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“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

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Foundering of the fishing vessel **ACHIEVE** and the death of a crew member north-west of the Island of Taransay, Western Isles 21 February 2013

SUMMARY

At about 1500 on 21 February 2013, the fishing vessel *Achieve* (Figure 1) foundered 6nm north-west of the Island of Taransay (Figure 2). Although all three of the vessel’s crew were rescued, one of them died later in hospital due to hypothermia.



Figure 1: Fishing vessel *Achieve*

No warning that *Achieve* was flooding was provided to the crew because the bilge alarm in the fish hold had been disconnected. As soon as the skipper became aware that his vessel was sinking, he transmitted a “Mayday” message on very high frequency (VHF) radio channel 16. However, because *Achieve* was sinking rapidly, the message was brief and did not include the position of the vessel. Immediately after making the transmission, the skipper left the wheelhouse and launched the liferaft. He then boarded the raft together with one of his crew. The second crewman, Norman Macleod, had donned a lifejacket and jumped into the sea as *Achieve* sank rapidly below him. He subsequently managed to board the liferaft after spending around 20 minutes in the water.

The brief “Mayday” message transmitted by the skipper of *Achieve* was initially misheard by the coastguard and around 45 minutes of response time was lost as the name and location of the vessel were established. Thereafter the crew were quickly rescued by a SAR helicopter and taken to hospital in Stornoway. Norman Macleod was conscious but delirious on arrival at the hospital and efforts to revive him were unsuccessful. He died later that evening.

The MAIB investigation has concluded that the foundering was caused by flooding in the vessel's fish hold, most likely as a result of a sprung plank in the hull. Although the skipper could have initiated a more comprehensive “Mayday” transmission by activating the distress button on the Digital Selective Calling (DSC) enabled VHF radio, or a similar button on the RNLI MOB Guardian base unit, he preferred to use the VHF voice channel because he did not fully understand how the automatic systems functioned.

The MAIB has published a flyer aimed at the operators of fishing vessels and small craft that seeks to provide the rationale for the correct use of the DSC system in distress situations. A recommendation (2013/203) to fit EPIRBs to all commercial fishing vessels was recently issued following the loss of the *FV Purbeck Isle* in 2012. As a consequence, no further recommendations have been made in this report.

FACTUAL INFORMATION

Background

Achieve had been operated by her first owner for 31 years until April 2010, when she was sold on to a new owner, who was the skipper of the vessel at the time of the accident.

The vessel had three underdeck compartments: a forward hold under the wheelhouse, a machinery space, and an aft fish hold of approximately 6 cubic metres capacity (**Figure 3**). There was a watertight bulkhead between the forward hold and machinery space; the bulkhead between the machinery space and fish hold was not watertight because of several openings for shaft, pipelines and cables. Above the forward hold and accessed from the wheelhouse was the accommodation space, which housed three bunks.

At the time of the accident, the water temperature was 8°C and the air temperature was 4°C.

Narrative

At 0800 on 21 February 2013, the crew of *Achieve*, comprising the skipper and his two crewmen arrived at the pier in Leverburgh, where the vessel was moored. One of the crewmen was Norman Macleod, who was a replacement for one of the vessel's permanent crew. The vessel sailed at around 0915 and headed to the west of the Isle of Harris to pick up three fleets of creels that had been left there since November 2012. The crew started lifting the creels from 1130, cutting the legs¹ off and storing the ropes in bins on deck. It was the skipper's intention to refurbish the fishing gear.

¹ Legs – the short length of line that connects the creel to the backrope.

