



INVESTIGATED BY THE MAIB ON BEHALF OF THE CAYMAN ISLANDS GOVERNMENT

Report on the investigation of
a fall from height on the bulk carrier

Equinox Seas

resulting in one fatality

at ONEX Syros Shipyard, Ermoupoli, Syros, Greece

on 17 April 2023



This investigation was carried out by the UK Marine Accident Investigation Branch (MAIB) on behalf of the Cayman Islands Government in accordance with the Memorandum of Understanding between the MAIB and the Red Ensign Group Category 1 registries of Isle of Man, Cayman Islands, Bermuda and Gibraltar.

Extract from

**The Cayman Islands Merchant Shipping
(Marine Casualty Reporting and Investigation)**

Regulations, 2018 – Regulation 4:

“The sole objective of a marine safety investigation into an accident under these Regulations shall be the prevention of future accidents through the ascertainment of its causes and circumstances. It is not the purpose of a marine safety 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 22 of The Cayman Islands Merchant Shipping (Marine Casualty Reporting and Investigation) Regulations, 2018, shall be inadmissible in any judicial proceedings whose purpose, or one of whose purposes, is to attribute or apportion liability or blame.

All MAIB publications can be found on our website: www.gov.uk/maib

For all enquiries:

Marine Accident Investigation Branch
First Floor, Spring Place
105 Commercial Road
Southampton
SO15 1GH
United Kingdom

Maritime Authority of the Cayman Islands
Breezy Castle Unit 1
125 Owen Roberts Drive
P.O. Box 2256
Grand Cayman KY1-1107
www.cishipping.com/contact-us

Email: maib@dft.gov.uk

Telephone: +44 (0)23 8039 5500

Press enquiries during office hours: +44 (0)1932 440015

Press enquiries out of hours: +44 (0)300 7777878

© Crown copyright, 2024

You may re-use this document/publication (not including departmental or agency logos) free of charge in any format or medium. You must re-use it accurately and not in a misleading context. The material must be acknowledged as Crown copyright and you must give the title of the source publication. Where we have identified any third party copyright material you will need to obtain permission from the copyright holders concerned.

CONTENTS

GLOSSARY OF ABBREVIATIONS AND ACRONYMS

SYNOPSIS

1

SECTION 1 – FACTUAL INFORMATION

2

1.1	Particulars of <i>Equinox Seas</i>	2
1.2	Background	3
1.3	Narrative	3
1.4	Environmental conditions	5
1.5	<i>Equinox Seas</i>	5
1.5.1	General	5
1.5.2	Crew	5
1.5.3	The fitter	5
1.5.4	Engine room ventilation system	6
1.5.5	Shipyard work	9
1.6	Equinox Maritime	14
1.6.1	General	14
1.6.2	Safety management system	14
1.7	ONEX Syros Shipyards S.A.	16
1.7.1	General	16
1.8	Regulation and guidance	16
1.8.1	Regulation in a shipyard environment – ships not in operation	16
1.8.2	Regulation in a shipyard environment – ships in operation	16
1.8.3	The Code of Safe Working Practices for Merchant Seafarers	18
1.8.4	Guidance on the management of safety in shipyards	19
1.8.5	Signage and barriers	21
1.9	Previous accidents	22
1.9.1	<i>BW Havfrost</i> – fall from height	22
1.9.2	<i>Seatruck Pace</i> – fall from height	22

SECTION 2 – ANALYSIS

23

2.1	Aim	23
2.2	Overview	23
2.3	Fatigue	23
2.4	The accident	23
2.4.1	Entry into the fan room	23
2.4.2	The fall	24
2.4.3	Cause of death	24
2.4.4	Emergency response	24
2.5	The ventilation fan removal	24
2.5.1	Specific risks	24
2.5.2	Barrier controls	25
2.6	Shipboard safety management	26
2.6.1	Shipyard environment	26
2.6.2	Management of safety on board <i>Equinox Seas</i> in the shipyard	26
2.6.3	Communication and coordination	26
2.6.4	Crew management	27

2.7	Guidance and regulation	27
2.7.1	Guidance to shipyards	27
2.7.2	The Code of Safe Working Practices for Merchant Seafarers	27
2.7.3	The Oil Companies International Marine Forum	28
2.7.4	Guidance to masters	28

SECTION 3 – CONCLUSIONS **29**

3.1	Safety issues directly contributing to the accident that have been addressed or resulted in recommendations	29
3.2	Other safety issues directly contributing to the accident	29
3.3	Safety issues not directly contributing to the accident that have been addressed or resulted in recommendations	29
3.4	Other safety issues not directly contributing to the accident	29

SECTION 4 – ACTIONS TAKEN **30**

4.1	Actions taken by other organisations	30
-----	--------------------------------------	----

SECTION 5 – RECOMMENDATIONS **31**

FIGURES

Figure 1: Access to the starboard engine room ventilation fan room

Figure 2: *Equinox Seas* general arrangement

Figure 3: Starboard engine room ventilation duct arrangement

Figure 4: Starboard engine room fan pedestal fire damper

Figure 5: Starboard ventilation trunk internal structure, looking up from the access cover

Figure 6: Disconnected fire damper actuator

Figure 7: Painting work on the starboard fan room, showing the areas of red and pink primer paint applied by the deck crew

