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Contact with quay and the subsequent foundering of FV *Shalimar*

Scrabster, Scotland

30 April 2014

SUMMARY

At 2127 BST[1] on 30 April 2014, the United Kingdom registered trawler *Shalimar* made heavy contact with the quay wall when shifting berths in Scrabster, Scotland. The vessel's wooden stern was severely damaged and the hull flooded rapidly. *Shalimar* sank at 2150. There was no pollution and there were no injuries. The vessel was re-floated 12 days later but it was beyond economical repair.

The MAIB investigation into the accident determined that *Shalimar*'s skipper had been unable to stop the vessel's movement astern because a morse cable, which controlled the main engine's gearbox, had come away from its mounting in the wheelhouse. Factors contributing to the loss of control of the gearbox and the vessel's foundering included:

- A retaining bracket used to secure the morse cable had been secured with only one screw, which had loosened over time.
- The main engine could only be started and stopped from inside the engine room.
- The rate of flooding exceeded the capacity of the vessel's pumps.
- The vessel was not fitted with watertight bulkheads.

If *Shalimar* had been built today, the current construction standards applicable to wooden fishing vessels would have significantly increased the vessel's survivability. Consequently, no recommendations have been made.

[1] All times are British Summer Time (UTC+1) and are accurate to within 5 minutes

Image courtesy of marinetraffic.com

Shalimar

FACTUAL INFORMATION

Narrative

At 2120 on 30 April 2014, the fishing vessel *Shalimar* was lying port side to the quay at Scrabster's fish market. Four crew were on board: the skipper, engineer and two deckhands. The fishing vessel was moored on the discharge berth adjacent to the fish market **(Figure 1)**. By prior arrangement, empty fish boxes for *Shalimar*'s next voyage had been left at the consigning berth, which was at the south-eastern end of the fish market building. This was the normal practice for port calls outside of office hours.

Shalimar's crew landed 348 boxes of white fish[2] and then prepared to shift the vessel approximately 80 metres to the consigning berth astern. The skipper, who was in the wheelhouse, told the engineer to start the main engine. He then notified the port's duty officer by very high frequency (VHF) radio that he was about to move *Shalimar* to the consigning berth. Meanwhile, the engineer went to the engine room **(Figure 2)** and started the main engine. He also stopped the auxiliary engine, which had powered the hydraulics used for landing the catch. The engineer then returned to the cabin.

One of *Shalimar*'s deckhands was on the quay and the other was on deck. On instruction from the skipper, the deckhand ashore let go the vessel's three mooring lines. Two of the lines were recovered on board but the deckhand ashore held onto the outboard end of the third line which was to be the first of the lines to be re-secured at the consigning berth.

At about 2125, the skipper set the engine to "astern" at 600rpm using the engine control lever on the port side of the wheelhouse. *Shalimar* gathered sternway at a speed of between 3 and 4 knots (kts),