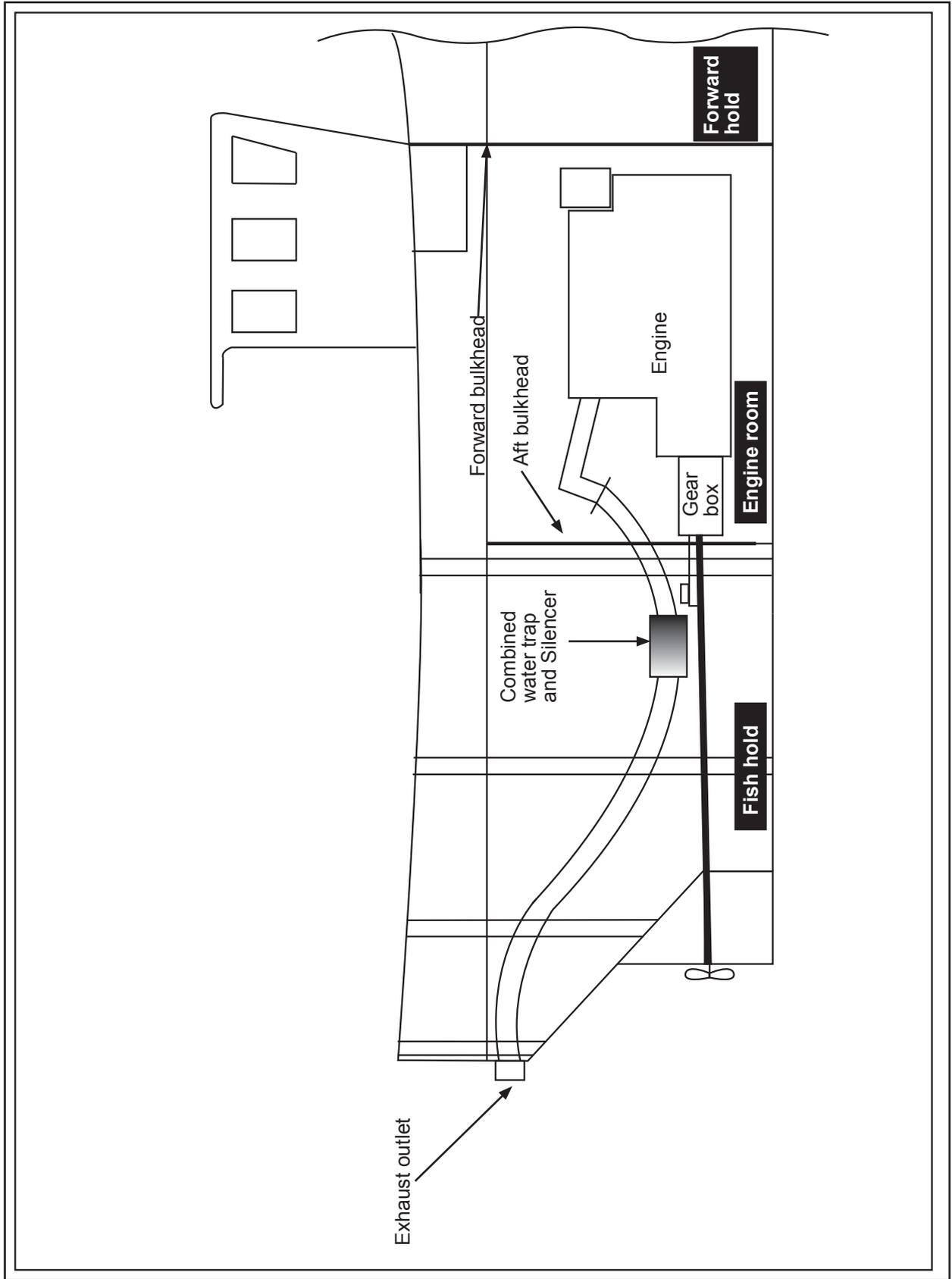


Figure 3: Schematic of *Achieve*, showing under-deck layout and exhaust system (segment of drawing, not to scale)

While picking up the second fleet, the back rope became entangled in the propeller. The crew released the rope by engaging the engine ahead and astern a few times so that the rope was cut by the cutter blade that was fitted forward of the propeller. Subsequently, the engine was run full ahead to ensure that no new vibration patterns had developed because of this incident. The skipper was satisfied with the outcome and continued to pick up the remaining creels.

By 1400 the crew had retrieved all three fleets of creels and *Achieve* was heading for Leverburgh at a speed of 5.3 knots. At this time the vessel had a slight starboard list and was down by the stern. *Achieve* was passing around 3 to 4 miles west of Gasker when the boat slammed heavily. At this time, there was a weak tidal stream at approximately 0.5 knots in a north-easterly direction and a force 4 south-easterly wind was blowing. The water was turbulent in the area and the crew reported that they had not experienced such a heavy slam in a long while. They attributed it to the wind and tide as well as to the sudden change of water depth in the area. Afterwards, the vessel gradually increased speed to around 6.5 knots.

Norman Macleod went to the accommodation area to rest while the skipper and the other crewman remained in the wheelhouse drinking tea. On noticing that the vessel's stern trim had increased, the skipper asked the crewman to help him shift the creels in order to correct the trim. As they started to move the creels, they noticed a wave lap along the gunwale. The vessel subsequently settled further down by the stern and the sea washed on to the deck.

The crewman shouted to Norman to fetch the lifejackets, and started throwing the creels overboard. The skipper ran into the wheelhouse and entered the engine room through the access hatch. He set the engine-driven deck wash pump to take suction from the fish hold and discharge overboard. While in the engine room he did not see any evidence of water leakage. Coming back into the wheelhouse, he activated the electrical clutch of the deck wash pump. By this time, the vessel's starboard quarter was under water. Norman put on his lifejacket while the other crewman continued to throw the creels overboard. The bilge alarm was not heard throughout the incident.

At 1458, the skipper called Stornoway coastguard (CG) on (VHF) radio and made a "Mayday" call. The call lasted 8 seconds during which the skipper gave the name of his vessel once, but he did not state the vessel's position. The skipper did not activate the distress alarm on the VHF with the digital selective calling (DSC) system nor on the Royal National Lifeboat Institution's (RNLI) 'MOB Guardian' manoverboard system. The CG watch operator misheard the vessel's name as *Accord* and responded "Fishing vessel *Accord*, what is your position?" Although the skipper realised that the CG had identified his vessel incorrectly, he concluded that he had no time to correct them as the vessel was sinking very rapidly. He also thought that when the MOB Guardian base unit lost its connection with the shore station, it would automatically transmit a distress message with the vessel's name and position. He did not take the engine out of gear or pick up his mobile phone from the wheelhouse console.