Figure 8: Starboard engine room fan unit awaiting replacement on board

Figure 9: Barrier tape across the fan room access

Figure 10: Pallet on the fan pedestal in the position it was reported to have been found

GLOSSARY OF ABBREVIATIONS AND ACRONYMS

°	-	degrees
°C	-	degrees Celsius
3/O	-	third officer
AIBN	-	Accident Investigation Board Norway
C/E	-	chief engineer
C/O	-	chief officer
cm	-	centimetre
COSWP	-	Code of Safe Working Practices for Merchant Seafarers
DOC	-	Document of Compliance
EEST	-	Eastern European Summer Time
EU	-	European Union
ILO	-	International Labour Organization
ISM Code	-	The International Management Code for the Safe Operation of Ships and for Pollution Prevention
kg	-	kilogramme
kW	-	kilowatts
LOTO	-	Lock-out, tag-out
m	-	metres
MGN	-	Marine Guidance Note
MLC	-	Maritime Labour Convention
mm	-	millimetre
nm	-	nautical mile
OCIMF	-	Oil Companies International Marine Forum
PPE	-	personal protective equipment
SMS	-	safety management system
SOLAS	-	International Convention for the Safety of Life at Sea, 1974 as amended
UK	-	United Kingdom
UTC	-	universal time coordinated
VHF	-	very high frequency

: All times in this report are Eastern European Summer Time (EEST) – universal time coordinated (UTC)+3.



Equinox Seas

SYNOPSIS

On 25 March 2023, the Cayman Islands registered bulk carrier *Equinox Seas* arrived at the ONEX Syros Shipyards S.A. facility on the island of Syros, approximately 50 nautical miles south-east of Athens, Greece for a period of scheduled maintenance.

On 17 April 2023, a fitter on board *Equinox Seas* entered the fan room on the starboard side of the ship's funnel, where an engine room fan had been removed. The fitter fell 10m down the open ventilation trunk to the engine room below. The fitter was recovered from the base of the ventilation trunk and moved to a local hospital, where he died from his injuries.

The investigation concluded that:

- The fitter passed a tape barrier placed across the entrance to the fan room access by the shipyard, possibly due to a reduction in alertness due to the time of day the accident occurred.
- The response to the accident by all the organisations involved was both timely and effective.
- The management of safety on board *Equinox Seas* in a ship repair setting, and the coordination of activities, was poor.
- Guidance on the management of safety on board ships in a ship repair facility was either unavailable or not widely promulgated, and the responsibility for safety was poorly understood.

Following the accident, the ship's management company, Equinox Maritime Ltd, amended its safety management system to address risks arising in a shipyard environment. The Maritime and Coastguard Agency initiated a work item to consider amendments to the Code of Safe Working Practices for Merchant Seafarers to highlight the raised level of risk awareness required while a ship is undergoing repair.

A recommendation has been made to ONEX Syros Shipyards S.A. to update its safety management system to ensure that risks created by the work carried out by its workers are effectively managed and coordinated with a ship's crew and that the responsibility for safety is clearly understood between all parties.

SECTION 1 – FACTUAL INFORMATION

1.1 PARTICULARS OF *EQUINOX SEAS*

SHIP PARTICULARS	
Vessel's name	<i>Equinox Seas</i>
Flag	Cayman Islands
Classification society	American Bureau of Shipping
IMO number/fishing numbers	9229697
Type	Bulk carrier
Registered owner	Equinox Seas Ltd
Manager(s)	Equinox Maritime Ltd
Construction	Steel
Year of build	2003
Length overall	189.99m
Registered length	182.61m
Gross tonnage	30,049
Minimum safe manning	14
Authorised cargo	Dry cargo in bulk

VOYAGE PARTICULARS	
Port of departure	Not applicable
Port of arrival	Not applicable
Type of voyage	Alongside at Ermoupoli, Syros, Greece
Cargo information	None
Manning	26

MARINE CASUALTY INFORMATION	
Date and time	17 April 2023 at 1350 (UTC +3)
Type of marine casualty or incident	Very Serious Marine Casualty
Location of incident	Ermoupoli, Syros, Greece
Place on board	Engine room
Injuries/fatalities	1 fatality
Damage/environmental impact	None
Ship operation	Undergoing maintenance
Voyage segment	Alongside
External & internal environment	Light airs, air temperature 20°C
Persons on board	26 crew, plus shore workers

1.2 BACKGROUND

On 24 March 2023, the Cayman Islands registered bulk carrier *Equinox Seas* arrived at the ONEX Syros Shipyards S.A. facility (the shipyard) on the island of Syros, Greece for scheduled maintenance. On 13 April 2023, after an initial period out of the water in one of the shipyard's floating docks, the ship moved to the eastern berth within the shipyard's perimeter for completion of the work being carried out on board.

Although *Equinox Seas* was operating under its own power at the time of the accident, the shipyard work had not been completed.

1.3 NARRATIVE

At about 0730 on 17 April 2023, *Equinox Seas*' chief engineer (C/E) conducted a toolbox talk where the crew, including the two fitters, were instructed to clean and tidy the ship in preparation for departure from the shipyard. It was a public holiday in Greece and no on board work by the shipyard was planned for the day.