[2] 348 boxes is approximately 15 tonnes of fish

Image courtesy of Scrabster Harbour Authority

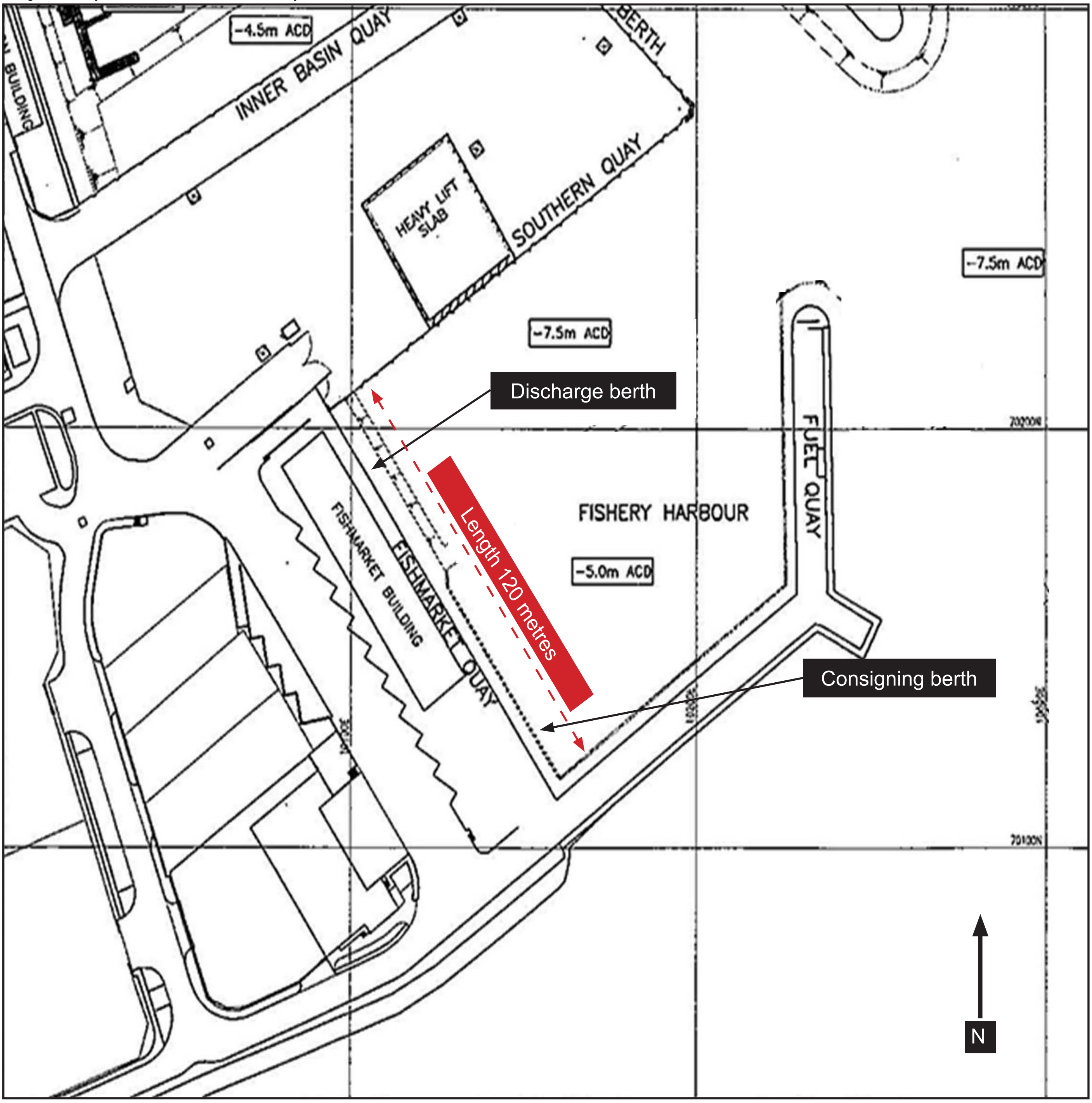

Figure 1: Scrabster Harbour

which was sufficiently slow to enable the deckhand ashore to keep up. As *Shalimar*'s bow passed the southern end of the fish market building, the skipper moved the engine control lever to "neutral" and then to "ahead" at 600rpm. *Shalimar* continued to power astern and the skipper immediately realised that there was a problem. He shouted to the deckhand ashore to get the line onto a bollard. The skipper also shouted to the engineer to stop the main engine. At the same time, he moved the engine control lever further forward in order to increase the engine speed and stop the vessel. The skipper then informed the port's duty officer by VHF radio that *Shalimar* was "*going to hit the pier*".

Due to *Shalimar*'s speed astern, the deckhand ashore was unable to get the line onto a bollard. At about 2127, *Shalimar*'s stern landed heavily on the framing between the tyre fenders on the quay wall. *Shalimar* rebounded and continued to strike the quay until the engineer stopped the main engine. Although jolted, *Shalimar*'s crew were uninjured.

