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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 such an 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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## Foundering of fishing vessel *Majestic* (LK678) 5 nautical miles off Yell, Shetland 21 January 2016

### SUMMARY

At 1443<sup>1</sup> on 21 January 2016 the 16m wooden potter *Majestic* (LK678) sank close to a gas pipeline off the Point of Fethaland, Shetland. The vessel's sinking resulted from a flood in the engine room that had started sometime between 0900 and 1000. The skipper and crewman abandoned into a liferaft shortly after they became aware of the ingress of water and were rescued by a nearby fishing vessel. No efforts were made to stem the flood and the vessel foundered approximately 4 hours after it was abandoned. There were no injuries and no pollution. The pipeline's owner, British Petroleum, later arranged for sandbags to be placed on the seabed between it and the wreck to prevent damage to the pipeline.

Image courtesy of Mike Pennington



*Majestic*

<sup>1</sup> All times are UTC.

The cause of the engine room flood is unknown but it was probably caused by a failure within a seawater system or sea valve. The investigation identified that:

- The engine room's bilge alarms sounded in the wheelhouse and were not heard by the skipper and the crew who were working on the deck. Consequently, the engine room had been flooding for up to 1 hour before the crew were alerted.
- The rate of the flooding would have been slowed by the operation of the electric bilge pump and possibly by stopping the main engine.
- The effectiveness of the crew's response to the flood was probably reduced because they did not routinely conduct emergency drills.
- The prompt abandonment and notification to the coastguard and vessels in the area reduced the risk to the lives of the crew.

This accident indicates that relevant guidance and the lessons from similar accidents were not being sufficiently heeded. In the accident, *Majestic's* wheelhouse was left unattended for a prolonged period and the crew were not practised in reacting to a flood on board. In addition, they did not wear personal flotation devices while working on deck and did not don lifejackets when abandoning the vessel.

A recommendation made to *Majestic's* owners is aimed at improving the safe operation of any vessels they may own or operate in the future.

## FACTUAL INFORMATION

### Narrative

At 0530 on 21 January 2016, the 16m wooden potter *Majestic* (LK678) sailed from Toft, Shetland, and headed for fishing grounds approximately 5nm to the north-east of Point of Fethaland (**Figure 1**). On board were the vessel's skipper and a crewman; both men were wearing oilskin trousers and jackets. The weather was fine and clear and the visibility was good. There was a moderate south-easterly breeze and the sea was slight with a 1m swell.

*Majestic* reached the fishing grounds at about 0630. Over the next 3½ hours, the skipper and the crewman worked three fleets of creels. This involved hauling, emptying, re-baiting, re-shooting the creels and processing the catch of brown crab. The hauler and its associated hydraulics were operating, which made it very noisy on the deck. During this period, other than when manoeuvring the vessel between the fleets, the wheelhouse was left unattended. Each fleet of creels took approximately 1 hour to process.

At about 1000, the skipper went to the wheelhouse and heard the engine room's bilge alarms sounding. He opened a forward wheelhouse window and shouted to the crewman on the deck below to check the engine room for flooding. Accordingly, the crewman lifted the engine room escape hatch (**Figure 2**). The skipper leant out of the wheelhouse window and he and the crewman saw that the engine room was flooded. The water level was above the deck plates, half way up the side of the engine casing.

The skipper and the crewman immediately went to the wheelhouse roof and launched the liferaft. The skipper then returned to the wheelhouse and, at 1010, he pressed the very high frequency (VHF) digital selective calling (DSC) distress alert. He also broadcast a "Mayday" via VHF radio, channel 16.