At 1300, the two fitters¹ from *Equinox Seas*' crew met at the workshop on the aft mooring deck. After a period in the workshop they went to the fan room on the starboard side of the second deck to check the remaining shipyard work. The access into the fan room (**Figure 1**) was open. At about 1350, one fitter had turned away to make their way back to the workshop when they heard a scream behind them. Turning back to the fan room, the fitter's colleague was not in sight. The fitter surmised that their colleague had fallen into the fan pedestal and down the ventilation trunk leading to the engine room.

The fitter quickly made their way down to the main deck, where they met the bosun and relayed what had happened. The bosun used their handheld very high frequency (VHF) radio to raise the alarm, saying that the fitter had *fallen down the fan*.

Equinox Seas' master and C/E were in the ship's conference room meeting the ship's agent when they heard the bosun's VHF call. They both made their way to the fan room.

The VHF radio call from the bosun was also heard by the chief officer (C/O) who, in turn used their own VHF radio to call the third officer (3/O) and instruct them to sound the general emergency alarm. The 3/O went to the bridge and sounded the alarm before using the ship's public address system to inform the crew of the location of the accident.

A fire and safety watchman employed by the shipyard was on board *Equinox Seas*. When the general emergency alarm sounded, the watchman made a phone call to the shipyard's main gatehouse to request emergency assistance. The security guards at the gatehouse then called the emergency services² on the island.

¹ A skilled member of the ship's crew who completes mechanical maintenance on board.

² Emergency medical support in Greece was provided by EKAB (Εθνικό Κέντρο Άμεσης Βοήθειας) the national medical emergency service.

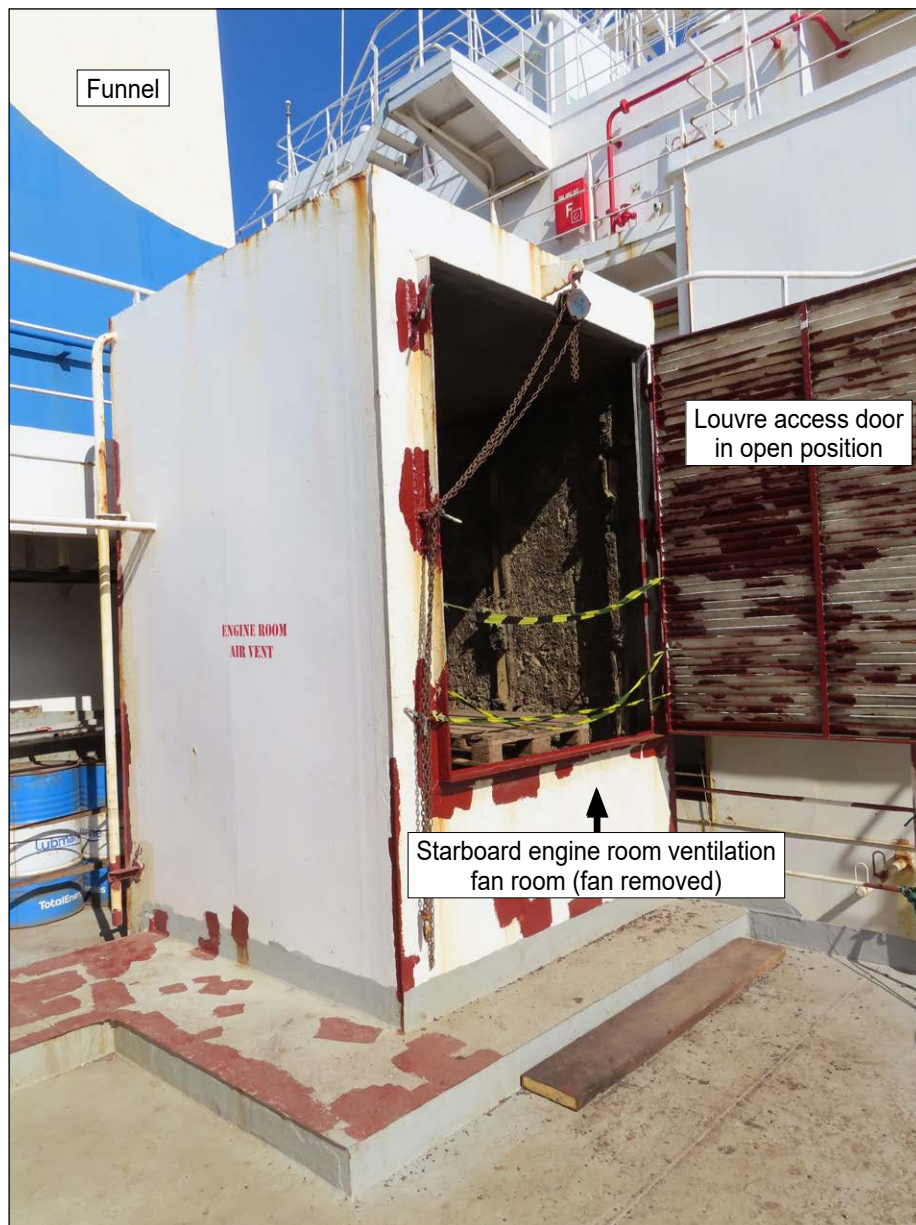


Figure 1: Access to the starboard engine room ventilation fan room

When the master and C/E arrived at the fan room no-one was visible, so they made their way down to the engine room. The C/E identified the access to the trunk leading from the fan room inside the entrance to the storeroom on the first platform deck. Listening at the access cover, they could hear the fallen fitter groaning inside. Crew members arrived at the scene in response to the announcement on the public address system and, with the assistance of a technician who was working on board, they started to unbolt the ventilation trunk access cover.