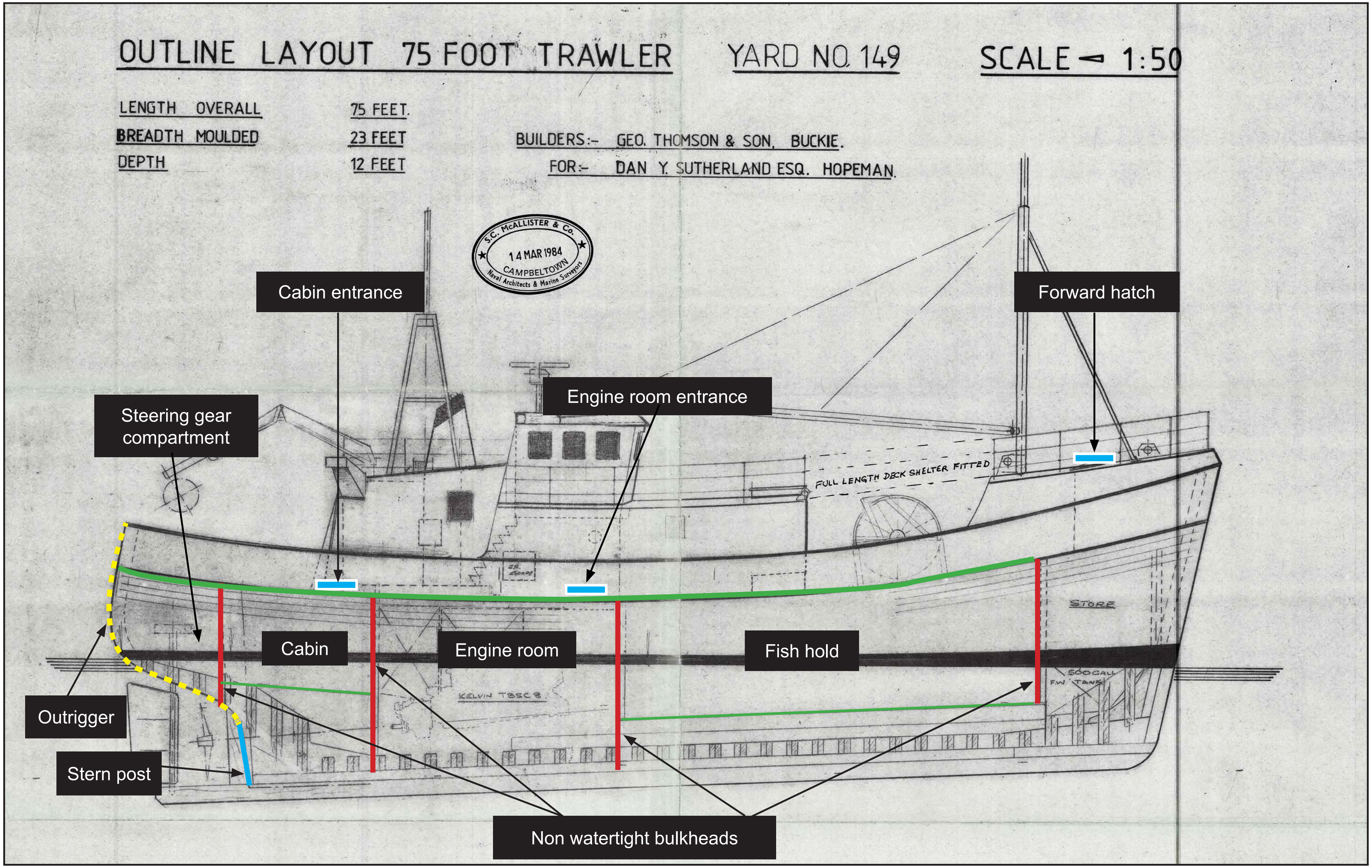

Figure 2: *Shalimar* general arrangement

The engineer left the engine room and made his way to the cabin where, through the open door, he saw water in the steering gear compartment **(Figure 2)**. The bilge alarm also sounded. The engineer quickly returned to the engine room and restarted the auxiliary engine. Once the engine was running, he started the general service pump.

The engineer then returned to the cabin, where he met the skipper. The water level had now risen above the deck, and a second bilge alarm was sounding. The skipper realised the severity of the situation and returned to the wheelhouse and called the port duty officer to request immediate assistance. At 2128, the duty port officer contacted the fire and rescue service. Meanwhile, on instruction from the engineer, both deckhands collected their passports from the cabin and then evacuated to the quay.

The skipper and the engineer remained on board the vessel until the fire and rescue service arrived at 2141. Following a discussion with the fire service's on-scene commander, the skipper and engineer returned to *Shalimar* with a hose from the fire tender to pump the water out of the hull. The skipper tried to put the hose into the forward deck hatch opening but, as *Shalimar* was now listing heavily to port, he was unable to do so. The skipper and engineer realised that the vessel could not be saved and they scrambled ashore just before *Shalimar* sank alongside the quay at 2150 **(Figure 3)**.

Figure 3: *Shalimar* submerged alongside

After *Shalimar* foundered, the vessel's two liferaft canisters floated to the surface, but the liferafts did not inflate. The vessel's EPIRB[3] remained in its stowage on the starboard side of the wheelhouse roof and did not activate.

Environmental conditions

The wind was light airs and the weather was fine and clear with excellent visibility. Sunset was at 2002 with nautical twilight at 2204. The predicted high water at Scrabster was 4.9 metres at 2132. The consigning berth had a charted depth of 5m.

[3] Emergency Position Indicating Radio Beacon

Salvage and damage

On 12 May 2014, *Shalimar* was lifted clear of the water by a floating straddle crane **(Figure 4)**. Examination of the vessel's hull identified that the damage to the cruiser-style stern was just below the bulwark on the centreline, an area which was not protected by the fishing vessel's fenders. The lower part of the outrigger[4] had been levered outboard, and adjacent larch planking had sprung away from the oak stern framing, which created a substantial area for water to ingress **(Figures 2** and **5)**.

Other than the damaged area, the wooden hull was in sound condition with no obvious weaknesses or underlying defects that would have been detrimental to the vessel's structural integrity or strength. Once temporary repairs had been completed, *Shalimar* was towed to MacDuff, Scotland, where the vessel was declared a constructive total loss.

