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MARINE ACCIDENT INVESTIGATION BRANCH

ACCIDENT REPORT

VERY SERIOUS MARINE CASUALTY | REPORT NO 5/2013 | FEBRUARY 2013

Fire and abandonment of *DENARIUS*
83 miles NNE of Kinnaird Head
9 July 2012

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 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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For all enquiries:

Email: maib@dft.gsi.gov.uk
Tel: 023 8039 5500
Fax: 023 8023 2459

SUMMARY

During the afternoon of 9 July 2012 the fishing vessel *Denarius* suffered a major fire. Prior to the accident, the vessel's main engine had been running with severely retarded timing for several hours, resulting in a build-up of unburnt fuel within the exhaust system. This fuel subsequently ignited; the resulting heat transferred through areas of poor insulation to wiring close to the exhaust trunking, causing the electrical insulation to catch fire. Dense smoke and fire then spread quickly, forcing the crew to abandon to liferafts.

Approximately 40 minutes later the crew were rescued by helicopter and taken to Lerwick, where they were treated for minor smoke inhalation.

The fire eventually burned out, allowing the derelict *Denarius* to be towed to port, where she was declared a constructive total loss by her insurers and subsequently scrapped.

Recommendations have been made to *Denarius*'s owner designed to ensure that lessons learned from this accident are applied to any vessels it may operate in the future.

Photograph courtesy of www.trawlerphotos.co.uk

Photograph courtesy of Marine Compliance Scotland

FACTUAL INFORMATION

Background

The trawler *Denarius* had been temporarily employed by the Scottish Fishermen's Federation (SFF) as a guard vessel for the offshore oil and gas industry. *Denarius*'s role was to prevent other fishing vessels from fishing over a newly laid pipeline which had yet to be buried under the seabed.

Narrative

At about 0945 on 9 July 2012, *Denarius* landed heavily off a large swell, and it was apparent to the watchkeeper that something had happened to the Mitsubishi main engine, causing it to lose power and emit an unusual sound. The watchkeeper immediately informed the skipper and driver[1].

The driver stopped the engine but the crew were unable to find the cause of the problem, which persisted when the engine was re-started. The engine appeared to be misfiring, was running irregularly and adjustment of the throttle had little effect.

The skipper contacted the vessel's managing owner (his father) by satellite telephone and explained the problem. The owner suggested that running the engine at idle for a long time, as was usual during guard duty, might have resulted in carbon build up within the engine and exhaust, and advised that this could be burned off by increasing to full speed for a while. The skipper followed this advice, but it appeared to exacerbate the problem. The skipper then contacted a boatyard ashore, Mallaig Boatbuilding & Engineering, to see if they could diagnose the problem. However, the boatyard personnel were unable to provide a diagnosis remotely, and the skipper was advised that, if the crew were unable to repair the engine, he should make for port, preferably under tow.

At 1202, the skipper, in consultation with the owner, decided to head for port at reduced power. He then contacted SFF Services to explain that *Denarius* was coming off station and off contract due to engine problems. It was agreed that other guard vessels would cover the station remotely until a replacement vessel arrived on scene.

The crew set about washing the vessel down from stem to stern and, as was normal practice in good weather, they left the weathertight doors on the starboard side and the engine room emergency escape hatch open **(Figure 1)** to improve drying and ventilation.