The master returned to the conference room and asked the ship's agent to contact the emergency services, then went back to the engine room. The agent called the main gatehouse with a second request for help, unaware of the earlier call made by the fire and safety watchman.

At 1405, an ambulance from the nearby hospital arrived at the shipyard gate and was directed to the berth where *Equinox Seas* was moored.

By 1412, the access cover to the ventilation trunk had been removed and the crew could see the fallen fitter in the plenum chamber³ at the base of the ventilation trunk. He was in an inverted position with his head and shoulders in the entrance of one of the distribution ducts leading from the plenum chamber. He was conscious, though clearly seriously injured.

Two crew from *Equinox Seas* entered the trunk and reassured the injured fitter. At 1416, the ambulance crew arrived at the entrance to the trunk, guided by three shipyard fire and safety watchmen.

At 1425, the fitter was secured to a rigid stretcher and then extracted from the ventilation trunk through the access opening from where he was taken to *Equinox Seas*' main deck and lifted off the ship by shore crane to the waiting ambulance. At 1434, the ambulance departed and transferred the fitter to Syros hospital where he received medical treatment. At 1847, the fitter was pronounced deceased.

1.4 ENVIRONMENTAL CONDITIONS

The weather on 17 April 2023 was fine and clear with an air temperature of 20°C. The decks of *Equinox Seas* were dry.

1.5 EQUINOX SEAS

1.5.1 General

Equinox Seas was a 30,049 gross tonnage geared bulk carrier built in 2003 and operated by Equinox Maritime Ltd (Equinox Maritime). It was registered in the Cayman Islands and was appropriately certified for operation.

1.5.2 Crew

Equinox Seas' crew hailed from four different nations and the on board working language was English. The composition and certification of the crew was in accordance with the requirements of the Cayman Islands.

The master was in overall command of the ship while it was in operation. Maintenance of the ship was managed by the C/O and C/E. The deck crew, who completed general maintenance on deck and carried out watchkeeping operations, reported to the C/O via the bosun. The engine crew worked under the direction of the C/E on matters related to engineering, watchkeeping and maintenance.

The two fitters on board were part of the engine crew but completed maintenance under the direction of either the C/E or C/O depending on the work to be done.

The C/O was the ship's safety officer.

1.5.3 The fitter

Emmanuel Tayong was a 37-year-old Filipino national who was 1.57m tall. He had joined *Equinox Seas* in the shipyard on 2 April 2023 and had previously worked on *Equinox Star*. He was scheduled to work from 0800 to 1700, with an hour for lunch

³ A housing that contains air at positive pressure and evenly distributes it to outlet ducting.

taken between 1200 and 1300. In the days leading up to 17 April 2023, the records of rest showed that his working hours exceeded those in the published schedule and that he had worked routinely from 0700 to 1800 with an hour for lunch and two short breaks in the morning and afternoon. This working pattern did not breach Maritime Labour Convention (MLC)⁴ rest requirements.

The shipyard work was completed daily between 0800 and 1700. Disturbance was minimal outside these hours, and through the night when the fitter was sleeping.

At the time of the accident the fitter was wearing overalls over undergarments, safety shoes, and work gloves. His left shoe came off during the accident. He was not wearing a safety harness.

The postmortem report, completed in Piraeus, Greece on 21 April 2023, indicated the cause of death as *serious thorax, abdominal and pelvic lesions (reported fall from height)*.

1.5.4 Engine room ventilation system

Equinox Seas had two engine room ventilation fans situated in separate fan rooms either side of the funnel casing on the second deck (**Figure 2**). Each fan was installed within a cowling that was fastened to a pedestal with an internal diameter of 1.20m and a height of 0.79m above the deck level. Within each pedestal was a fire damper that enabled the ventilation trunk to be closed off in the event of a fire.

The starboard fan pedestal sat at the top of a trunk leading vertically down to the engine room. The trunk was 10m long and was of rectangular cross-section, 1.67m wide and 1.60m deep (**Figure 3**).