The skipper ran out of the wheelhouse and released the liferaft, launching it to the starboard side. At the time, the vessel was listing approximately 45° to starboard. As the liferaft was being launched, Norman jumped clear of the vessel. He was followed shortly afterwards by the other crewman. *Achieve* was motoring around in circles and the liferaft, which had fully inflated, was snagged on the vessel's mast. As he entered the liferaft, the skipper kicked it clear of the vessel. Meanwhile, the other crewman, seeing *Achieve* heading towards him, clambered back on to the vessel's whaleback². The skipper then helped him into the liferaft.

The liferaft's painter was still attached to *Achieve* and, as the vessel circled, it was being pulled towards the propeller on the port side. The skipper cut the painter and the liferaft drifted away from the vessel. The crewmen in the liferaft saw water coming out of the overboard discharge of the deck wash pump until the engine sputtered and stopped.

² Whaleback – an arched structure over the bow of a boat designed to provide shelter from the prevailing seas.

The skipper and the crewman scanned the sea surface for Norman, and after a brief period saw him approximately 100m to 150m upwind from them. They stowed the liferaft's drogues and tried to paddle towards him, but made little progress due to the wind. The skipper then deflated the liferaft's canopy, following which they made headway and eventually succeeded in paddling to Norman, who then helped himself into the liferaft. Although none of the crew had any means of knowing what the time was, the skipper estimated that Norman had been in the water for approximately 20 minutes. In the liferaft, Norman was reported to be in a state of shock, though he was able to recognise his two colleagues by their names and was talking to them. He was covered by foil blankets, the canopy was re-inflated and the water in the liferaft was bailed out. The skipper also set off some of the pyrotechnics.

Stornoway CG relayed the "Mayday" signal, in which the name of the vessel in distress was broadcast as *Accord*. By 1541, they established that no fishing vessel by the name of *Accord* was in distress. One of the watch managers at the CG station then listened to the "Mayday" call again and realised that the vessel name sounded like *Achieve*. The CG immediately made contact with people in the area who knew *Achieve* and alerted ARCC Kinloss, who tasked helicopter R100 from the Stornoway base at 1549. R100 lifted off within 7 minutes, with instructions to search along the coast from the south of Stornoway to the Sound of Harris. The CG also tasked the lifeboats from Leverburgh and Stornoway to search in this area.

At 1558 Falmouth CG alerted Stornoway CG that the MOB Guardian hourly update from *Achieve* had not been received by the RNLI. Falmouth CG provided the last known position of the vessel and Stornoway CG was able to direct the helicopter and the lifeboats to a location west of the Isle of Harris. At around 1614, R100 sighted a red flare from the liferaft, and all the crew were retrieved from it within 25 minutes. Norman was conscious, but was shivering violently. The helicopter crew cut off most of his clothing, administered oxygen and covered him in thermal blankets. The helicopter arrived at the Western Isles Hospital, Stornoway, at 1649. Norman was reported to be conscious and delirious, with a body temperature of 26.7°C on admission to hospital. However, a short while later he suffered a cardiac arrest. The efforts to resuscitate him were unsuccessful and Norman was pronounced deceased at 2150. The post mortem report concluded that the cause of death was hypothermia. The report noted that the condition of his heart was poor³. The toxicology report stated that there were no traces of alcohol in his bloodstream.

The skipper and the other crewman were treated for mild hypothermia and were discharged the same evening.

Crew

Norman Macleod was 46 years old and had been a fisherman since the age of 16. He had replaced a crewman on *Achieve* approximately 2 months before the accident, but in the last year he had sailed occasionally on the vessel. He had completed all the mandatory Sea Fish⁴ courses. Norman weighed 75kg and was 170cm tall. He was a heavy smoker, but was not suffering from any known ailments.

The skipper was 30 years old and had completed all the mandatory Sea Fish courses in addition to holding a skipper's licence for under 16.5m fishing vessels issued by Sea Fish. He had completed a GMDSS Short Range Radio Certificate course in January 2005; he did not remember that the DSC distress button had to be kept depressed for 3 seconds for it to initiate a distress message.

The skipper also held a second engineer's Certificate of Competency (STCW III/2 unlimited) and had worked on oceangoing ships until 2003, when he started working on a part-time basis on fishing vessels. In 2007 he bought his own fishing vessel and commenced working full-time as a fisherman. The skipper had purchased *Achieve* in April 2010.

³ Severe atherosclerosis with the left anterior descending and circumflex arteries.