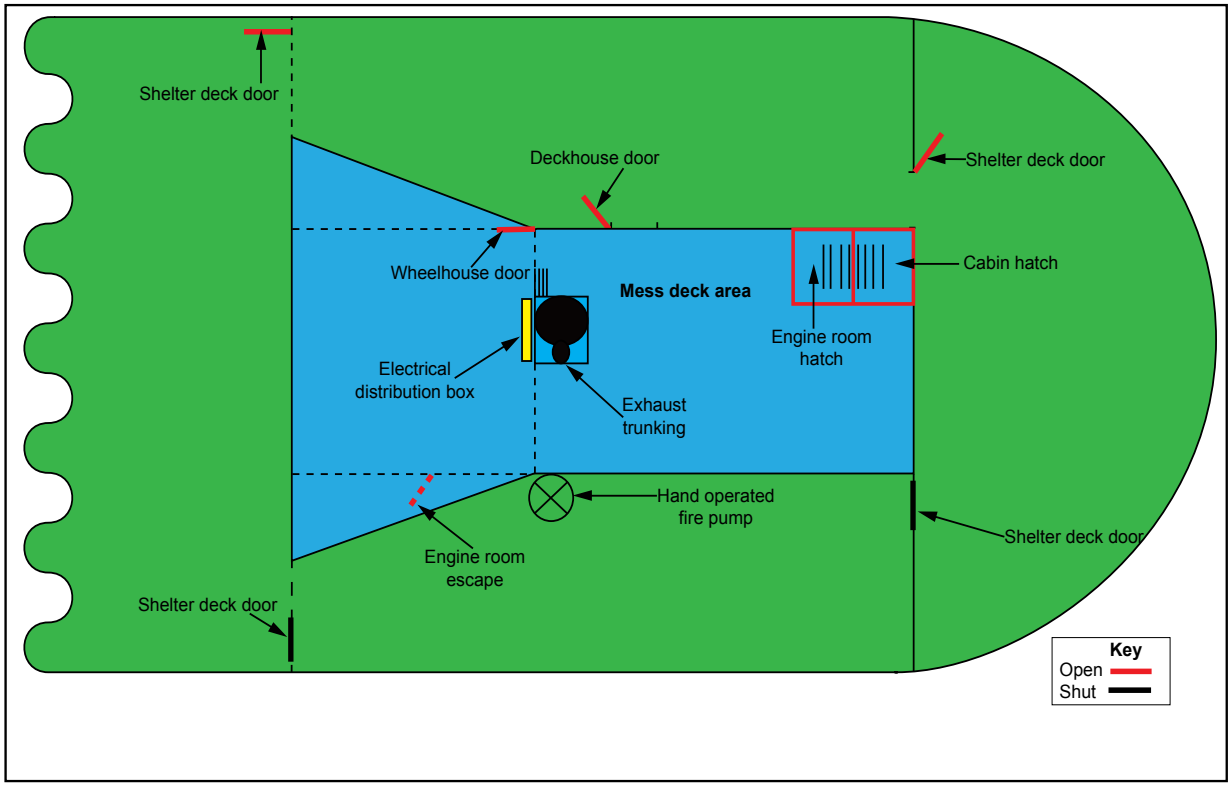


Figure 1: Diagrammatic representation of *Denarius*'s accomodation arrangements at time of its evacuation

[1] Driver: A colloquial term for the crewman who also looks after a fishing vessel's engines. In this case, limited to basic care and maintenance.

As the passage continued, the misfiring and irregular running of the engine worsened, and at 1246 the skipper contacted the Scottish agent for Mitsubishi engines, Macduff Diesels Limited, for advice. The Macduff Diesels Limited's representative explained that remote diagnosis was difficult but, given the symptoms, suggested the crew stop the engine in order to check the fuel injection pump timing, and gave instructions on how to do this. It was also explained that if the problem was indeed due to a timing issue, and the crew were unable to repair the engine, they would need to be towed to port as the engine would probably not restart.

The engine was stopped, the fuel injection pump timing gear was inspected and the fuel injection pump drive coupling, which set the fuel injection pump timing, was found to be loose. This coupling was normally secured by two bolts. However, the securing nuts on both bolts had slackened off and were now missing **(Figure 2)**.

Denarius's driver could not locate the missing nuts in the bilges and was unable to find replacements with which to reset the timing and secure the coupling. The skipper then made the decision to attempt to restart the engine without further work and, when it did restart, *Denarius* resumed her passage. Following the re-start, in addition to the irregular running and misfiring, the engine sounded as though there were explosions occurring within the exhaust system with increasing regularity.

During this period, numerous telephone calls were made to the owner, keeping him apprised of the situation.

At 1421, in view of the deteriorating condition of the engine, the skipper contacted SFF Services to ask if a guard vessel could be released to tow *Denarius* to port. He was informed that no vessels could be released at that time although one vessel, which was some 10 hours distant, was due to come off station the following day