Image courtesy of Ria Maat ([MarineTraffic.com](https://www.marinetraffic.com))

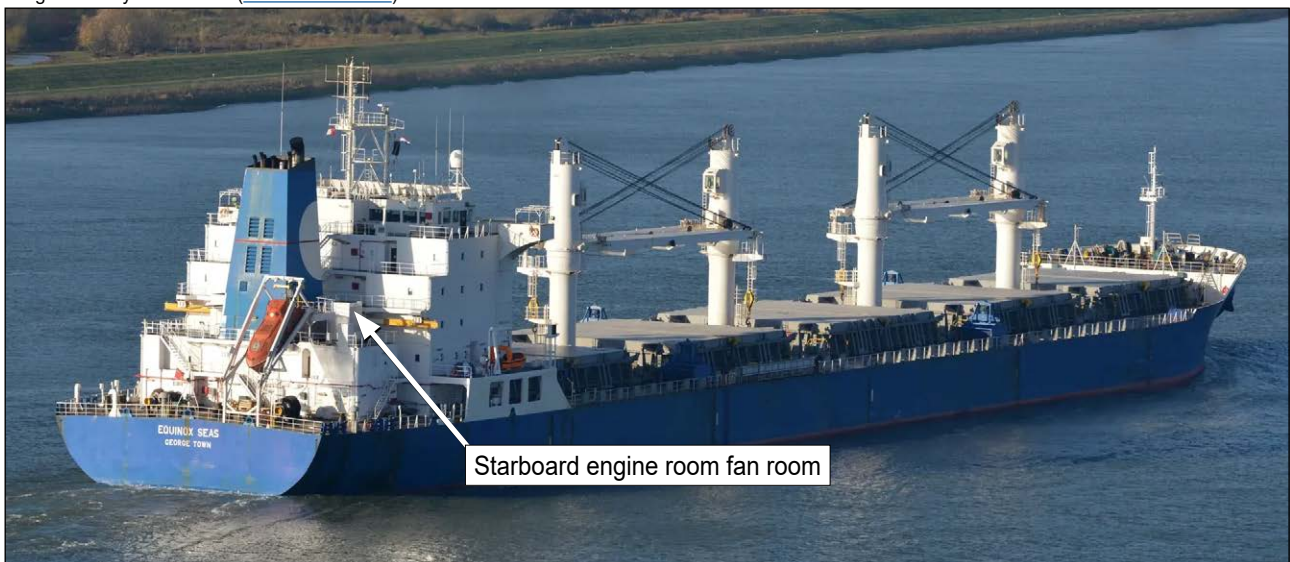


Figure 2: *Equinox Seas* general arrangement

⁴ The Maritime Labour Convention (MLC) was adopted as International Labour Organization (ILO) convention number 186 in 2006.

Image courtesy of [Brodosplit](#)

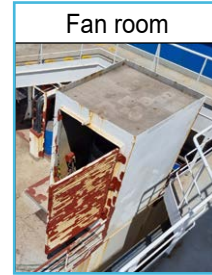
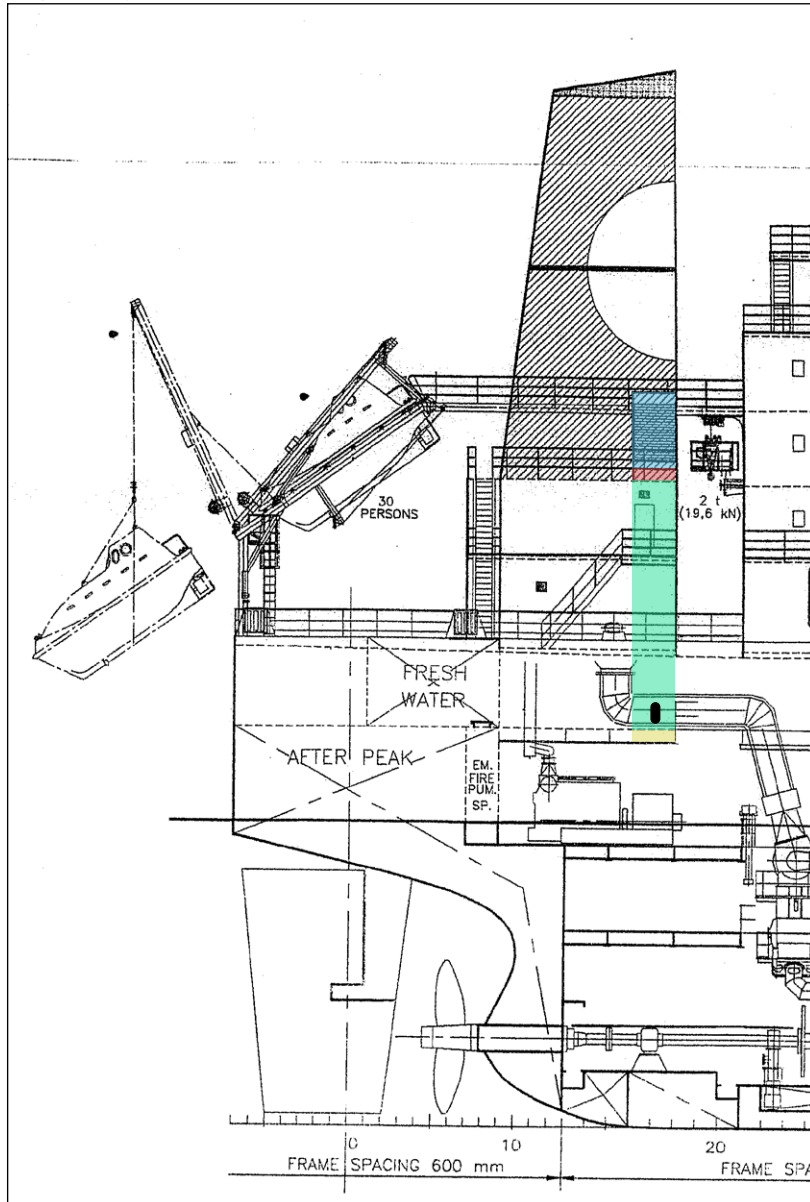


Figure 3: Starboard engine room ventilation duct arrangement

The starboard ventilation trunk fire damper comprised a steel disk pivoted along its central axis, offset by 45° to the centreline of the ship. The damper was designed to rotate by 90° between the open and closed positions. In the closed position, across the airflow, the damper rested against seats set into the pedestal. The aft inboard half of the flap rotated downwards to open the damper (**Figure 4**). An actuator was installed to allow the damper to be operated remotely.

