of the multi-socket adapter was the most likely cause of the fire.



Figure 4: Fire damage to crew mess room



Figure 5: Location of source of fire

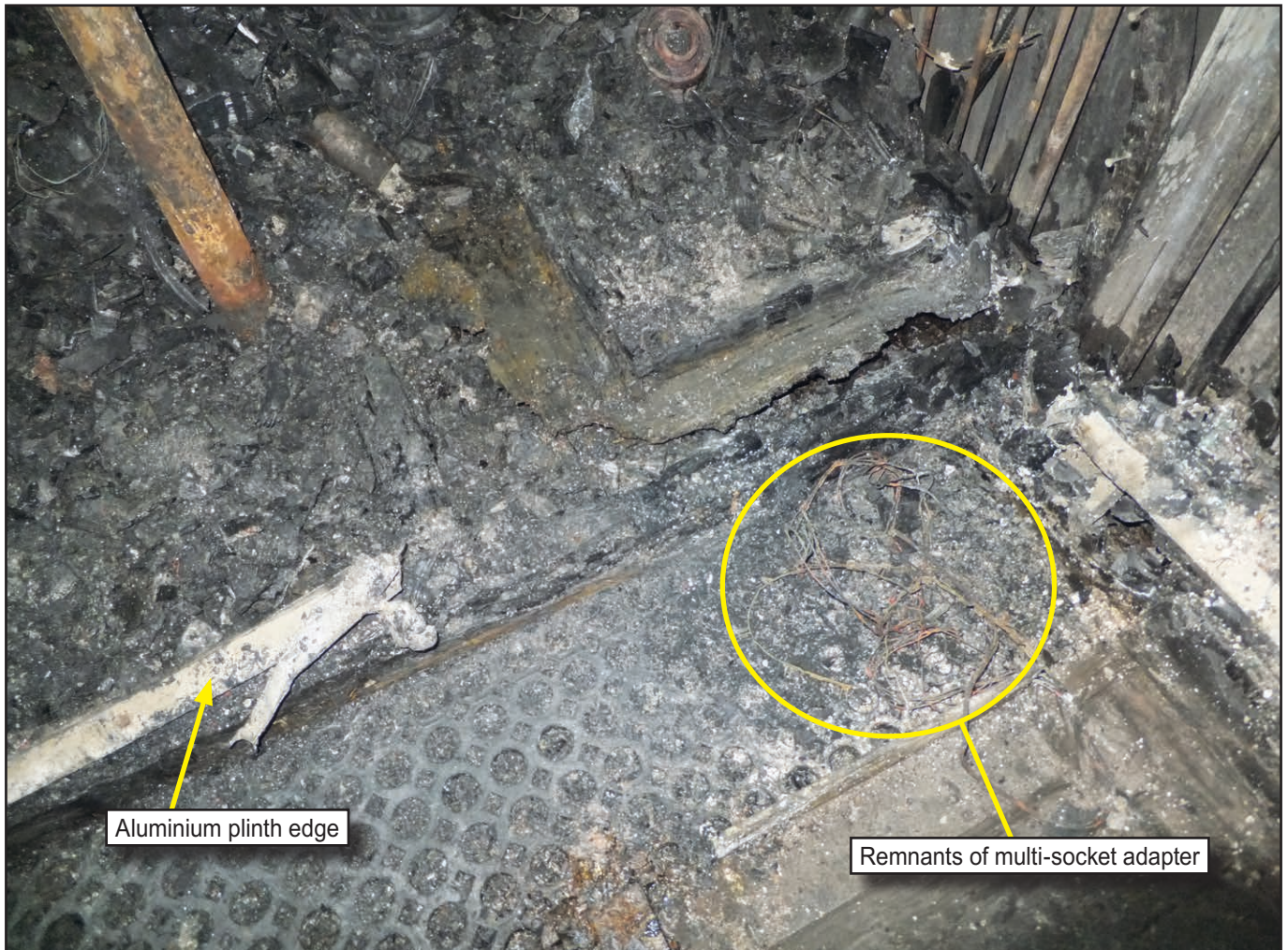


Figure 6: Remnants of multi-socket adapter

Fire detection and alarm system

It was fortunate that one of the crew awoke and discovered the fire shortly after it had started. In the absence of a smoke detector in the crew mess room, this alerted the crew to the fire and triggered them to evacuate the vessel without delay. The nearest sensor to the probable source of the fire was a heat detector in the galley, which would not have activated until later, or possibly not at all if the fire door to the galley had been shut.

Ardent II's fire detection and alarm system was initially restricted to the engine room as a means of exempting the engine room from being fitted with 'A60 standard' divisions. Efforts were subsequently made to upgrade the vessel's fire detection and alarm capability but the description in the regulations of areas to be covered allowed the crew mess room to remain excluded. A more explicit instruction on which spaces on board similar fishing vessels require a means of fire detection to be fitted is included in MGN 501 (F), which is intended to become mandatory in 2017 and should address this omission.