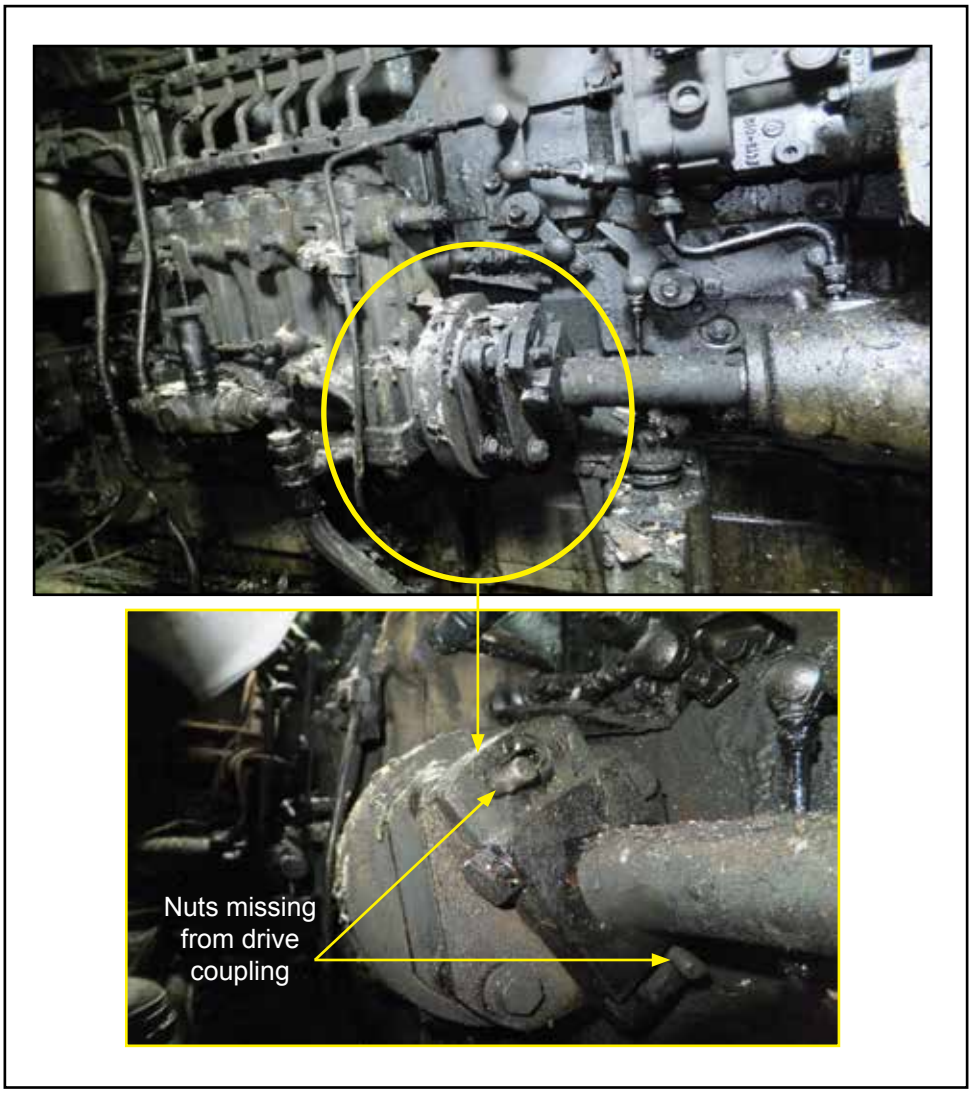


Figure 2: Fuel injection pump coupling

and would be able to provide a tow. The skipper discussed this option with the owner, but they were unwilling to drift not-under command (NUC) for almost 30 hours as they considered this would make them a danger to navigation. In view of this, an alternative tow was agreed by radio with the skipper of a trawler approximately 40 miles to the south, who recovered his nets and headed for *Denarius*. Meanwhile *Denarius*'s skipper continued southwards towards the other trawler to close the distance between them.

At around 1510 *Denarius*'s engine sustained what sounded like a massive misfire. This was followed by the exhaust temperature, shown on the wheelhouse instrumentation, increasing to around 700°C, more than double the normal operating temperature. The skipper stopped the main engine from the wheelhouse. When the driver then went into the engine room, he noticed that the main engine's turbo charger casing was glowing cherry red.

Several minutes later, thin wispy smoke appeared in the wheelhouse from behind the bulkhead panelling, directly forward of the exhaust trunking and close to an electrical distribution box. The skipper telephoned the owner to update him and proceeded to remove panel retaining screws with the intention of identifying the source of the smoke. As he did this, the smoke became very dense, causing him to cough and choke. Over the satellite telephone the owner heard the skipper coughing, followed by the driver shouting at him to leave the wheelhouse, and he advised the skipper to send out a distress call. However, immediately after this, at 1530, the satellite telephone link with *Denarius* was lost.

Evacuation

The skipper instructed his crew to make preparations for abandonment as he attempted to transmit a distress call by radio. However, by then, power had been lost to the vessel's radios. As he was driven from the wheelhouse by thick acrid smoke, the skipper was able to grab the vessel's portable emergency radio.

The vessel's propane gas bottles were stored on the galley/mess roof, and when the crew went to collect the liferafts they identified that the gas bottles posed a hazard, and so removed them to the aft deck. The crew then carried both liferafts from their cradles behind the wheelhouse to the fore deck, as far away from the smoke as possible, and the skipper quickly went below decks to the cabin. There he collected emergency parachute flares and warm clothing before joining his crew on the foredeck.

Smoke alarms in the mess deck activated as the dense smoke dispersed from the wheelhouse, but no flames were yet apparent as the crew stood on the foredeck. One crew member retrieved thermal flotation suits and inflatable lifejackets from just inside the starboard shelter deck door, while the skipper went aft to retrieve the emergency positioning indicating radio beacon (EPIRB) from above the wheelhouse. After the crew donned their flotation suits, the skipper activated the EPIRB and regularly transmitted distress calls on the portable VHF radio, but these were not answered. The liferafts were launched to windward and pulled alongside with some difficulty, due to the resistance created by the water ballast pockets and drogues.

The EPIRB signal was initially picked up by Falmouth coastguard at 1540, and subsequent hits over a 15 minute period identified *Denarius* and gave her position. This information was relayed to Shetland coastguard, and its search and rescue (SAR) helicopter, R102, which was on a training exercise, was recalled, refuelled and deployed.

As the smoke and heat intensified, the skipper calmed his crew, some of whom were becoming increasingly anxious, and explained that it was best for them to remain on board for as long as was practicable.

At about 1605 flashover[2] occurred, causing the wheelhouse windows to explode, the aft mast to collapse, and an intense fire to sweep over *Denarius* from aft towards the foredeck. At this point the skipper gave the order to abandon to the liferafts.

Abandonment and rescue

The crew abandoned by boarding ladder to one of the liferafts, taking with them the EPIRB, radio and parachute flares. They then lashed the remaining liferaft to the one they were in before cutting themselves free from *Denarius*. *Denarius* then drifted downwind and away from the rafts.

[2] Flashover: The sudden and rapid spread of fire through the air, caused by the ignition of smoke or fumes from surrounding objects following their thermal decomposition.

Although the crew were unable to make contact with anyone by radio, distress relay communications by other stations could be heard occasionally when the rafts rose on wave crests. The skipper continued to transmit on radio that they had abandoned the vessel and were safe and well, not knowing if his transmissions were being heard.

At 1640, R102 made radio contact with the crew of *Denarius*, and subsequently airlifted all six crewmen safely to Lerwick hospital, where they were treated for minor smoke inhalation and shock before being discharged.

Vessel

Denarius was a 53 year old steel-hulled trawler which had undergone various modifications and repairs.