At the base of the ventilation trunk at deckhead level on the second platform deck, a plenum chamber contained three distribution duct outlets that supplied ventilation to the engine room. Ventilation to the engine casing at main deck level and the first platform deck was provided by a series of scoops set into the vertical trunk leading to distribution ducts on those levels. The trunk was fitted with four stay bars of 50mm angle profile, two each at deck one and main deck levels. Internal rungs providing means to ascend the trunk for maintenance were installed up the forward outboard corner (Figure 5).



Figure 4: Starboard engine room fan pedestal fire damper

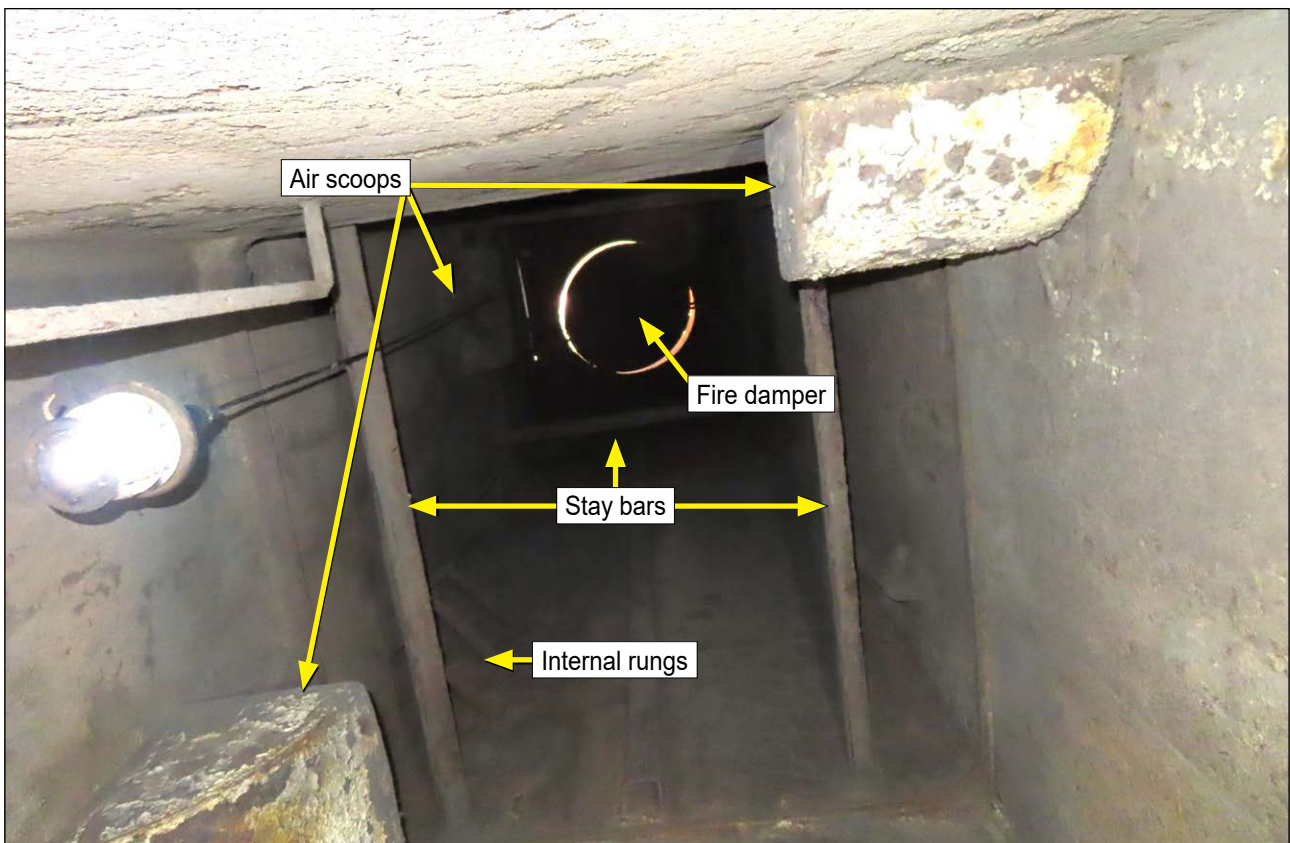


Figure 5: Starboard ventilation trunk internal structure, looking up from the access cover

The fan rooms containing the two ventilation fans were of solid steel construction with louvres installed on the inboard and outboard sides. The outboard louvre assembly was hinged at the forward end, forming a louvred door. Three dogs were provided for securing it in position when closed. The lower sill of the louvre doorframe sat 0.90m above the outside deck level.