The DSC distress message was received by the Shetland Coastguard Operation Centre (CGOC) and the nearby fishing vessels *Fairway II* (LK270) and *Kestrel* (LK268). The coastguard watch officer was

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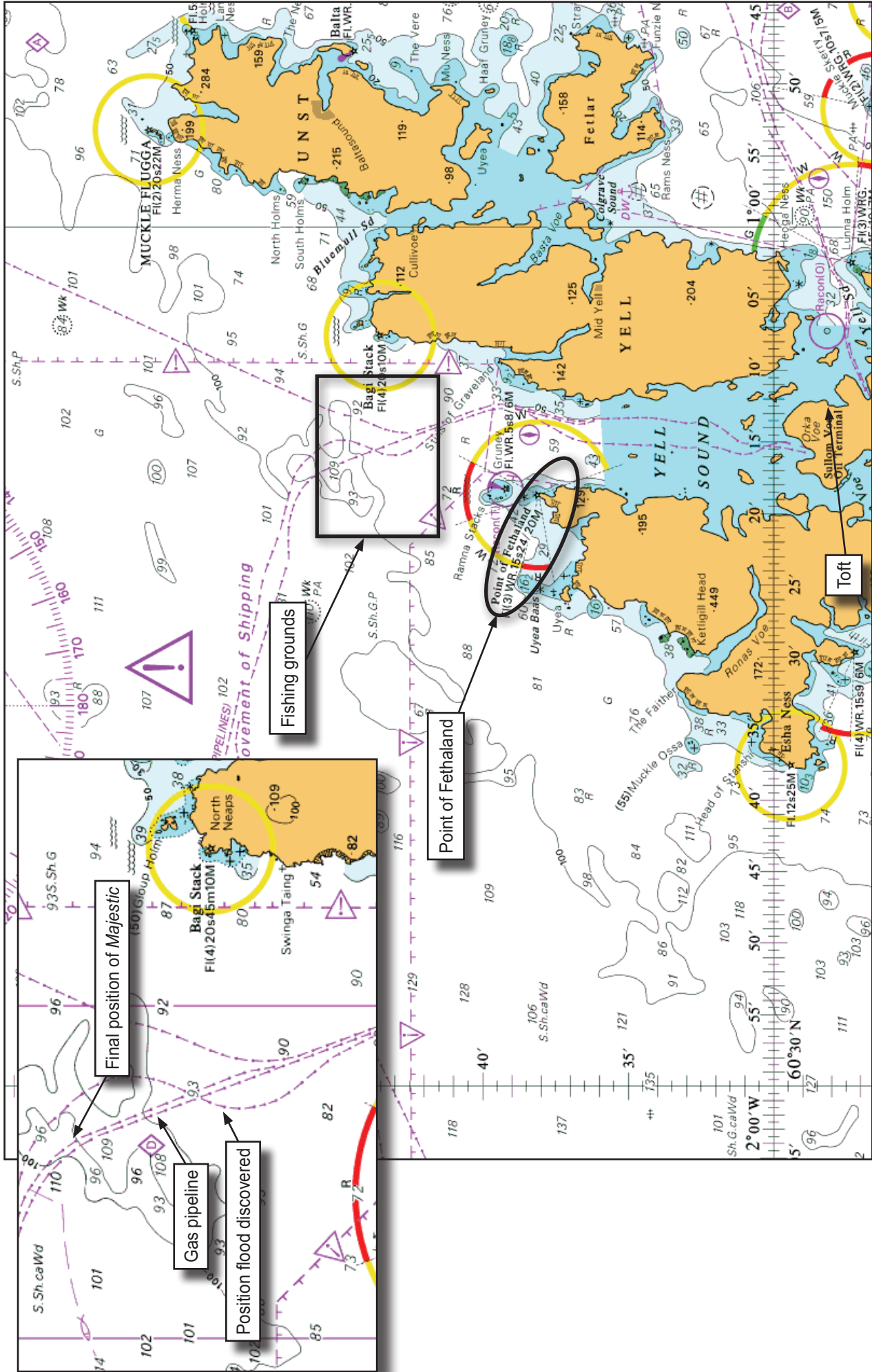
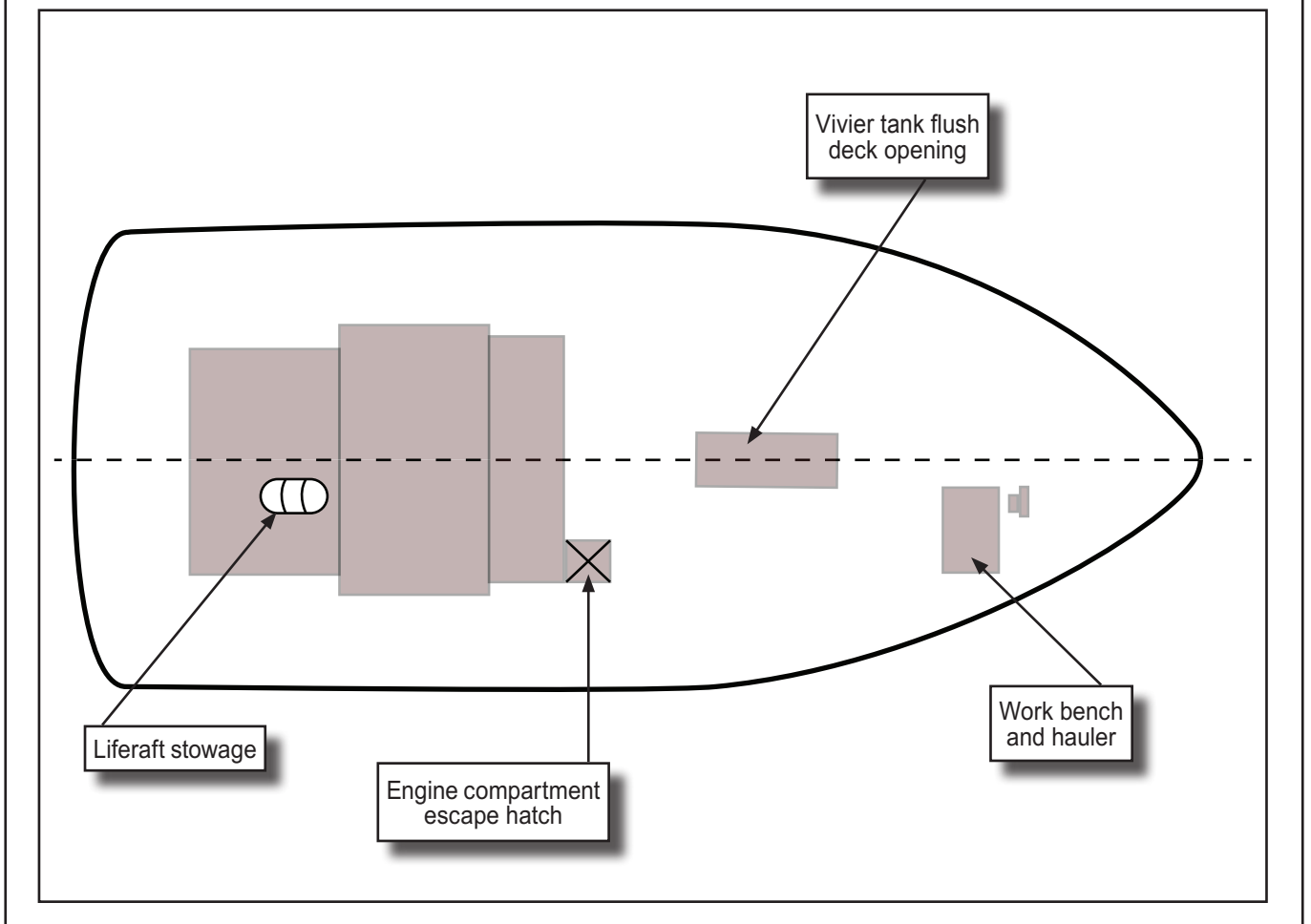
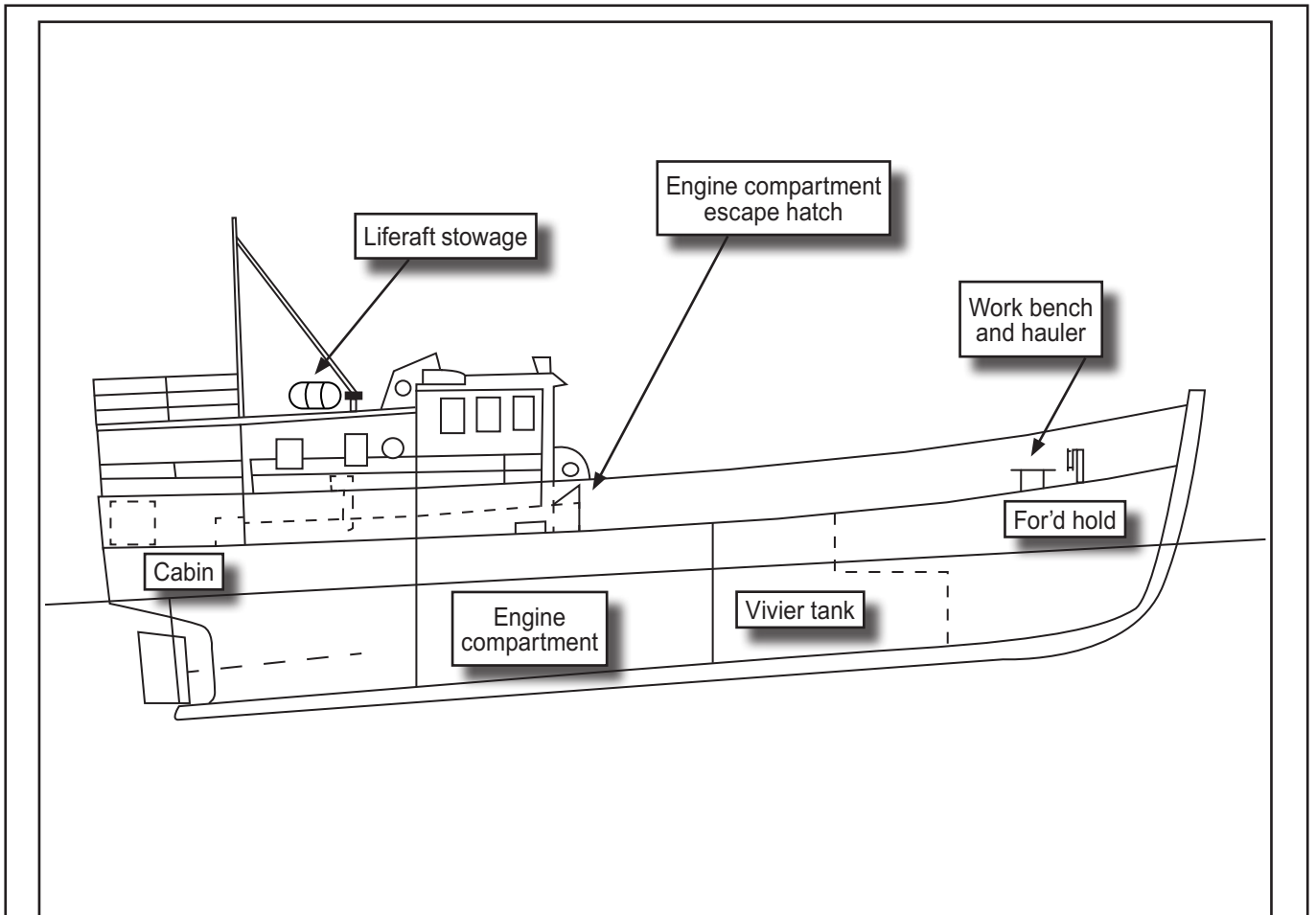