In 2006 she had been re-engined with a 343kW Mitsubishi S6R2-MPTK engine which replaced an earlier engine fitted in 1990. As part of the installation, a new exhaust section was installed in the engine room, which passed up through the mess deck via an insulated trunking behind the wheelhouse bulkhead. The owners were supplied with Mitsubishi's operation and maintenance manual for the new engine. This was a 79 page, illustrated document giving guidance on its basic operation and maintenance. The manual was stored on board, but was seldom consulted.

Fire-fighting

Denarius's fire-fighting equipment met the requirements of 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* (the 15-24 Code). The equipment consisted of:

- A substantial deck wash pump powered from the main and auxiliary engines.
- A portable salvage pump, which could double as a fire pump, stored in the foc'sle.
- A hand-powered fire pump, which was positioned on the port side deck below the shelter deck.
- A fixed fire-fighting (carbon dioxide) system for the engine room, activated from a position on the port side deck close to the engine room escape hatch.
- A variety of portable extinguishers.

Emergency drills, including fire drills, were a requirement of the 15-24 Code but were seldom carried out on board *Denarius* while she was fishing. However, her crew participated in numerous emergency drills when the vessel was on guard vessel duties, as they had ample time, and they were actively encouraged by SFF Services to do so.

Environment

During the afternoon of 9 July 2012 the wind was north-north-easterly Beaufort force 4. Earlier in the day the wind had been force 6, leaving an associated residual swell.

Crew information

Denarius's skipper was 22 years old and had been the vessel's regular skipper since January 2012. He held a Class 2 (fishing) certificate of competency and had attended Sea Fish Industry Authority (Seafish) 1-day statutory training courses in basic sea survival, fire-fighting, first-aid, and safety awareness and risk assessment. Additionally, he had attended a 5-day advanced fire-fighting and prevention course as part of his training for his certificate of competency. Prior to his brother taking over as driver, he had been *Denarius'*s driver for over a year.

The skipper's 20 year old brother had been the vessel's driver for 2 years. Although he held all of Seafish's statutory certification for fishermen, he had no formal engineering training. However, none was required for a vessel of *Denarius*'s engine power.

In addition to the skipper and driver, *Denarius* carried one other local crewman. He was 20 years old and had sailed on *Denarius* for 1 year, and had previous experience on offshore oil and gas industry standby vessels. He held certificates of equivalent competency to Seafish certification standards. Additionally, he held an STCW[3] certificate of Proficiency in Survival Craft and Rescue Boats.

Denarius carried two Sri Lankan deckhands and one Filipino deckhand. All held either Seafish certification or equivalent certification as required. They had sailed on *Denarius* for between 6 months

[3] STCW – Standards of Training, Certification and Watchkeeping

and 2 years, and had previous fishing experience before joining *Denarius*. All spoke acceptable levels of English.

ANALYSIS

Engine

The bolts **(Figure 2)** securing the fuel injection pump timing coupling had slackened off over a period of time, causing the fuel injection timing to be retarded by approximately 20°. This led to incomplete combustion, enabling unburnt fuel from the cylinders to enter and accumulate within the exhaust system. The symptoms of this were: loss of power, increased exhaust temperature, smoke from the exhaust, vibration and misfiring.

The Mitsubishi S6R2 Operation and Maintenance Manual supplied with the main engine in 2006 made frequent references to the fuel injection pump timing. These included a requirement for the injection timing to be checked and adjusted every 2000 running hours. The manual also explained in relatively simple terms how to complete these and other necessary checks and adjustments **(Figure 3)**.

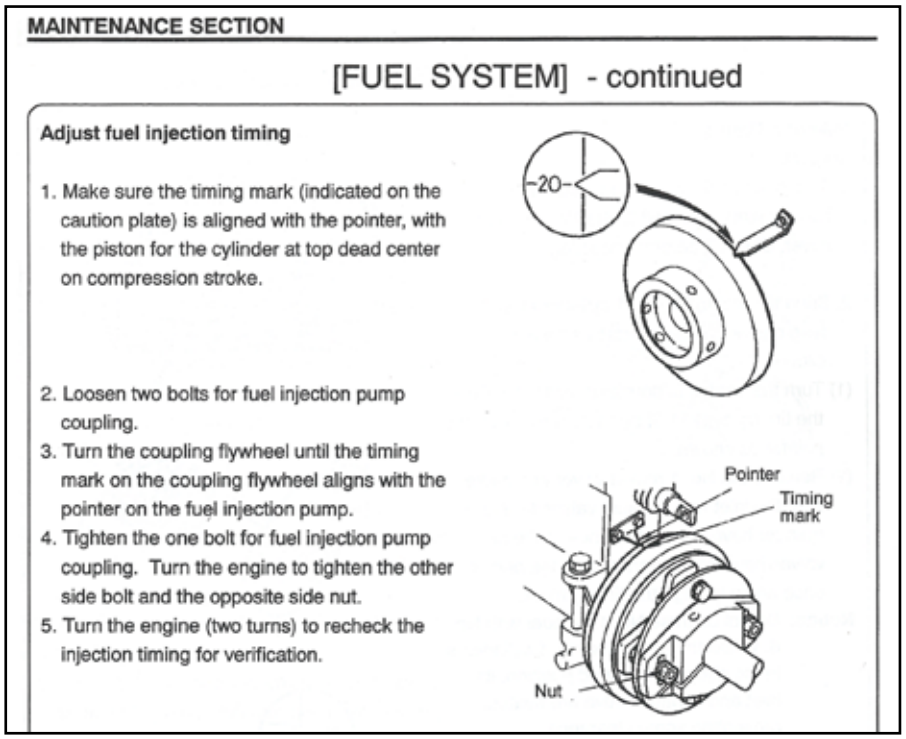


Figure 3: Engine Operations Manual section regarding fuel injection pump timing adjustment

In July 2010 the fuel injection pump had been replaced; this was the last known occasion that the timing had been checked and set. Since that time the engine had run a further 9000 hours, approximately 7000 hours beyond the recommended period between checks of the injection timing.