1.5.5 Shipyard work

1.5.5.1 General

The specification for the work to be undertaken by the shipyard was drawn up in February 2023 by *Equinox Seas*' technical superintendent in conjunction with the ship's senior officers.

Acting under delegated authority from the technical manager of Equinox Maritime, the technical superintendent directly managed the conduct of the ship repair activities.

The work specification contained a number of general entries related to safety dictated by the shipyard, but none set by Equinox Maritime. The aspects of the work specification related to the individual work items did not contain detail of any safety provisions other than costings for any removals required for access and staging, if necessary.

The general terms of the shipyard contract, appended to the work specification, indicated that the ship's crew was *allowed to carry out routine maintenance work only* and that *a list of work intended to be carried out was to be submitted to yard's management upon arrival for approval* [sic]. No such list of work was submitted to the shipyard.

1.5.5.2 Management of crew activities

The ship's crew remained under the control of the senior officers on board throughout the period *Equinox Seas* was in the shipyard. The master was relieved on 7 April 2023, part-way through the repair period, as a routine change of personnel. The outgoing master was Greek and the incoming master was Turkish. Equinox Maritime retained the outgoing master on board for the remaining period of the dry dock to support the technical superintendent. The outgoing master continued to exercise a degree of control over crew activities, including issuing instructions for cosmetic work being undertaken by the deck crew.

Work planning meetings were routinely held at about 0900 each morning and on completion of each day's work during the period *Equinox Seas* was in the shipyard. The meeting participants included the ship repair manager from the shipyard, the technical superintendent, and the ship's senior officers. These meetings, held predominantly in the Greek language, did not follow a written agenda and were mainly related to the shipyard work being undertaken. No minutes were taken of the content of the meetings other than brief progress notes maintained by the technical superintendent. There was no evidence that safety considerations formed part of the discussions.

Once the change of master had taken place, the outgoing master maintained a presence in the work planning meeting. The new master, the C/E and the C/O could not speak Greek and relied on a verbal account of the meeting contents provided by the superintendent and outgoing master.

1.5.5.3 Engine room ventilation fan work

Among the planned work contained in the specification were two jobs related to the engine room ventilation fans: first, the fan and motor assemblies were to be removed to the shipyard workshop for overhaul and balancing; second, the fire dampers in the fan pedestals were to be inspected and renewed if necessary while the fan assemblies were ashore.

The work on the port engine room fan was completed first. Once this fan had been reinstalled and tested, the starboard fan was removed for overhaul. The fan cowling assembly, including the fan and motor, was removed by staff from the shipyard and taken ashore.

After the removal of the starboard engine room fan, the fire damper actuator at the base of the pedestal was disconnected (**Figure 6**) by *Equinox Seas*' electrician. With the actuator removed, the damper was free to rotate.

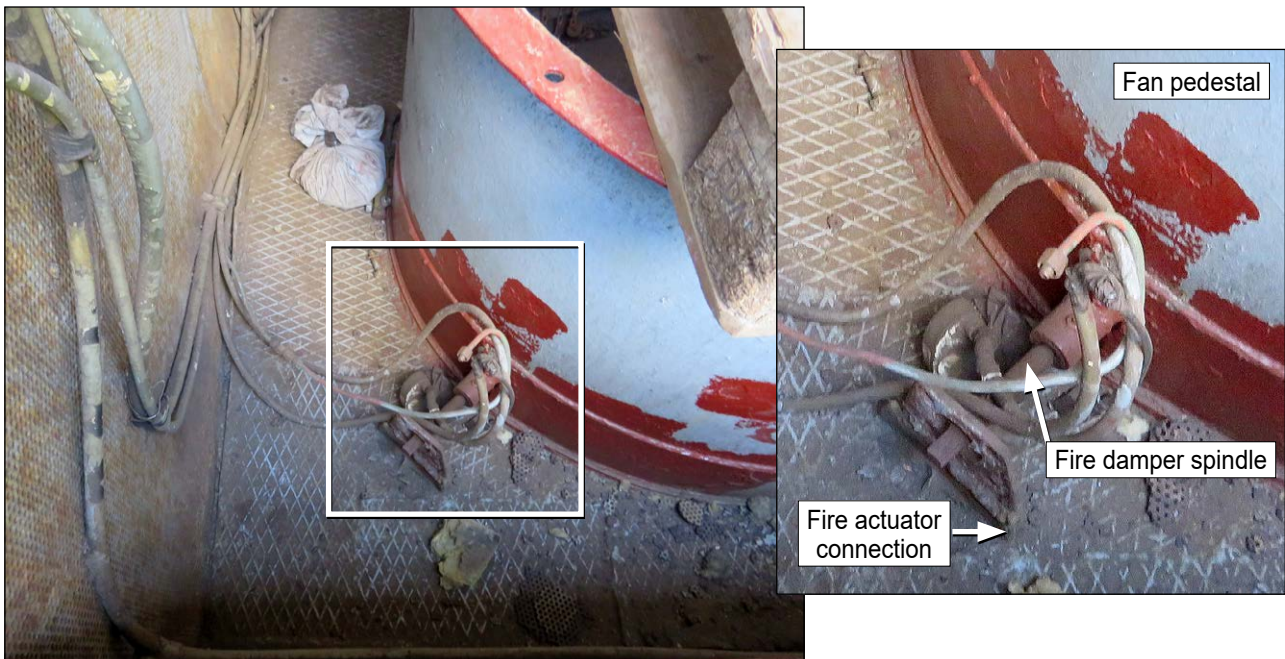


Figure 6: Disconnected fire damper actuator

The removal of the fans enabled access to the rear of the fan room and the ship's deck crew were instructed by the C/O, under the direction of the outgoing master, to scale and paint the fan rooms. In the starboard fan room, the louvres of the fan room air inlets and the fan pedestal were scaled back to a good surface where corroded, and primer paint was applied (**Figure 7**). It was intended that the paintwork would be completed after the installation of the fan.