Figure 1: Yell sound fishing grounds (inset: Orka gas pipeline and position of sinking)



**Figure 2: Vessel layout**

unable to acknowledge the message due to a technical fault but he quickly established contact with *Majestic's* skipper on VHF radio, channel 16. *Fairway II* and *Kestrel* were 4nm and 3.4nm respectively from *Majestic*; *Fairway II* immediately started to close to assist and *Kestrel's* fishing gear was hauled.

*Majestic's* skipper informed the coastguard that the vessel was sinking due to a flood in the engine room. He also advised that it was too dangerous to go into the compartment and that he intended to abandon into a liferaft. The coastguard watch officer advised the skipper to take with him a hand-held VHF radio and the vessel's Emergency Position Indicating Radio Beacon (EPIRB). The watch officer also tasked rescue helicopter R900, which was on a training exercise in the area. The Aith and Lerwick all-weather lifeboats (AWL) were not tasked due to their distance from *Majestic*, an assessment that the vessel was sinking quickly and the relatively close proximity of R900, *Fairway II* and *Kestrel*.

On leaving the wheelhouse, *Majestic's* skipper took a hand-held VHF radio and his mobile phone, but he did not collect the EPIRB. At about 1017, the skipper and the crewman boarded the liferaft; neither wore a lifejacket. The men cut the liferaft painter and then paddled the liferaft clear of *Majestic*. *Majestic's* engine was running but it was not in gear.

At about 1022, R900 arrived on scene soon followed by *Fairway II*. At 1033, *Majestic's* skipper and crewman were recovered from the liferaft onto the fishing vessel (**Figure 3**). *Majestic* remained upright and on an even keel (**Figure 4**) and over the next 4½ hours the vessel drifted towards the Orka Vow gas pipeline to the north (**Figure 1 inset**); *Fairway II* and *Kestrel* were in attendance. Shetland CGOC informed British Petroleum (BP), the pipeline's owners, of the situation and, at 1333, the coastguard also discussed the possibility of taking *Majestic* in tow with *Fairway II's* skipper. However, *Fairway II's* skipper considered it too dangerous to put anyone on board.

At about 1440, *Majestic* heeled to port and trimmed by the stern. It sank 3 minutes later in a depth of 100m. The vessel's EPIRB released and activated and was recovered by *Kestrel's* crew.

## Post-foundering actions

A 500 metre temporary exclusion zone was established over the site of *Majestic's* wreck and BP deployed a guard vessel to the area. A remotely operated vehicle (ROV) survey identified that *Majestic* had settled on the seabed 2 metres from the gas pipeline; the vessel was heeling towards the pipeline. As a precaution, the ROV was used to place large sandbags between *Majestic* and the pipeline to prevent the wreck from toppling (**Figure 5**).

## Crew

*Majestic's* skipper (aged 34) and the crewman (aged 35) were brothers and had been fishermen all their working lives. They had co-owned *Majestic* since 2012 and crewed the vessel themselves. Other crewmen had occasionally been employed to assist but recruitment and retention of fishermen was difficult due to competition from the oil and gas industry.

The skipper held a Seafish<sup>2</sup> under 16.5m skipper certificate<sup>3</sup> and the crewman held a fishing vessel class 1 Certificate of Competency (CoC) as well as a fishing vessel engineer class 2 CoC. Both men had completed the mandatory Seafish training courses<sup>4</sup>. Neither the skipper nor the crewman usually wore lifejackets when working on deck. They also did not routinely conduct emergency drills.

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<sup>2</sup> Seafish – the Sea Fish Industry Authority works across all sectors of the UK seafood industry to promote good quality and sustainable seafood, and to improve the safety and standards of training for fishermen.

<sup>3</sup> The under 16.5m skippers' certificate is a voluntary qualification administered by Seafish aimed at increasing the navigational and engineering knowledge of skippers and watchkeepers on small fishing vessels.

<sup>4</sup> New entry fishermen must complete basic safety courses in sea survival, elementary first-aid; fire-fighting and health and safety. Fishermen with two years' experience must also complete a 1-day mandatory safety awareness course run by Seafish.



Figure 3: Majestic's crew recovered by Fairway II



Figure 4: Majestic at 1036



**Figure 5:** Sandbags positioned against the wreck

## Construction

*Majestic* was built in 1977 to a traditional wooden design with oak frames and iroko planking. The vessel complied with The Fishing Vessels (Safety Provisions) Rules 1975 and comprised three main internal compartments: fish hold (that contained a vivier<sup>5</sup> tank), engine room and accommodation (**Figure 2**). The vessel's bulkheads were not required to be watertight but the bulkhead between the fish hold and the engine room was required to be of solid and substantial construction. The bulkhead between the engine room and the accommodation, and the engine room deck head were steel and met the B15 fire rating standard<sup>6</sup>.

<sup>5</sup> The vivier tank was a holding tank with a capacity of approximately 12t that was used to keep shell fish alive. Pumps maintained a continuous supply of fresh sea water to the tank, the level of which was controlled by an overflow system that discharged excess water overboard.