Had the manufacturer's guidance regarding the injection pump timing been followed, the coupling bolts would have been examined regularly. This would have reduced the likelihood of the bolts slackening off unnoticed and would have familiarised the driver with the coupling arrangement.

Denarius's operators had seldom looked at the Mitsubishi S6R2 Operation and Maintenance Manual, preferring to contact shore engineers by satellite telephone for diagnosis and advice on non-routine issues. The availability and ease of satellite telephony facilitates this type of technical support, but the verbal information given can be difficult to assimilate in comparison with that provided by the illustrated manufacturers' manuals. Furthermore, such advice tends to be topic-specific, whereas the act of reading through manuals also gives additional general knowledge which can prove useful in the future. Had *Denarius*'s crew consulted the troubleshooting section of the Operation and Maintenance Manual when the engine fault first manifested itself at 0950, they would have noted the following relevant symptoms and remedial actions:

Engine lacks power: fuel injection timing incorrect – Readjust

White or blue exhaust smoke: fuel injection timing incorrect – Readjust

Black or gray exhaust smoke: fuel injection timing incorrect – Readjust [sic]

This would have enabled them to quickly identify the source of the problem. The decision to continue running the engine after the timing had slipped caused the nuts to slacken further, until the point they dropped off the bolts. It is almost certain that when the fault first occurred, one or both nuts would still have been in place. At that time it would have

been relatively simple to follow the instructions in the manual for adjusting and tightening the fuel injection pump coupling.

After the fault was diagnosed, the crew were unable to find the fuel injection pump drive coupling nuts or any suitable replacements. There were a number of possible means by which they could have temporarily secured this coupling, such as utilising fasteners from another piece of machinery on board. However, they chose to restart the engine as it was, demonstrating a limited understanding of basic engineering and little recognition of the risks incurred.

Having arranged to take a tow back to port, and in the knowledge that the tow vessel was en-route, the decision to continue running the engine to close the gap between the two vessels, to avoid the perceived danger of laying NUC, was an error of judgment. Although it would have been difficult to foresee the consequential fire, prolonged running of the mistimed engine would have eventually caused significant mechanical damage, resulting in unplanned downtime and lost revenue.

There was no requirement for any of the crew on fishing vessels with main engines of less than 750 kW, such as *Denarius,* to undergo engineering training. However, Seafish did offer free, non-mandatory, training in the form of a Maritime and Coastguard Agency approved 5-day diesel engine course. None of *Denarius*'s crew had attended this course.