⁴ Sea Fish Industry Authority

Construction

Achieve was constructed from sawn oak frames at 925mm spacing, with three bent frames between the main frames⁵. The hull planking was of larch, approximately 40mm thick. The transom utilised a two-layer construction method, each plank being 25mm thick. The hull fastenings were galvanised boat nails in the sawn frames and copper rivets in the bent frames.

Loading

Achieve had an approximate weight of 3 tonnes of load on board at the time of the accident, including 160kg of catch, rope, grapple, 160 creels of 12kg each, anchors, fuel and personnel. In addition, the vessel was fitted with permanent solid ballast weighing 4 tons. The skipper considered that the vessel was not loaded to her full capacity.

Bilge system

Achieve had three bilge pumping arrangements: a manually-operated pump; a 126 litres/minute automatic bilge pump powered by a 24V direct current (DC) motor was located in the fish hold; and, an engine-driven, electrically-clutched JABSCO deckwash/bilge pump of 145 litres/minute capacity at 1100rpm (**Figure 4**).

The fish hold bilge pump was modified to work in automatic mode after *Achieve* was sold by its original owner. There was no indication in the wheelhouse to show the operational status of the pump. It discharged overboard through a 25mm bore flexible hose. A non-return valve was fitted before the overboard discharge to prevent any siphoning when the pump was not running. The skipper had tested the pump on the morning of 21 February by lifting its float switch by hand.

Changeover cocks on the suction and discharge of the JABSCO pump enabled it to be configured either as a deckwash pump or as a bilge pump. The pump had three independent bilge suction, one in each of the forward hold, engine room and fish hold.

A bilge high level sensor was fitted forward of the engine. This alarm was last tested by the skipper a week before the accident. At the time of the accident, the bilge alarm fitted in the fish hold was not connected.

Seawater systems

An engine-driven seawater pump with an approximate capacity of 80 litres/minute at 1200rpm supplied cooling water to the engine cooling fresh water header tank and oil coolers, before discharging into the wet exhaust system of the engine. The seawater discharge from the coolers was a 32mm diameter reinforced plastic pipe which connected to the exhaust pipe through a 90° plastic elbow.

Exhaust system

The exhaust from the engine discharged through a stainless steel elbow which connected to a reinforced rubber exhaust hose of approximately 150mm diameter. The hose was connected to a combined water trap and silencer made of GRP and located in the fish hold. The outlet from the silencer was also a reinforced rubber hose of 150mm outer diameter, which was clipped under the deck and connected to a plastic stub pipe at the transom with spanner tightened jubilee clips. The plastic stub pipe was a replacement for the original fitting that was made of bronze and had two grooves for locating the jubilee clips.

⁵ Frame made by heating a straight piece of wood in a steam bath and bending it to the required shape