<sup>6</sup> A bulkhead or deck head constructed of non-combustible material with an insulation value that ensures the average temperature of the unexposed side to a fire will not rise more than 140°C above the original temperature, nor will the temperature at any one point, including any joint, rise more than 225°C above the original temperature within 15 minutes.

## Seawater inlets and discharges overboard

The table below summarises *Majestic's* seawater inlets and discharges and the status of the associated machinery at the time of the flood:

Engine Room Inlets / Discharges			
Inlet	System	Discharge	Running
50mm (S)	Main Engine cooling water	50mm (P)	Yes
	Gearbox cooling water (supplied from engine cooling water)	40mm (P)	Yes
40mm (P)	Vivier Tank circulating pump	Unknown	Yes
50mm (P)	13m <sup>3</sup> /hr Deck Wash / bilge pump	50mm (S)	Yes
-	11m <sup>3</sup> /hr Electric Engine / Room bilge pump	30mm (P)	No
-	Hand operated Engine Room bilge pump	60mm (S)	No
Other discharges			
-	11m <sup>3</sup> /hr Electric Fish Hold bilge pump		No
-	6m <sup>3</sup> /hr Electric Accommodation bilge		No
-	Hand operated Fish Hold bilge pump		No

(P) = Port side, (S) = Starboard side

## Bilge pumps and alarms

*Majestic* was fitted with four power driven-bilge pumps: two in the engine room, one in the fish hold and one in the accommodation. Hand-operated bilge pumps were also fitted in the engine room and the fish hold and a portable engine-driven salvage and fire pump was carried on board.

The engine room bilge pumps comprised one electric pump and one engine-driven pump with rated capacities of 11m<sup>3</sup> and 13m<sup>3</sup> per hour respectively. The bilge pumps in the fish hold and accommodation were also electric-powered with rated capacities of 11m<sup>3</sup> and 6m<sup>3</sup> per hour respectively. The on/off switches for the electric bilge pumps were located on a panel in the wheelhouse.

Two bilge water level detectors were fitted in *Majestic's* engine room; a 'high' level and a 'low' level. Bilge water level detectors were also fitted in the accommodation and the fish hold. Both the visual and aural alarms associated with the water level detectors were located in the wheelhouse.

The engine room bilges were routinely pumped three or four times each day to remove accumulated water. The crew had not identified why this water had been accumulating.

## Surveys and maintenance

The Maritime and Coastguard Agency (MCA) surveyed *Majestic* in 2012 after the vessel had grounded. The attending surveyor noted that repair was required to planking on the vessel's sides and internal stiffeners. Other than that the vessel's stability book was not on board at the time of the survey, no further deficiencies were identified.

The MCA also completed a United Kingdom Fishing Vessel Certificate renewal survey on board *Majestic* on 17 August 2013 in Macduff shipyard, Scotland. During the survey, all sea valves were removed and were found to be in a satisfactory condition, as was the vessel's non-ferrous seawater pipework. However, survey of the hull identified that extensive caulking was required in way of the forefoot.



The surveyor noted that routine drills were not recorded on board. A fire drill and an abandon ship drill were conducted during the survey. Lifejackets were worn for the abandon ship drill; *Majestic* carried six abandon ship lifejackets and four inflatable personal flotation devices (PFD).

In April 2014, *Majestic* was taken out of the water for routine maintenance. The work carried out included:

- Caulking and painting of the hull
- Servicing of machinery
- Replacement of the vivier tank.

## ANALYSIS

### Flooding mechanism

It is evident that the flood into *Majestic*'s engine room started between 0900 and 1000 when the wheelhouse was unattended. That only the bilge alarms for the engine room were sounding when the skipper returned to the wheelhouse, indicates that, by then, the floodwater had not spread to a significant level in the fish hold or the accommodation.

The source of the floodwater in *Majestic*'s engine room is unknown. Water ingress into the engine room bilges was a regular occurrence that required the bilges to be pumped frequently. However, this was probably due to degraded caulking in the vessel's iroko planking. It is difficult to keep vessels made of iroko watertight as the wood is very hard and the caulking between planks quickly loses integrity.