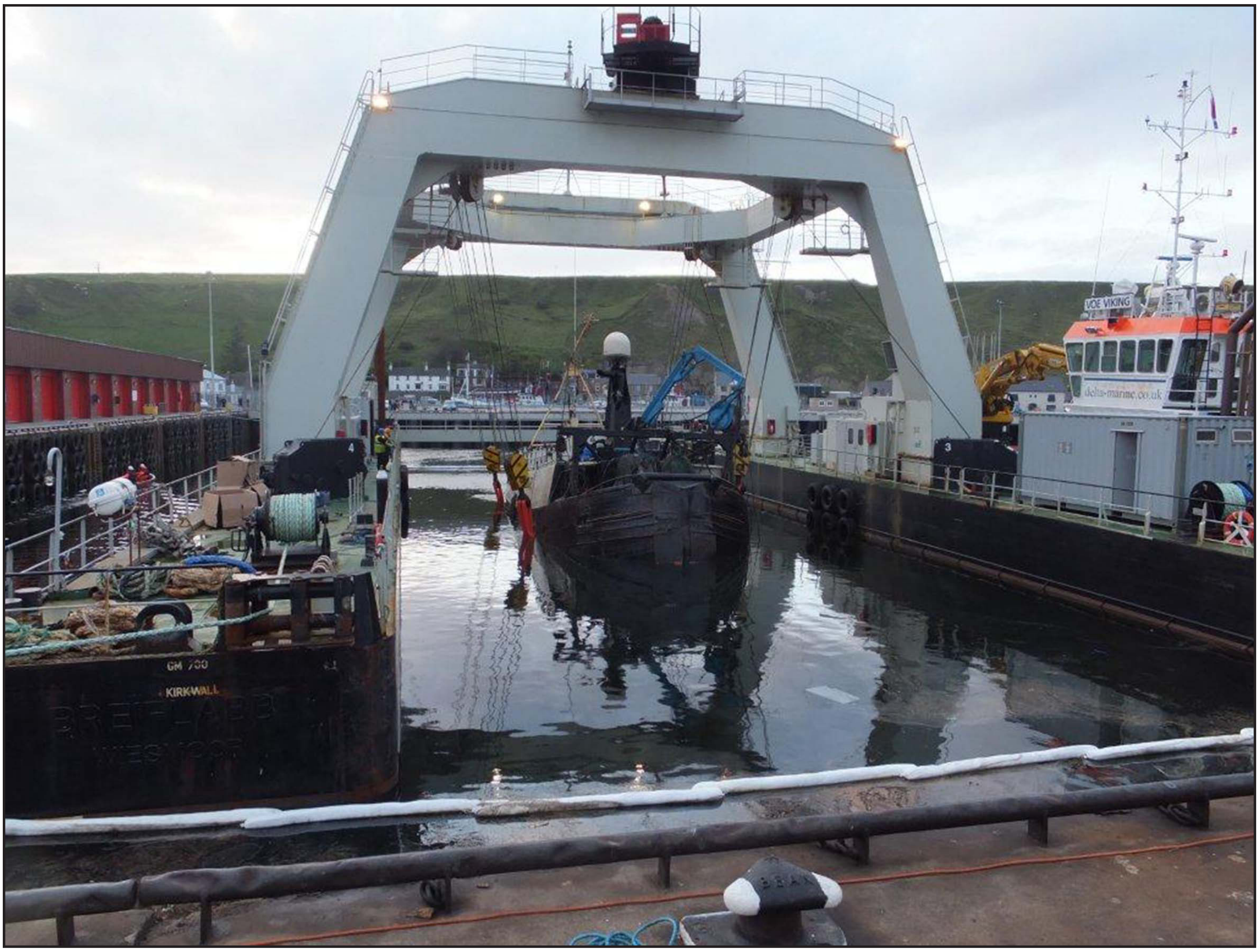

Figure 4: Salvage

Construction and layout

Shalimar was built as a seine netter by George Thomson & Son of Buckie, Scotland in 1985 in accordance with the construction requirements of the Fishing Vessels (Safety Provisions) Rules 1975. As a wooden fishing vessel, it was required to have two bulkheads of "*solid and substantial*" construction to separate the fish hold from the rest of the vessel. The bulkheads were not required to be watertight. *Shalimar*'s bulkheads were constructed of 6.3mm galvanised steel. The aft bulkhead was insulated with 100mm slab cork and a cement finish.

[4] Outrigger – a curved frame on the centreline at the stern of a wooden fishing vessel which caps the stern post

Figure 5: Stern damage

The vessel's layout **(Figure 2)** was typical of a Scottish seine netter with the cabin, engine room and fish hold located in the hull and the galley, mess room and wheelhouse within the superstructure at main deck level. Access to the engine room was through a hatch located on the port side forward in the galley, while access to the cabin was by a hatch located on the starboard side aft of the superstructure.

Machinery

At build, *Shalimar* was fitted with a Kelvin TBSC8 diesel engine with 495bph at 1315rpm. The fishing vessel was re-engined in 1997 with a Mitsubishi S6R2 diesel engine with 455bph at 1350rpm. The Mitsubishi engine was selected as it had a similar specification to the original Kelvin diesel. In 2012, the engine's governor malfunctioned, causing the main engine to over-speed. The engine was severely damaged and was replaced by another Mitsubishi S6R2. The main engine could only be started or stopped from within the engine room.