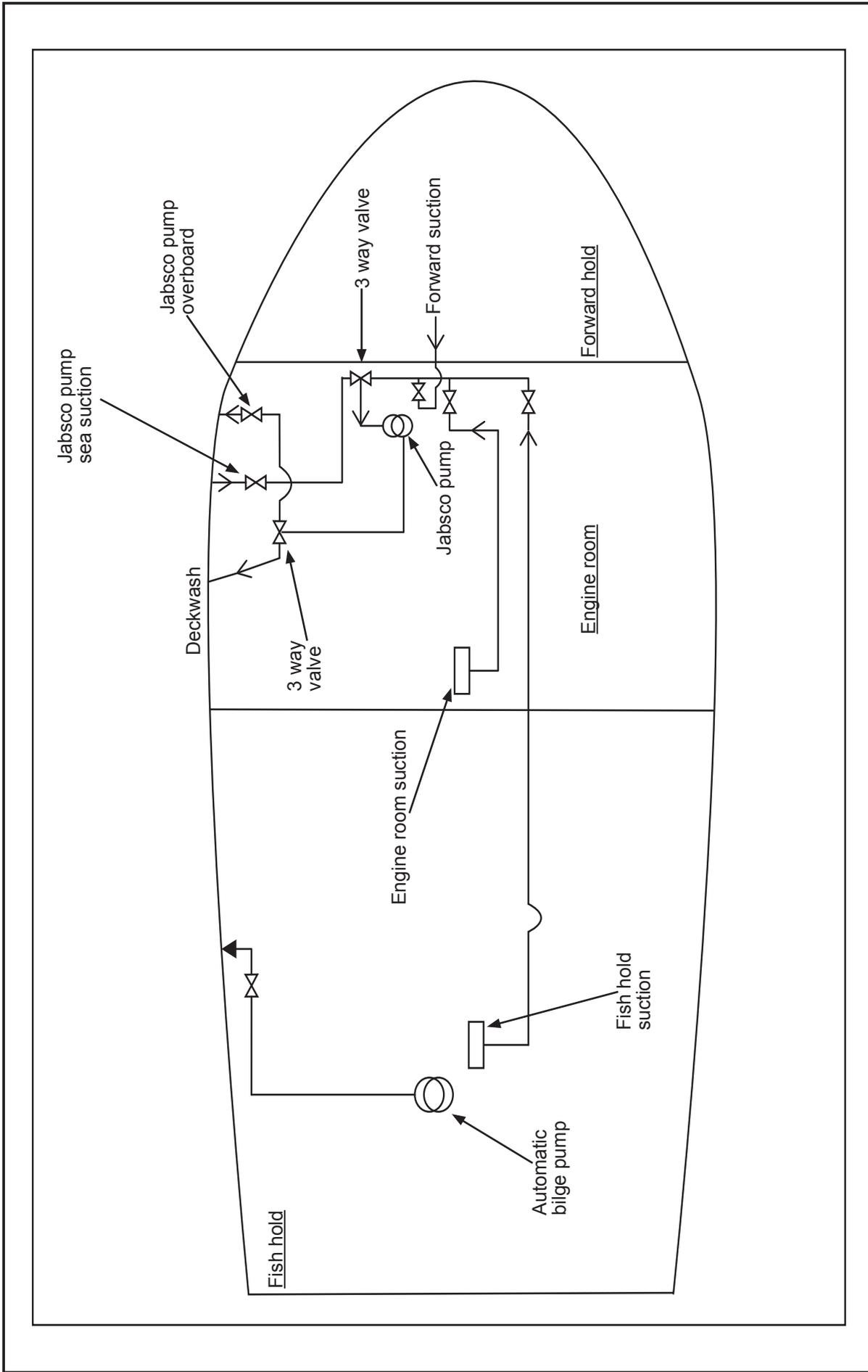


Figure 4: Bilge pumping systems (manual pump not shown)

The stub pipe contained a reinforced neoprene flap valve to prevent water ingress when the engine was not running. The flap valve had been checked to be intact in December 2012. Tests on a new valve conducted by the previous owner of *Achieve* ascertained that it could withstand at least 0.5m head of water.

Maintenance history

In 2002, *Achieve* had undergone extensive refurbishment including the replacement of the engine, seawater and exhaust pipes, rudder stock, and the intermediate and tail shafts and bearings. A Hercules-type flush hatch was fitted to replace the existing hatch to the fish hold. While in the possession of the new owner, the stern shooting arrangement was removed and an aluminium gantry with a mast and a mizzen sail was fitted. In 2012, the new owner fitted longitudinal boards on both sides of the propeller shaft and rearranged the solid ballast in order to create a clear area for the bilges. In early 2013, a new hauler was fitted complete with new engine drive and hydraulic tank.

Achieve was taken out of the water for maintenance two or three times between 2010 and 2013 during which the new owner carried out: internal and external inspection and cleaning; recaulking of deck and hull planking as required; and overhaul of the JABSCO seawater pump and bilge pump.

Digital Selective Calling

Achieve was fitted with two VHF radios; one of them was an ICOM 411 model with DSC capability. It was possible to initiate a “Mayday” call using DSC by pressing a red button marked ‘Distress’ and holding it down for 3 seconds. As a minimum, the distress call transmits the Maritime Mobile Service Identity (MMSI⁶) number of the vessel, its position and time of activation to shore stations and all DSC equipped vessels in the area. The distress message is transmitted five times, with a brief pause for acknowledgement. If not acknowledged, the process is repeated up to a maximum of five times. The CG, on receiving the distress message, makes contact with the vessel on channel 16 for further details. The CG also relays the distress message on channel 16 for the benefit of vessels not fitted with DSC.

Although the CG continues to monitor channel 16 via loudspeakers, the primary means of promulgating distress alerts is via the DSC systems. Increasingly, vessels with DSC capability rely on it for communication as well as for monitoring distress calls; keeping a listening watch on channel 16 is becoming less common.

Manoverboard Guardian

An MOB Guardian system was fitted in the wheelhouse of *Achieve* to the left of the DSC unit. The base unit of an MOB Guardian system transmits the vessel’s position to the RNLI operation centre in Poole, England, at hourly intervals. A missed report will result in the vessel’s last known position being passed to the Maritime Rescue Coordination Centre (MRCC) at Falmouth, if the RNLI fails to make radio contact with the vessel. The system fitted on *Achieve* was supplied with three personal safety device (PSD) units intended to be carried by individual members of the crew. The base unit automatically transmits a distress signal when a PSD is separated from it by a distance sufficient to break the Bluetooth^{®7} link between them. *Achieve*’s base unit also had a distress button that, when pressed continuously for 5 seconds, alerted the RNLI’s head office in Poole, England by transmitting the name and location of the vessel.

More than 450 vessels have been fitted with MOB Guardian. The RNLI has stopped the sale of MOB Guardian since 2012, but will continue to provide the service to existing vessels until 2017.

⁶ MMSI number is a series of 9 digits used to uniquely identify a marine vessel or a shore station. MMSI number is only given to vessels with DSC capability or ship to earth satellite system.

⁷ Bluetooth[®] is a technology for wireless exchange of data between electronic devices separated by short distances.