It is calculated that *Majestic* would have required to take on board 100m<sup>3</sup> of water in order to lose stability. Therefore, as the vessel survived for between approximately 4 hours 40 minutes and 5 hours 40 minutes after the flooding started, the flooding rate must have been between 17.5 and 21m<sup>3</sup>/hr. This rate of water ingress was significantly higher than usual. Therefore, it was almost certainly due to a material failure of pipework or a seal on one of the engine room's seawater systems connected to seawater inlets or discharge overboard valves, rather than the loss of caulking.

### Safety-critical alarms

MGN 313(F)<sup>7</sup> states that the wheelhouse must not be left unattended at any time, primarily to ensure that a proper lookout is maintained and that a vessel is navigated safely. However, the equipment installed in fishing vessels' wheelhouses is not usually limited to navigation equipment and propulsion and steering control systems. Safety-critical alarms, such as fire and bilge-level alarms, are also fitted. Therefore, if a wheelhouse is left unattended, the risk of these alarms going unnoticed is significantly increased.

On board *Majestic*, the purpose of the automatically activated bilge alarms was to provide the crew with an early notification of a flood. However, both the skipper and the crewman were working on deck and did not hear the bilge alarms over the noise of the deck hydraulics and machinery. As a result, the flood went unnoticed for up to 1 hour. Had the skipper and the crewman been alerted as soon as the bilge alarms sounded, the likelihood of them being able to enter the engine room to turn on the motor-driven bilge pump, and to identify and resolve the source of the water ingress would have increased significantly.

Despite the guidance in MGN 313 (F) and numerous investigation reports, it is still common practice for fishing vessel wheelhouses to be left unattended. In the last year, the MAIB has published two reports into the loss of two vessels primarily because their wheelhouses were unmanned: the collision between

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<sup>7</sup> Keeping a Safe Navigational Watch on Fishing Vessels.

*Good Intent* (SY79) and *Silver Dee* (B310);<sup>8</sup> and the fire and foundering of *Karinya* (FR699)<sup>9</sup>. In the latter case, the fire alarm in the wheelhouse could not be heard by the skipper, who was on deck operating winch controls.

The desire to minimise manpower costs and the reported difficulties in recruiting fishermen often result in minimum crewing that makes it likely that the wheelhouses on board many fishing vessels will be left unattended during certain phases of the fishing process. In view of the need to maintain a safe navigational watch, such a situation cannot be condoned. However, as leaving wheelhouses unattended for short periods is likely to persist, it would be beneficial for safety-critical alarms to be audible throughout a vessel, and not only in the wheelhouse. In this respect, a two stage alarm similar to a navigation watch alarm, in which a general alarm sounds when an initial alarm has not been acknowledged within a defined time period, could be of benefit.

## Crew response

The skipper's quick decision to abandon ship after seeing the water level in the engine room, the immediate launch of the liferaft and the prompt activation of the DSC backed up by a "Mayday" broadcast, ensured the risk to the lives of the skipper and the crewman was reduced considerably. As a consequence, they were able to abandon *Majestic* in a controlled and safe manner and external assistance was provided very quickly.

However, notwithstanding the skipper's understandable reluctance to enter the engine room to investigate the source of the flood or to start the motor-driven bilge pump, several actions were not taken that potentially could have delayed the need to abandon and might have prevented the vessel's loss. Notably, the electric bilge pump was not switched on and the vessel's main engine was not stopped. With a capacity of 11m<sup>3</sup>/hr, the operation of the electric bilge pump would have reduced the flooding rate by about 50%. In addition, if, as is possible, the water ingress was caused by a failure connected with the engine's cooling system, the ingress rate would have probably decreased further as soon as the engine was stopped.

## Onboard drills

A factor that almost certainly reduced the skipper and crewman's ability and willingness to tackle the flood in the engine room was that they did not routinely carry out emergency drills on board. MSN 1770 (F)<sup>10</sup> requires fishing vessel crews to carry out at least one emergency drill each month. Drills are used to rehearse anticipated emergency scenarios, including flooding, and are intended to provide training, reduce confusion, and verify the adequacy of emergency response actions and equipment.