Shalimar was fitted with a single, right-handed, fixed propeller. There was no visible indication in the wheelhouse to show the propeller's direction of rotation (ahead/astern).

In addition to providing propulsion, the main engine also powered a general service pump rated at 800 l/min. A second general service pump, also rated at 800 l/min, was powered by an auxiliary engine in the engine room. Both general service pumps were well maintained and were tested daily. Associated pipework in the engine and fish rooms was also regularly inspected. The vessel's bilge alarms were tested weekly.

Engine and gearbox control system

Shalimar's engine and gearbox were controlled by a system of morse cables. Similar to the cabling found on a bicycle brake system, the morse cables, which comprised a steel wire inside a plastic sheath, converted the movement of control levers in the wheelhouse into a pull/push movement at the governor and/or gearbox.

Two control levers were fitted in the wheelhouse: a master and a slave. The master lever was located on the starboard side of the wheelhouse and the slave lever was on the port side. The movement of the levers was synchronised by morse cables so that when either control lever was moved, the other would move in the same direction by the same amount **(Figure 6 – cables a and b)**. The master control lever was also connected to the engine governor and gearbox in the engine room by morse cables **(Figure 6 – cables c and d)**.

Apart from a minor adjustment to the morse cables when the vessel was re-engined in 2012, there is no evidence of the morse control system being inspected, greased or maintained.

Examination of the engine and gearbox control system

Following *Shalimar*'s salvage, examination of the engine and gearbox control system behind a console in the wheelhouse identified that a retaining bracket used to secure the cable between the master control lever and the gearbox had detached from the supporting framework **(Figure 7)**.

The retaining bracket was found at the bottom of the console and contained only one screw. It was undamaged and the empty screw-hole was filled with debris and grease **(Figure 8)**.