Emergency Position Indicating Radio Beacon

Emergency Position Indicating Radio Beacons (EPIRB) are designed for use on all types of vessels. They operate worldwide using international satellites to send distress signals via the dedicated digital distress frequency of 406MHz. Although it was not mandatory for owners of fishing vessels of less than 15m length to fit an EPIRB, their carriage is recommended by the Fishing Vessel's Code of Practice for the Safety of Small Fishing Vessels (SFV Code), (MSN⁸ 1813).

In the event of a vessel sinking quickly, a float-free EPIRB would be activated automatically when it is submerged in the water and released from its mounting, allowing it to float to the surface. The beacon's distress signal will alert the CG rescue services almost immediately.

Cold water immersion

There are typically three distinct effects of immersion in very cold water. Cold shock, or the sudden lowering of the skin temperature immediately upon entering cold water below 15°C, sets in within 30 seconds and lasts 2 to 3 minutes. Cold shock can cause breathing problems and often result in the casualty drowning. Functional disability sets in within 2 to 15 minutes when the casualty is unable to perform acts of self-preservation. Hypothermia, or the condition when the body temperature drops 2°C below the normal temperature of 37°C, sets in anywhere from 15 to 30 minutes.

The core body temperature can continue to drop even after being rescued from the water if the re-warming efforts are not effective.

Small fishing vessels code

The SFV Code includes a checklist of equipment required on board decked vessels less than 10m registered length. Although this checklist includes 'bilge pump' and 'bilge level alarm', it does not stipulate how many of each are required. It is recommended in the checklist that a DSC enabled VHF radio should be fitted. The carriage of a liferaft and EPIRB are 'optional'.

Section 3.5 of the SFV Code requires that the vessel owner, or a competent person employed by him, inspects the vessel annually to confirm that: *safety equipment carried onboard the vessel has been suitably maintained and serviced...safety and other specified equipment continues to comply with the checklist...and a health and safety risk assessment has been completed.* Risk assessment for vessels less than 10m is not required to be written down. The owner is required to sign a self-certification declaration and retain a copy on board. The annual self-certification for *Achieve* was never carried out.

Sea Fish Industry Authority requirements

Seafish's 'Construction Standards for New Fishing Vessels Less than 15m Length Overall (Sept 2012 Edition)' requires a bilge alarm system to be fitted in the wheelhouse with audible and visible indications. Bilge level sensors are required in the machinery space and fish room or fish hold. The standard specifically states that a bilge alarm sensor is to be fitted where bilge levels cannot be checked without entering the compartment concerned. When *Achieve* was built, only vessels over 24m registered length were required to be fitted with a bilge alarm.

Inspections

The MCA carried out a 5-yearly inspection of *Achieve* in January 2010 and another inspection in January 2011 after the vessel was purchased by the second owner. During the later inspection, the surveyor asked the owner to fit a bilge alarm in the fish hold. Although a bilge alarm was fitted in the aft hold, it was subsequently disconnected due to false alarms, and was not reconnected.

⁸ MSN: Merchant Shipping Notice

A pre-purchase survey was also carried out by an independent naval architect on behalf of the bank which provided the mortgage for the purchase. No major deficiencies were reported.

Previous accidents

Between the years 2000 and 2012, 48 UK registered fishing vessels of wooden construction <12m registered length foundered, resulting in 11 fatalities. Of these, two fatalities were due to hypothermia.

The MAIB is aware of three accidents where not using the DSC to raise a distress alarm has resulted in fatalities. Three fishing vessels - *Blue Sinata* in 2005, *About Time* in 2011, and *St Amant* in 2011 - conveyed their position erroneously over VHF voice calls, resulting in the initial rescue efforts being conducted in the wrong area. In several other accidents not resulting in fatalities, skippers have either forgotten to use DSC or have not kept the distress button pressed in for the required number of seconds.

MAIB's accident investigation into *Purbeck Isle* detailed several cases where the fitting of an EPIRB unit resulted in quick and effective rescue operations by the CG⁹.

ANALYSIS

Accident mechanism

It is certain that *Achieve* foundered due to the flooding of its fish hold. There was no early warning of the flooding because the bilge alarm in the fish hold was disconnected at the time of the accident. The crew were unable to inspect the fish hold to determine the cause of flooding or to stem the ingress of water, as several layers of creels blocked the access to the hold. By the time the skipper started the emergency bilge pump, the flooding in the compartment was so severe that the pump was unable to cope. As the vessel was loaded to less than its full capacity, it is considered that the loading on the day did not contribute to the foundering of *Achieve*.

The source of flooding

The source of water ingress was unlikely to have been in the engine room, as the skipper did not notice any water in the engine room bilges when he entered it to switch the deck wash pump suction to draw from the bilge after it had been established that the vessel was beginning to sink. Flooding of the hold could be due to: damage to the hull below the waterline; failure of pipelines containing seawater; leakage past the propeller shaft or rudder glands; and downflooding from the deck.