The scope of flooding drills that can be conducted on vessels such as *Majestic*, that have few crew, is limited. Nevertheless, 'table-top' discussions covering the actions to take and the equipment available to deal with floods in different compartments would have assisted the skipper and the crewman with the development of ship-specific plans and procedures. Consequently, the importance of operating the electric-driven bilge pump and stopping the engine as soon as a flood in the engine room was discovered, might have been identified.

## Wearing of lifejackets

That the skipper and the crewman did not wear PFDs when working on deck and did not don lifejackets when abandoning is of concern. A more rapid foundering, stumbling when entering the liferaft, or difficulties when deploying the liferaft could easily have resulted in one or both of the men ending up in the sea.

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<sup>8</sup> Collision between the fishing vessels *Silver Dee* (B310) and *Good Intent* (SY79) resulting in the foundering of *Silver Dee*, Irish Sea, 29 July 2015, MAIB report 4/2016.

<sup>9</sup> Fire and foundering of fishing vessel *Karinya* (FR 699), Moray Firth 4 October 2015, MAIB report 7/2016.

<sup>10</sup>The Fishing Vessels Code of Safe Working Practice for the Construction and Use of 15 metre length overall (LOA) to less than 24 metre registered length (L) Fishing Vessels.

Despite the advantages of wearing a PFD when working on the open deck at sea, many fishermen still do not wear them. In 2000 the MAIB made its first recommendation about the compulsory wearing of lifejackets by fishermen working on deck. In the intervening years, there has been a succession of discussions, education programmes and research projects that have had very limited success. Since 2012, European funding has also been used by the various fishing industry associations to provide PFDs to thousands of fishermen free of charge. Despite these initiatives, the culture of the fishing industry has been slow to change, and fishermen continue to drown who might otherwise have lived had they been wearing a PFD when they entered the water.

## CONCLUSIONS

- The flooding was probably caused by a failure within a seawater system inside the engine room.
- The engine room had been flooding for up to 1 hour before the crew were alerted.
- The engine room's bilge alarms sounded in the wheelhouse and were not heard by the skipper and the crew who were working on the deck.
- The prompt abandonment and notification to the coastguard and vessels in the area reduced the risk to the lives of the crew.
- The rate of the flooding would have been slowed by the operation of the electric bilge pump and possibly by stopping the main engine.
- The effectiveness of the crew's response to the flood was probably reduced by not routinely conducting emergency drills.

## ACTION TAKEN

### MAIB actions

The MAIB has issued a flyer to the fishing industry highlighting the safety issues identified in this report.

## RECOMMENDATIONS

The **owners of *Majestic*** are recommended to:

- 2016/135      Take steps to ensure on any vessel they own or skipper in the future that:
- The dangers of leaving the wheelhouse unattended are fully assessed so that practical measures can be adopted to mitigate such risks;
  - Emergency drills are conducted in accordance with MSN 1770 (F) and;
  - PFDs are worn by all crew when working on the open deck at sea.

## SHIP PARTICULARS

Vessel's name	<i>Majestic</i>
Flag	United Kingdom
Classification society	Not applicable
IMO number/fishing numbers	LK678
Type	Potter
Registered owner	Privately owned
Manager(s)	Not applicable
Year of build	1977
Construction	Wood
Length overall	16.0
Registered length	15.98
Gross tonnage	51
Minimum safe manning	Not applicable
Authorised cargo	Not applicable

## VOYAGE PARTICULARS

Port of departure	Toft
Port of arrival	Not applicable
Type of voyage	Coastal
Cargo information	Not applicable
Manning	2

## MARINE CASUALTY INFORMATION

Date and time	21 January 2016 at 1443
Type of marine casualty or incident	Very Serious Marine Casualty
Location of incident	60°45'54N, 001°17'01W - 5nm NW of Yell, Shetland
Place on board	Ship / engine room
Injuries/fatalities	None
Damage/environmental impact	Total loss, no significant pollution
Ship operation	Fishing
Voyage segment	Mid water
External & internal environment	Moderate breeze, slight seas with a 1m well, good visibility and fine weather.
Persons on board	2