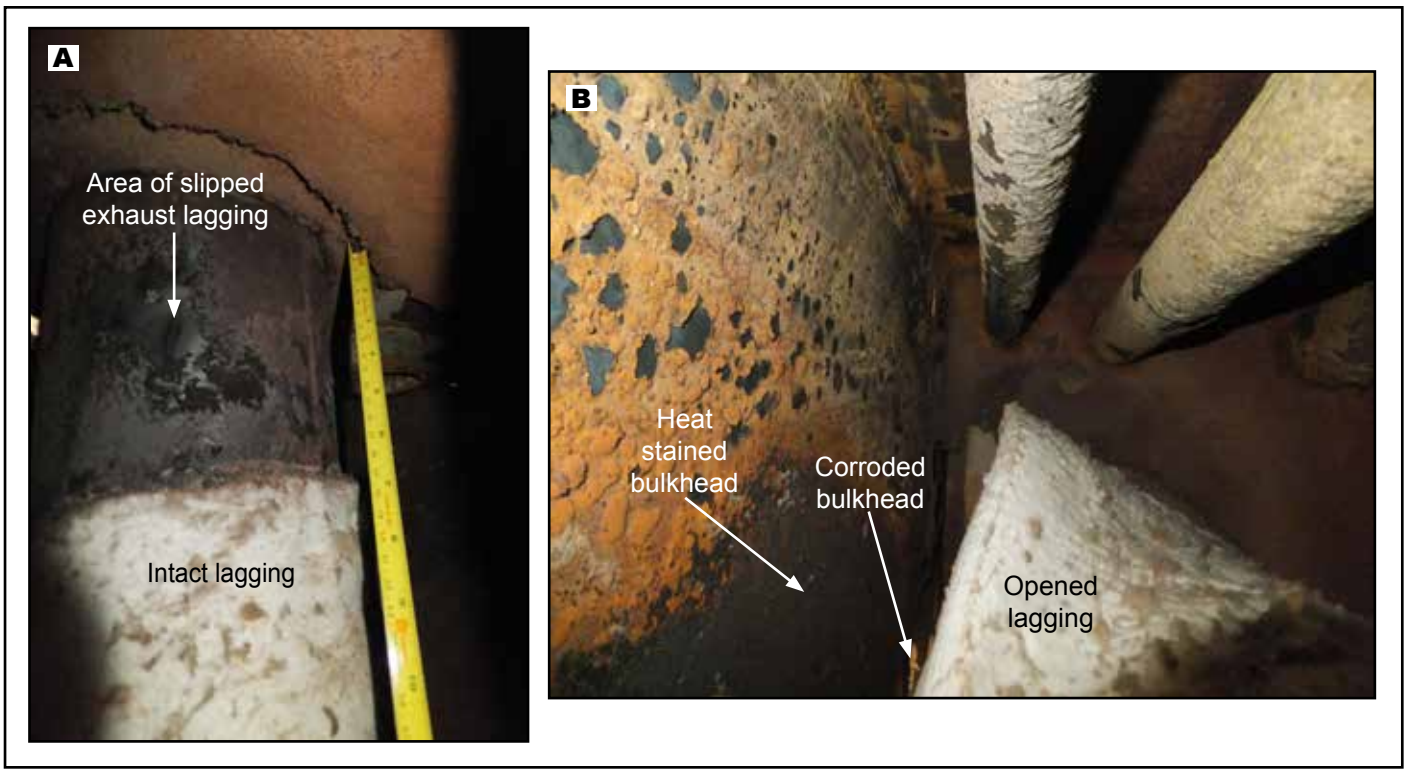
Fire

The prolonged running of the engine with retarded timing caused fuel to accumulate in the exhaust system. Some of this fuel burnt explosively, and as these explosions within the exhaust system increased in frequency and violence, the temperature within the exhaust system also increased, leading to the turbocharger casing glowing cherry red[4]. Heat higher up in the exhaust could have been exacerbated by accumulated carbon deposits also igniting. This heat was transferred through the bulkhead into the wheelhouse by both: convection, through a corroded bulkhead **(Figure 4)**; and radiation, from the upper exhaust trunking where the lagging had slipped over time to leave a 170mm gap **(Figure 5)** that coincided with an area where the mineral board insulation forward of the bulkhead had degraded.

Figures 4a, 4b and **4c:** Showing corroded bulkhead damage

Directly forward of the exhaust trunking in the wheelhouse was a main electrical distribution box **(Figure 6)**. The insulation covering electrical cables to and from this is most likely to have been the starting point of the subsequent fire, with the

[4] for cast steel to glow cherry red would require a sustained temperature of 815°C.



Figures 5a and **5b:** Inside exhaust trunking looking towards deckhead; lagging opened up, heat stained bulkhead and corrosion damage