The failure of the wet exhaust piping system would result in the cooling water from the engine circuit discharging directly into the hold. However, the automatic bilge pump should have easily coped with this leakage. If the failure took place between the outlet of the silencer and the plastic stub pipe at the transom, the exhaust flap on the stub piece would have prevented water flowing back into the hold. Irrespective of where the failure occurred, exhaust fumes would have filled the space and made their way to the engine room and wheelhouse. Therefore, it is unlikely that the wet exhaust system failed.

If the discharge hose on the automatic bilge pump had come adrift between the non-return valve and the overboard valve, the hold would have flooded progressively with the pump discharging water back into the hold. However the JABSCO pump would have coped with the inflow¹⁰ even if the head of water above the overboard valve had increased significantly.

⁹ MAIB Accident Investigation Report 7/2013

¹⁰ A 25mm opening under a head of 1m of water would only result in an ingress of 130 litres/minute which would have been less than the 145 litres/minute capacity of the JABSCO pump

Siphoning effect through the deckwash line can be ruled out as its overboard discharge valve was well above the waterline and was shut. The deckwash pump was not running until started to pump out the bilges. The hatch cover to the fish hold was secured and water tight. For all these reasons, downflooding can be ruled out.

The vessel's hull planks and fastenings were well maintained and were reported to have been in good condition. However, it is not unreasonable to assume that there may have been weak points in the vessel's hull which when subjected to a heavy slam may have caused a plank to spring or open partially allowing water to enter the hold.

Damage approximately 0.5m below the waterline resulting in an opening of approximately 5cm diameter would cause an inflow of 228 litres/min. The automatic bilge pump with a capacity of 126 litres/min would have run continuously under these circumstances. However, the water level in the hold would have continued to rise, increasing the head of water above the damage to such an extent that with both the automatic bilge pump and the JABSCO pump together would not have coped. The most probable source of water ingress was therefore, a sprung hull plank.

Bilge alarm and pump running indication

The engine room bilge alarm was tested a week before the accident, and it is assumed that it was functional at the time of the accident. As the vessel was already down by the stern because of the weight of creels on deck, the water would have continued to accumulate aft, trimming the vessel further by the stern, possibly accounting for why the bilge alarm did not sound.

Although there was no requirement for an additional bilge alarm in the fish hold, the skipper of *Achieve* was asked by the MCA surveyor to fit one. This instruction was based on the attending surveyor's own experience and risk assessment. The rationale for the surveyor's instruction is further supported by the current Sea Fish construction standards. It is unfortunate that although this alarm was fitted in compliance with the surveyor's instructions, it was subsequently decommissioned. As the annual self-certification was not carried out, the risks posed by the disconnected hold bilge alarm were never formally considered. Had the hold bilge alarm been functional, it should have alerted the crew almost as soon as the flooding started. The crew could then have taken steps to prevent further flooding, or at least raised a distress call much earlier.

The bilge pump was set to operate in automatic mode and would have run continuously when the aft hold was flooding. However, as there were no lights or alarms to indicate that the pump was working, the crew would not have been alerted to the problem.

Distress message

The skipper's partial "Mayday" call on VHF channel 16 lasted 8 seconds while a DSC "Mayday" call using the ICOM 4II fitted on board would have taken only 3 seconds to initiate. Moreover, it would have automatically conveyed the vessel's location and its MMSI number to the CG. It is commendable that the skipper had registered the vessel's MMSI number with the DSC equipment and connected the GPS to it, although there was no mandatory requirement to fit a DSC enabled VHF radio on vessels of the size of *Achieve*. It is understandable that with the vessel sinking rapidly, he wanted to be reassured by establishing voice contact with the CG. However, had he raised the "Mayday" on DSC, the CG would have returned the call on channel 16 and spoken to him. It would have also resulted in reducing the rescue time by more than 45 minutes. This accident and several others, where DSC was not used or was used incorrectly, calls to question whether the proper use of DSC is well understood in the fishing industry. Further, the lack of knowledge on the part of the skipper about the functioning of DSC, despite having passed a certified GMDSS course, suggests that refresher courses in the subject may be extremely beneficial.

Had even one of the crewmen carried the MOB Guardian PSD, the CG through the RNLI would have received an immediate alert with sufficient information to effect a rescue. It was also unfortunate that the

skipper had an incorrect understanding of the MOB Guardian's function. Having assumed that the base unit would trigger an automatic alert when it lost its connection, the skipper did not consider it crucial to correct the CG's misunderstanding of the vessel's name.

EPIRB

Had *Achieve* been equipped with a float free automatically activated EPIRB, the CG would have been alerted as soon as the vessel foundered. Although the SFV code does not require an EPIRB to be fitted on vessels under 15m, this accident, the triple fatality accident of *Purbeck Isle* and several others that the MAIB has investigated in the past, make the case compelling for the mandatory carriage of EPIRBs on all commercial fishing vessels irrespective of size. Considering that 83% of the UK fishing fleet is under 12m in length, this matter should be treated with urgency. For this reason, the MAIB's investigation report into the loss of *Purbeck Isle* recommended that EPIRBs be fitted to commercial fishing vessels, irrespective of size (Recommendation 2013/203).