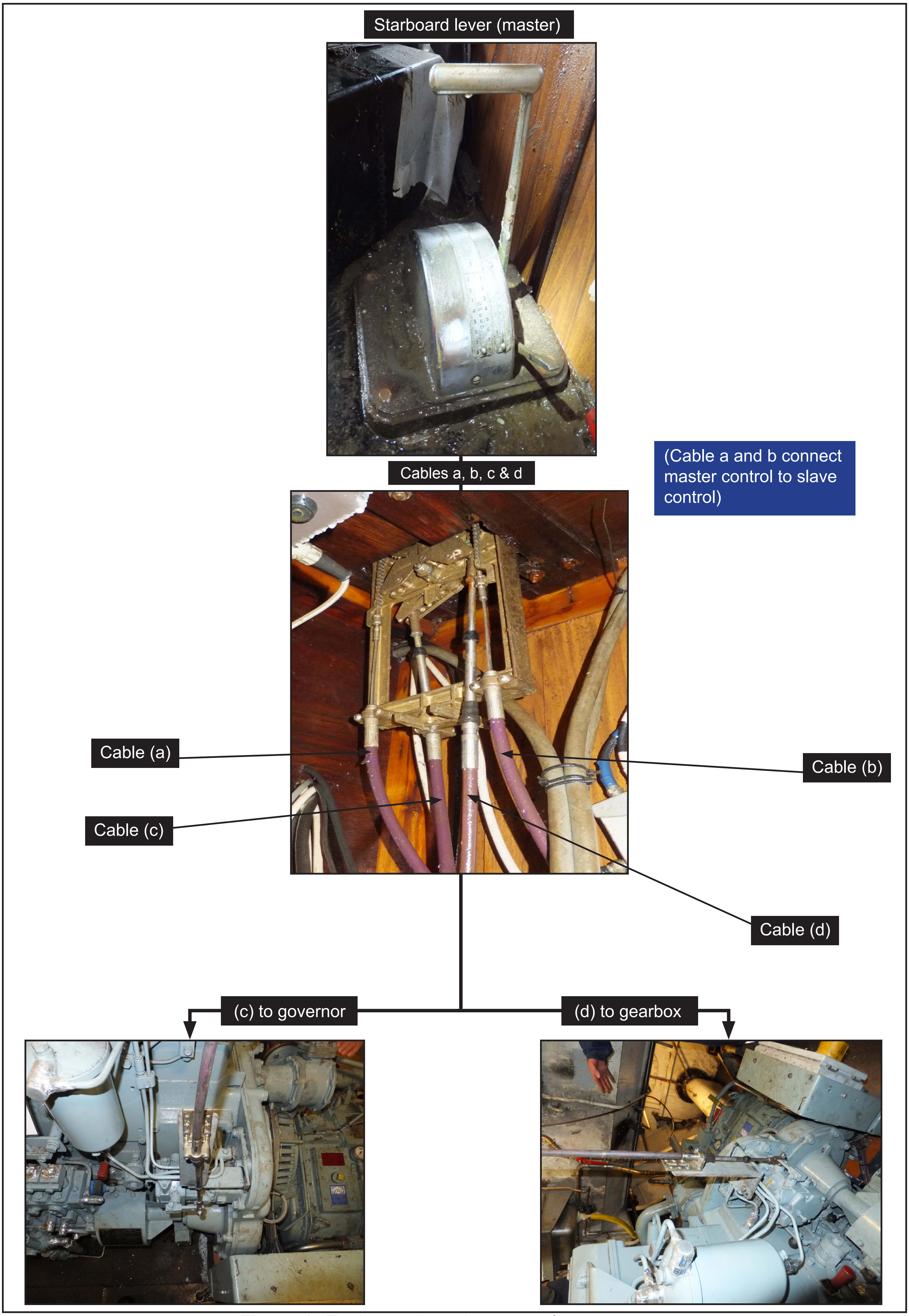

Figure 6: Engine and gearbox control arrangement

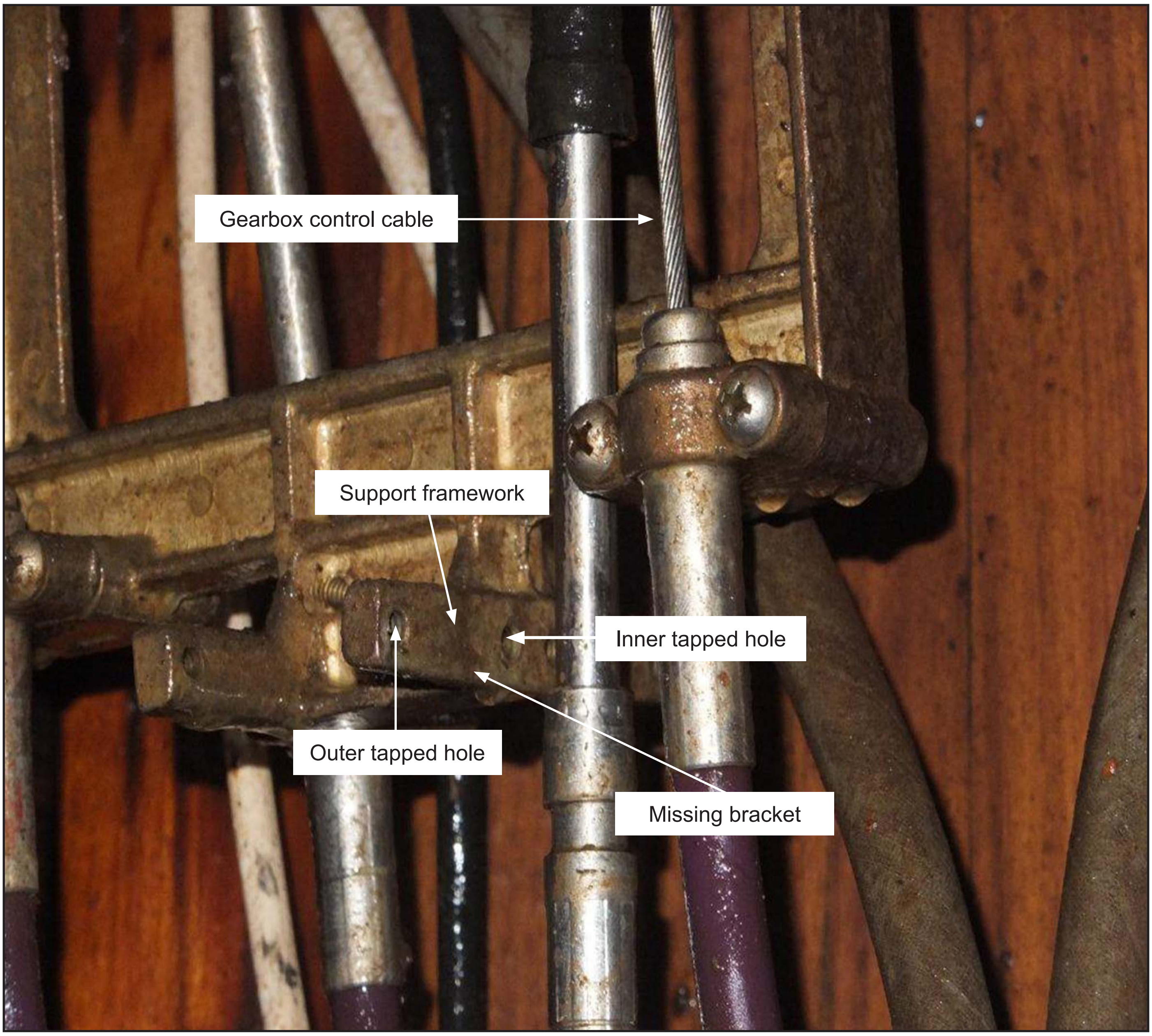

Figure 7: Support framework

Figure 8: Detached securing bracket

The control system was tested. When the position of the master control lever was adjusted:

- The morse cable connecting the lever and the gearbox moved bodily. The plastic sheath moved as well as the wire, and the gear on the engine remained unchanged.