Action on discovery of the fire

The fire quickly spread throughout the vessel. By using available portable fire extinguishers, and closing doors and other openings on discovery of the fire, the crew might have been able to restrict its spread, or even extinguish it, before they evacuated onto the quay. Such actions might then have enabled the fire service to start tackling the fire at an earlier stage in its development and so limit the resulting damage. However, the fact that the quay offered the crew a safe haven is likely to have influenced their decision to evacuate the vessel immediately, rather than to attempt to contain and extinguish the fire.

Electrical safety on board

While good practice suggests that electrical appliances should be switched off and unplugged when not in use, some appliances, such as freezers and fridges, require a constant power supply.

Ashore, the Electricity at Work Regulations 1989 place a responsibility on employers that any electrical equipment that has the potential to cause injury is maintained in a safe condition. The Regulations do not specify what needs to be done, by whom, or how frequently. However, Portable Appliance Testing (PAT) is a common method used by employers to discharge this responsibility.

The Merchant Shipping and Fishing Vessels (Provision and Use of Work Equipment) Regulations 2006 place a similar responsibility on employers in relation to electrical equipment on fishing vessels. Regular visual inspection of electrical equipment to check for bare wires, that appropriate fuses are in place, and for signs of burning, together with regular PAT, would provide an effective means for reducing the risk of electrical fires.

Living on board fishing vessels

The MAIB investigation of the fire on board *Vision II* highlighted a number of concerns about crew living on board fishing vessels while in port. MGN 413 (F) and MGN 425 (M+F) summarise many of these issues and provide guidance on ensuring crew safety. The practice of crew locking themselves inside a vessel is an understandable measure from a security aspect and, as demonstrated in this accident, is unlikely to hinder their escape provided that they are immediately alerted of the need to do so and have the necessary capacity. However, in other circumstances, the situation could present significant problems for the fire service in both rescuing crew and fighting the fire. The issue of access to a fishing vessel in an emergency is something that owners and operators should take fully into account as part of their risk assessment before allowing crew to live on board in port.

CONCLUSIONS

- An electrical fault or failure of a multi-socket adapter in the crew mess room was the most likely cause of the fire.
- There was no smoke detector fitted in the crew mess room and it was fortunate that one of the crew awoke and discovered the fire at an early stage. It enabled the crew to be alerted to the fire and triggered them to evacuate the vessel without delay.
- The fact that the quay offered the crew a safe haven is likely to have influenced their decision to evacuate the vessel immediately, rather than to attempt to contain and extinguish the fire.
- MGN 501 (F), which contains guidance on fire protection, is intended to be made mandatory in 2017. This will mean that the crew mess rooms of fishing vessels like *Ardent II* are fitted with a means of fire detection in the future.
- Regular visual inspection of electrical equipment to check for bare wires, that appropriate fuses are in place, and for signs of burning, together with regular PAT, would provide an effective means for reducing the risk of electrical fires.
- Although not a contributory factor of this accident, access to a fishing vessel in an emergency is something that owners and operators should take fully into account as part of their risk assessment before allowing crew to live on board in port.

ACTION TAKEN

MAIB actions

The **Marine Accident Investigation Branch** has:

Issued a flyer to the fishing industry highlighting the safety issues identified in this report, and endorsing the practice of regular visual inspection and PAT of electrical equipment as an effective means for reducing the risk of electrical fires.

RECOMMENDATIONS

In view of current regulation and guidance, and that the voluntary code of practice for fishing vessels of 24m registered length and over is intended to become mandatory in 2017, no recommendations are made in this report.

Safety recommendations shall in no case create a presumption of blame or liability

SHIP PARTICULARS

Vessel's name	<i>Ardent II</i>
Flag	UK
Classification society	Not applicable
IMO number/fishing numbers	INS127
Type	Fishing trawler
Registered owner	Private
Manager(s)	Grampian Sea Fishing Ltd
Construction	Steel
Length overall	26.70m
Registered length	24.36m
Gross tonnage	251
Minimum safe manning	Not applicable
Authorised cargo	Fish

VOYAGE PARTICULARS

Port of departure	Peterhead
Port of arrival	Peterhead
Type of voyage	Not applicable
Cargo information	None
Manning	7

MARINE CASUALTY INFORMATION

Date and time	0500 16/8/16 (UTC+1)
Type of marine casualty or incident	Very Serious Marine Casualty
Location of incident	Peterhead
Place on board	Crew mess room
Injuries/fatalities	None
Damage/environmental impact	Constructive Total Loss
Ship operation	Alongside/moored
Voyage segment	Alongside/moored
External & internal environment	Dark, light breeze
Persons on board	3