Revival efforts

The surviving crewmen's estimate that Norman might have spent around 20 minutes in the water was approximate because neither of them had any means of measuring the time. Norman would have suffered coldwater shock as soon as he entered the water, and might have ingested some water during this stage. As he had put on a lifejacket before entering the water, his head was not immersed and therefore his chances of survival were good in spite of being in the water for a considerable time. It would have been very difficult for the crewmen in the liferaft to raise his body temperature as he remained in wet clothes until he was winched into the helicopter. Moreover, it would have been difficult to keep the cold wind out of the liferaft as the crew would have had to keep the front flap open, looking out for their rescuers.

The efforts of the helicopter crew to warm Norman appear to have been more successful; he was conscious, although shivering violently, when he arrived at the hospital. However, as the post mortem report indicated that Norman's heart was not in a healthy condition, he would have been predisposed to a cardiac arrest due to the combined effect of extremely low body temperature, the stressful experiences that he endured during this accident, and the subsequent rescue and revival efforts.

Liferaft

The skipper should be congratulated for ensuring there was a serviced and working liferaft on board as fishing vessels under 10m registered length were not required to carry one. Further, his timely action in releasing the liferaft, kicking it clear when it was about to be snagged in the mast, cutting it free as it was drawn towards the propeller and helping one of his crewmen into the raft, were all commendable. His diligence and presence of mind might have saved his own life and that of his crewman. Had Norman remained with the others, he would have most certainly avoided spending 20 minutes in the cold sea and his survival chances would have been much greater.

CONCLUSIONS

- *Achieve* foundered because of water ingress into the aft fish hold. Although the cause of flooding cannot be determined with certainty, it is considered most likely that, when the vessel experienced a heavy slam off Gasker, a hull plank under the waterline was sprung which allowed water to flood into the fish hold.
- Although the forward bilge alarm was functional, it did not operate during the accident as all the water accumulated aft due to the vessel's stern trim. As the bilge alarm in the fish hold was disconnected, the crew did not receive any warning of the flooding.
- The bilge pump was set to operate in automatic mode. As there were no running lights or alarms to indicate that the pump was working, the crew would not have been alerted to the flooding in the aft fish hold.
- Although the vessel's DSC enabled VHF radio and the MOB Guardian system had distress call buttons capable of transmitting vessel details and position, neither was used to send out a "Mayday" call. The "Mayday" call transmitted by the skipper over VHF channel 16 was incomplete, and resulted in the rescue efforts being delayed by more than 45 minutes.
- It was estimated that Norman McLeod was immersed in 8°C sea water for approximately 20 minutes. It is likely that his body temperature continued to drop while awaiting rescue in the liferaft.
- The skipper's diligence in maintaining a serviced liferaft on board and the action he took to help his crewmen into the liferaft, might have prevented further fatalities.
- As the post mortem report indicated that Norman's heart was not in a healthy condition, he would have been predisposed to a cardiac arrest due to the combined effect of extremely low body temperature, the stressful experiences that he endured during this accident, and the subsequent rescue and revival efforts.
- Had *Achieve* been fitted with a float free automatically activated EPIRB, the CG would have been alerted of the vessel's name and position as soon as it foundered.

ACTION TAKEN

MAIB actions

The MAIB has published a safety flyer on DSC for dissemination within the fishing industry.

RECOMMENDATIONS

In view of the recommendation¹¹ recently issued by the MAIB, which calls for the fitting of EPIRBs on all commercial fishing vessels irrespective of size, no recommendations have been made in this report.

¹¹MAIB recommendation 2013/203.

SHIP PARTICULARS

Vessel's name	<i>Achieve</i>
Flag	United Kingdom
Fishing number	SY 75
Type	Fishing vessel, potter
Registered owner	Privately owned
Manager(s)	Privately managed
Year of build	1979
Construction	Wood
Length overall	10.24m
Registered length	9.85m
Gross tonnage	10.57

VOYAGE PARTICULARS

Port of departure	Leverburgh
Port of arrival	Not applicable
Type of voyage	Other
Cargo information	Crabs
Manning	Maximum 3

MARINE CASUALTY INFORMATION

Date and time	21 February 2013, 1500
Type of marine casualty or incident	Very Serious Marine Casualty
Location of incident	57° 56.11'N 007° 13.60'W
Injuries/fatalities	One fatality
Damage/environmental impact	Vessel foundered; no pollution
Ship operation	On passage
Voyage segment	Mid-water
External & internal environment	Wind force 4-5 South easterly, slight to moderate sea, sea temperature 8°C, air temperature 4°C. North-easterly tidal stream at approximately 0.5knot.
Persons on board	3