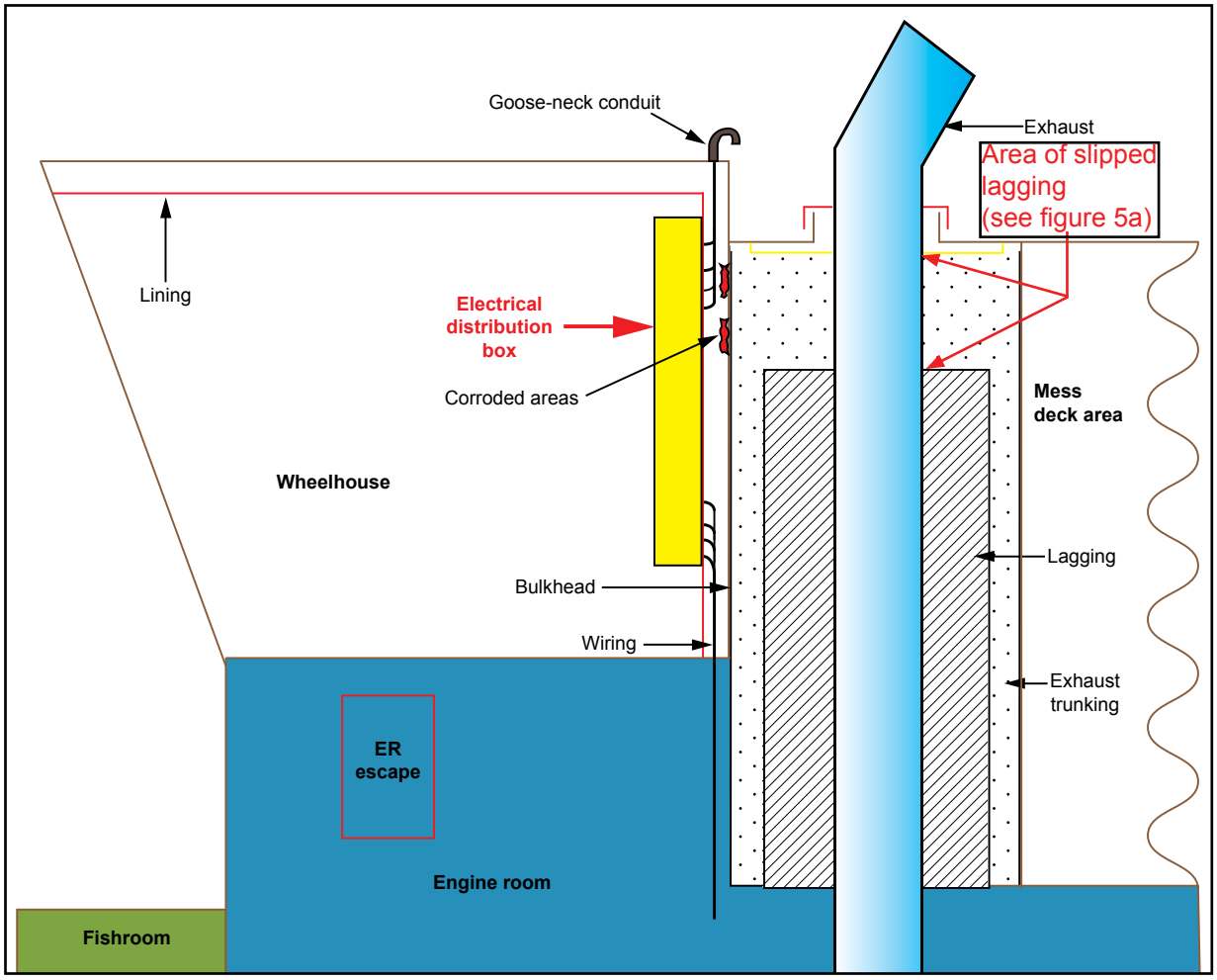


Figure 6: Diagrammatic profile of wheelhose and exhaust trunking areas

carbonaceous material in the wheelhouse linings providing further fuel. When the engine was finally shut down, the exhaust temperature remained high, indicating there was still sufficient fuel within the exhaust system to keep a fire burning, maintaining a heat source to the fire at the back of the electrical distribution box.

The wheelhouse bulkhead was corroded through in places close to the deckhead, probably as a consequence of sea water acting on the steel deckhead, aggravated by heat from the exhaust. Once the deckhead was perforated in this area, water was able to seep into the exhaust lagging, where it would be boiled off as steam that subsequently condensed onto and corroded other internal steel surfaces. This would have been difficult to detect since typically the only obvious symptom is a brief smell of damp lagging drying when starting the engine from cold. When deckhead repairs were carried out on *Denarius*, they did not include the corroded areas inside the exhaust trunking and the bulkhead, which had probably been deteriorating undetected since the vessel's last major modification 22 years earlier. In this case, water and steam had also probably led to degradation of the mineral board insulation forward of the bulkhead, which then provided a direct path for excessive heat from the exhaust to act upon the electrical insulation.

Emergency Response

Communications

Throughout the day *Denarius*'s skipper was in contact with various parties, in particular the owner, by satellite telephone. Between the first detection of smoke within the wheelhouse and the subsequent deckhouse evacuation some 15 minutes later, the skipper made two calls to the owner. However, no communication was made with the coastguard. Had the skipper contacted the coastguard at the first sign of smoke, SAR helicopter R102 could have been recalled from its training exercise and prepared for further deployment. Furthermore, early radio communications with the coastguard would have reduced *Denarius*'s crew's dependency on their EPIRB for alerting the coastguard.

Fire and smoke containment

No flames were seen prior to the smoke build up which forced evacuation of the wheelhouse and accommodation spaces. However, notwithstanding the fire-fighting training and emergency drills that the crew had taken part in, several doors and hatches in the accommodation were left open **(Figure 1)**. Additionally, the starboard shelter deck weathertight doors had been left open following cleaning of the vessel earlier that day, and as was common practice in good weather, with the engine room emergency escape on the port side deck also left open to provide additional ventilation. Not only does the practice of leaving doors and hatches open at sea endanger a vessel through the more common risk of flooding, but it also significantly increases the speed of fire spread. Although closing the doors might not have starved the fire of oxygen sufficiently to put it out, it would certainly have increased the time before flashover and delayed the spread to other spaces, thereby providing a safer environment for longer.

However, even though the crew were faced with an increasingly perilous situation, it is commendable that, when collecting the liferafts from their stowage, they had the presence of mind to recognise the hazard posed by the adjacent propane gas bottles stored above the seat of the fire and removed them to the quarterdeck.

Fire-fighting

The seat of the fire was behind panelling, which would have needed to be removed before extinguishers could be used effectively. However, the removal of the panelling could have been counterproductive, by allowing more air to feed the fire, thereby exacerbating the situation.

Vessels of less than 24m are not required to carry breathing apparatus, and any attempt at fighting the fire effectively on board *Denarius* would have required such equipment. In the absence of breathing apparatus, the only viable action available was external boundary cooling, which would also have required a good supply of water. However, *Denarius*'s engine-driven water pumps were disabled due to the engines being stopped, eliminating the opportunity for boundary cooling in the area where the engine exhaust exited the deckhouse, immediately above the source of the fire **(Figure 7)**.

Denarius was equipped with a portable salvage pump, stored in her foc'sle, which could have been set up as a fire pump. However, it would have taken valuable time to prepare this, and the crew

would have needed to position it to draw suction from the sea while also allowing the exhaust to vent to atmosphere outside the vessel.

Figures 7: Exhaust exit from deckhouse deckhead

There was also a hand-powered fire pump and hose on the port side shelter deck. However, due to the risk of the fire spreading, it would have been dangerous to put someone into the enclosed space to manually operate that pump.