- The wire inside the morse cable connecting the lever to the engine governor moved. The plastic sheath remained secured to the supporting framework and the position of the engine governor altered as intended.

Crew

Shalimar's skipper (aged 46) and the engineer (aged 48) were brothers and had been fishermen all their working lives. They had owned *Shalimar* since 1997.

The two deckhands were Filipino nationals and were employed on 9 month contracts. Both deckhands were also experienced fishermen.

All of the crew had completed the four mandatory Seafish[5] training courses (Basic Sea Survival, Basic First-Aid, Basic Fire-Fighting and Prevention, and Safety Awareness) or accepted equivalents. The skipper held a Class 2 fishing skipper's certificate[6] but the engineer did not hold a formal engineering qualification.

Shalimar's crew completed monthly drills[7] which usually consisted of a fire or manoverboard drill. Flooding drills were not undertaken but *Shalimar*'s crew regularly discussed flooding scenarios.

ANALYSIS

Failure mechanism

Shalimar struck the quay wall because the vessel's movement astern could not be stopped. The skipper had moved the engine and gearbox control lever in the wheelhouse to 'ahead' but the vessel continued to drive astern. Examination and testing of the engine and gearbox control system identified that the morse cable link between the control levers in the wheelhouse and the gearbox had not worked as intended because a retaining bracket used to secure the cable had detached from the supporting framework **(Figures 7** and **8)**.

The retaining bracket was designed to be secured to the support framework by two screws. As only one screw was found in the bracket, the remaining screw hole in the bracket was filled with debris, and the outer of the two tapped holes in the framework was considerably cleaner than the inner, it is highly likely that the bracket had been secured with one rather than two screws for some considerable time before it detached. In view of the difficulty in accessing the inner tapped hole due to the surrounding framework and cables, it is possible that only the outer screw had been fitted when the system was first installed.

The gearbox control cable had functioned correctly for many years, but it is evident that over time the single screw in the retaining bracket worked free from the supporting framework. As the screw was fitted without a locking washer, it had probably loosened due to vibration.

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[5] 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

[6] A Class 2 fishing skipper's certificate permits a person to be skipper on board a fishing vessel up to 30 metres registered length, within a limited area

[7] Merchant Shipping Notice (MSN) 1770 *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*, specifies that a monthly safety drill must be carried out on all fishing vessels greater than 15 metres in length. Merchant Guidance Note (MGN) 430 *Fishing Vessels: Checks on Crew Certification and Drills*, specifies the drills to be completed and provides scenarios for drills which include fire, collision, flooding or grounding

It is also evident that the screw and bracket must have detached from the supporting framework immediately after the skipper put the engine 'astern' at 600rpm using the port control lever in the wheelhouse. Consequently, his subsequent movement of the control lever successfully increased the engine's speed but did not alter the direction the gearbox was driving.

Reaction

When *Shalimar*'s skipper tried to check the vessel's movement astern by moving the engine and control lever 'ahead', *Shalimar*'s stern was less than 30m from the quay wall. Therefore, at a speed of 4kts, the skipper had approximately 15 seconds to identify that the vessel was not responding and take corrective action.

In the circumstances, the skipper's actions to try and secure a line ashore, increase the engine speed ahead, stop the engine and finally advise the port of the impending contact were positive and well-intended. Although the skipper's increase in the engine speed ultimately led to *Shalimar* hitting the quay wall at a slightly higher speed than would otherwise have been the case, the action was instinctive and was taken without the benefit of any visual indication, other than the control levers, to show the direction of movement of the propeller shaft (ahead or astern).

Survivability

Shalimar's cruiser-style stern **(Figure 2)** struck the quay on the protruding framing in between the tyre fenders **(Figure 3)**. The force of the impact forced the bottom of the outrigger away from the stern post and sprung adjacent planks from the stern frame **(Figure 5)**. Although the resulting water ingress was quickly detected and a general service pump was started, the rate of ingress exceeded the pump's capacity. As *Shalimar*'s fish room bulkheads were not watertight, the incoming seawater quickly spread through the vessel. This caused the vessel to list heavily to port and then sink only 23 minutes after the impact with the quay.

In view of the extent of the damage **(Figure 5)** it would have been almost impossible for the crew to stem the water ingress in the time available. It is sometimes feasible to stop or minimise flooding caused by a breached hull by fothering[8] but this would have been difficult to achieve on this occasion due to the location of the damage, the equipment required and the crew's lack of training and practice in this area.

In the circumstances, the early evacuation of the deckhands followed by the evacuation of the skipper and engineer after their unsuccessful attempt to control the flooding were appropriate. As the skipper and engineer had owned the vessel for 17 years, these were understandably difficult actions to take, but they possibly prevented serious injury or worse.