Abandonment

When the smoke in the wheelhouse intensified, the skipper had no hesitation in ordering his crew onto deck to make preparations for abandonment. This decision, taken at an early stage of the escalating situation, was paramount to the successful abandonment of *Denarius.*

As a result of a crewman bravely going aft along the shelter deck and down onto the main deck to retrieve the thermal floatation suits and lifejackets, the crew were suitably attired prior to abandonment. This would have greatly enhanced their chances of survival if they had been forced to enter the water. However, the opportunity to close the aft weathertight door, having retrieved the equipment, was missed.

The skipper's actions of going to the cabin below decks to collect pyrotechnics and warm clothing might have placed him in danger, but his presence of mind to take the portable radio and EPIRB undoubtedly gave the crew the best possible chance of being rescued, especially since the coastguard had not been alerted. However, there was ample room for pyrotechnic storage above decks on *Denarius*. Had the flares been stowed in such an area, they would have been more readily available in an emergency and thus avoided the need for anyone to go below decks. Additionally, there were quantities of pyrotechnics in each liferaft.

After launching the liferafts the crew had some difficulty pulling them alongside *Denarius* due to the resistance created by the water ballast pockets and the drogues, which were packed in such a way that they deployed upon raft inflation. This is done to ensure that liferafts deploying automatically from a sinking vessel remain in the vicinity to give swimmers the best possible chance of reaching them. Seafarers should bear in mind that, in the event of manual launching, they should keep the painter line as short as practicable, thus reducing the distance a deployed drogue would have to be pulled through the water to bring the raft alongside.

The crew of *Denarius* stayed with the vessel as long as was reasonably safe to do so, even though the skipper had to prevent some from premature abandonment. The final abandonment to two liferafts with appropriate life-saving appliances was well carried out and indicative of effective training, drills and leadership.

CONCLUSIONS

- The fire started on *Denarius* as a result of the main engine being run with severely retarded timing for a period of almost 5 hours. This caused unburnt fuel to accumulate in the exhaust system, where it burned with increasing regularity and violence, eventually resulting in fire and extreme heat.

- Excessive temperatures within the exhaust were transmitted to electrical wiring insulation as a result of an un-lagged area on the exhaust and perforated bulkheads resulting from corrosive degradation over a period of almost 22 years.
- The main engine's fuel injection pump timing had not been inspected and maintained as per the manufacturer's operation and maintenance manual. Had the manufacturer's guidance regarding the injection pump timing been followed, the coupling bolts would have been regularly examined and it is less unlikely that they would have been able to slacken off unnoticed.
- The crew did not have the technical competence to diagnose or rectify the fuel injection pump timing problem, and did not foresee the potential consequences of continuing to run the malfunctioning engine.
- Weathertight doors were regularly left open, and in their haste to evacuate the deckhouse area, the crew left other doors and hatches open, allowing the smoke and fire to spread quickly through the vessel.
- Pyrotechnics were not stowed in a readily available place on board.
- The coastguard was not alerted to the situation or contacted at any point.
- The abandonment was carried out successfully as a result of effective training, emergency drills and leadership.

ACTIONS TAKEN

The owner of *Denarius* has:

- Stowed pyrotechnics and emergency radios on board its replacement vessel in a readily accessible position by the wheelhouse door.
- Implemented a strict regime of monthly EPIRB testing.
- Enrolled its replacement vessel and crew onto the Scottish Fishermen's Federation's *Onboard Support Scheme* for safety management.

Other actions already in hand, but not as a direct consequence of this accident:

- The Maritime and Coastguard Agency (MCA) has improved its survey regime to ensure that drills are observed during fishing vessel surveys.
- Seafish actively promotes a free of charge, non-mandatory, 5 day MCA-approved diesel engine course for vessels that do not require engineering certificates of competency.
- The Scottish Fishermen's Federation has commenced offering an Onboard Support Scheme to assist with, and enhance, member vessels' safety management. This includes a vessel visit by the SFF Marine Safety and Training Officer to assist skippers and crews complete online risk assessment for their vessel.

Recommendations

MB Denarius BF 804 LLP is recommended to:

2013/202 Ensure the lessons learned from this accident are applied to its replacement vessel, and all future vessels it may own, and in particular:

- That engine manufacturers' maintenance instructions are understood and complied with.
- That fire drills include the methods and benefits of smoke and fire containment.
- That its "drivers" attend the Seafish 5 day diesel engine course.

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

SHIP PARTICULARS

Vessel's name	*Denarius*
Flag	UK
Classification society	Not applicable
Fishing numbers	BF 804
Type	Twin rig trawler
Registered owner	MB Denarius BF 804 LLP
Manager(s)	MB Denarius BF 804 LLP
Construction	Steel
Length overall	22.4m
Registered length	20.70m
Gross tonnage	113
Minimum safe manning	Not applicable
Authorised cargo	Not applicable

VOYAGE PARTICULARS

Port of departure	Fraserburgh
Port of arrival	Macduff
Type of voyage	Offshore oil and gas industry guard vessel
Cargo information	Not applicable
Manning	6

MARINE CASUALTY INFORMATION

Date and time	9 July 2012 at 1530
Type of marine casualty or incident	Very Serious Marine Casualty
Location of incident	83 miles NNE of Kinnaird Head
Place on board	Complete vessel
Injuries/fatalities	None
Damage/environmental impact	Constructive total loss
Ship operation	Offshore oil and gas guard vessel
Voyage segment	Mid water
External & internal environment	Beaufort Force 4
Persons on board	6