[8] Fothering is a method used to slow or stop flooding caused by a breached hull. The procedure involves the use of a waterproof patch, such as a tarpaulin, which is rigged over the breach on the outside of the hull. The patch is then held in place using securing strops that run around the vessel

Construction requirements

Shalimar was built nearly 30 years ago to meet the requirements of the Fishing Vessels (Safety Provisions) Rules 1975. Since then, there have been numerous changes to the construction requirements applicable to new vessels; *Shalimar* did not have to meet these revised requirements due to grandfather rights[9]. Had *Shalimar* been constructed today, it would be required to have a means of starting and stopping its engine from the wheelhouse. It would also be required to be fitted with watertight bulkheads either side of the engine room rather than '*solid and substantial'* bulkheads either side of the fish room. Specifically:

- MSN 1770 states that main engines should be controlled from the engine room and a "*separate area*", which is suggested to be the wheelhouse. The Seafish Construction Standards 2006, adds the provision that there should be a means to stop or start electrically started engines from the wheelhouse control position.

- MSN 1770 also states:

  "In vessels constructed of wood, a collision bulkhead and bulkheads at the fore and aft ends of the machinery space, should be provided. The after bulkhead of the machinery space may terminate on a horizontal, flat that extends aft to the stern, above the line of shafting. The bulkheads and flat referred to in this section should be of adequate strength and gasketed and/or caulked to prevent significant leaks or flooding."

In this case, the delay in stopping the main engine, while the engineer moved from the cabin to the engine room, prevented the vessel's speed from being reduced before the impact. Although stopping the engine sooner would not have prevented *Shalimar* striking the quay, it might have helped to limit the resulting damage. This would have only been possible had an 'engine stop' been fitted in the wheelhouse.

Similarly, the fitting of watertight bulkheads would not have prevented *Shalimar* from flooding but they would have slowed down the rate at which the flooding spread and the speed of foundering. Consequently, the crew would have had more time to use the pumping facilities available from ashore.

Lifesaving equipment

When *Shalimar* sank, the vessel's liferafts floated to the surface but remained tethered to the vessel and did not inflate. This indicates that although the hydrostatic release units (HRU)[10] activated, the depth of water at the berth, even at around the time of high water, was too shallow to induce sufficient tension on the liferafts' painters to pull the painters from the liferaft canisters and then inflate the liferaft. The tension on the painters was also insufficient to break the 'weak link' to free the liferafts from the vessel.

The failure of *Shalimar*'s EPIRB to release from its stowage and activate was also probably due to the limited depth of water in the dock. The EPIRB and the liferafts were fitted with Hammer H20 HRUs, which were designed to activate at a depth of between 2 and 4m. As the vessel came to rest on the seabed on its port side **(Figure 3)** and the EPIRB was stowed on the starboard side of the wheelhouse roof, it is highly likely that the EPIRB was never submerged to the depth required to activate the HRU.

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[9] Grandfather rights or clause – the practice of permitting vessels to operate to the standards applicable at the time they were built or otherwise stated

[10] HRU – a mechanical unit which activates when a pre-determined water depth (pressure) is reached to automatically release lifesaving equipment

CONCLUSIONS

- *Shalimar* struck the quay wall because the morse cable controlling the gearbox did not operate as intended. This prevented the skipper from checking the vessel's astern movement.

- The morse cable control did not operate because a retaining bracket, which had been secured by only one screw, had detached from its supporting framework.

- The engines could not be stopped before the vessel struck the quay wall because the engine could only be stopped from inside the engine room.

- Due to the extent and nature of the damage, the resulting rate of flooding exceeded the capacity of the vessel's pumps.

- The flooding spread quickly through the vessel as none of its internal bulkheads were watertight.

- The evacuation of the vessel's crew to the quay was timely.

- Changes to fishing vessel construction standards with regard to engine stops and watertight bulkheads should help to prevent new vessels from experiencing similar accidents in the future.

RECOMMENDATIONS

In view of the advancements in the construction standards applicable to wooden fishing vessels, no recommendations have been made.

SHIP PARTICULARS	
Vessel's name	*Shalimar*
Flag	United Kingdom
Classification society	Not applicable
IMO number/fishing numbers	BCK 598
Type	Stern trawler
Registered owner	Privately owned
Manager(s)	Not applicable
Year of build	1985
Construction	Wood
Length overall	22.86m
Registered length	21.72m
Gross tonnage	168
Minimum safe manning	Not applicable
Authorised cargo	Not applicable
VOYAGE PARTICULARS	
Port of departure	Scrabster
Port of arrival	Scrabster
Type of voyage	Not applicable
Cargo information	Not applicable
Manning	4
MARINE CASUALTY INFORMATION	
Date and time	30 April 2014 at 21:27
Type of marine casualty or incident	Very Serious Marine Casualty
Location of incident	Scrabster
Place on board	Ship
Injuries/fatalities	None
Damage/environmental impact	Constructive Total Loss
Ship operation	Manoeuvring
Voyage segment	Departure/arrival
External & internal environment	Fine weather with light airs
Persons on board	4