The starboard fan overhaul (**Figure 8**) was completed before the shipyard ceased work for the public holiday and its reinstatement was planned for 18 April 2023.

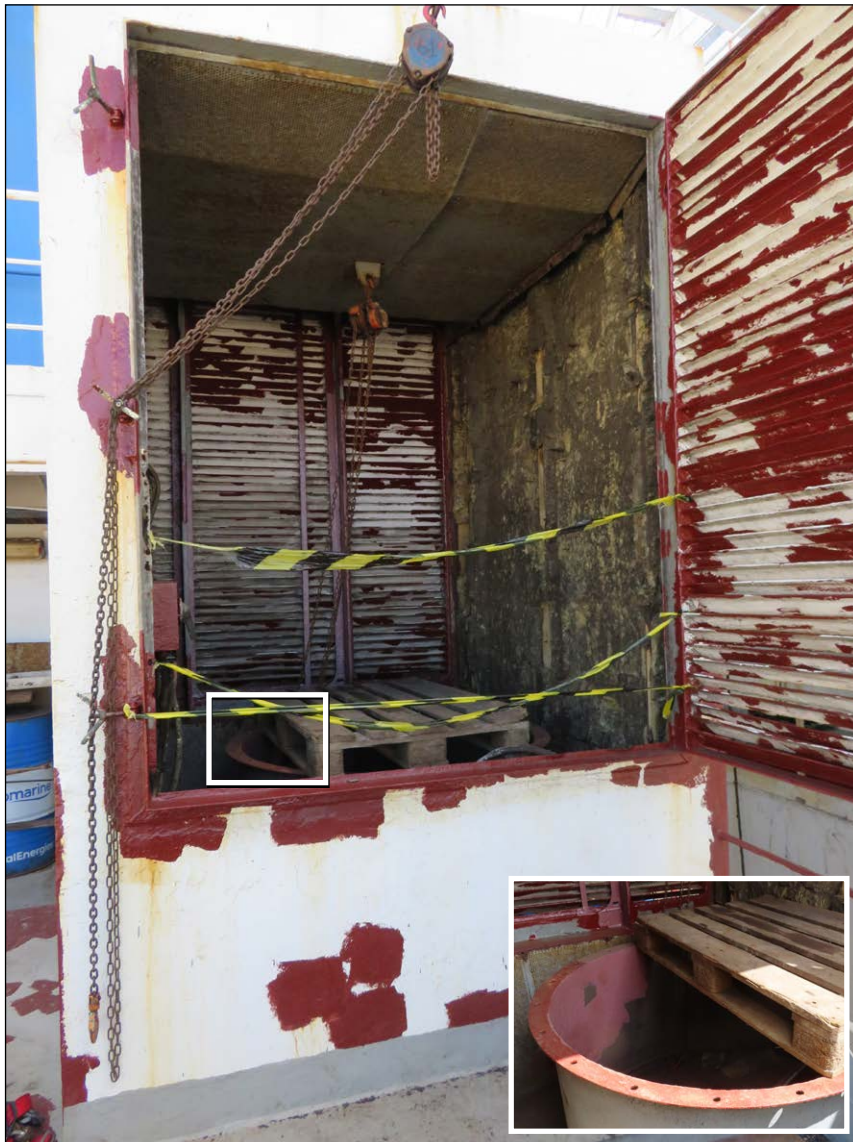


Figure 7: Painting work on the starboard fan room, showing the areas of red and pink primer paint applied by the deck crew



Figure 8: Starboard engine room fan unit awaiting replacement on board

1.5.5.4 Barrier control

Once the starboard fan was removed, the shipyard placed black and yellow striped tape across the entrance to the fan room to restrict access to the space (**Figure 9**). No steps or staging were provided outside the fan room to provide a means of access. There was no additional signage applied to indicate the nature of any hazards in the space.



Figure 9: Barrier tape across the fan room access

A standard wooden pallet⁵ was placed on the top of the pedestal, partially covering the opening. The pallet was not secured and was reported to have been positioned across the forward half of the pedestal opening (**Figure 10**). The length of the pallet was 1.2m, the same as the internal diameter of the pedestal opening.

At the access to *Equinox Seas* from ashore, the shipyard signage indicated generic hazards and those specific to suspended loads and the presence of drops. The signs required safety helmets, boots, gloves, and overalls to be worn.

When the deck crew undertook the painting work in the fan room, no permit for working at height was issued but, under the instruction of the C/O, they wore safety harnesses as fall protection. The deck crew passed beyond the black and yellow tape and used the pallet on top of the pedestal as a platform from which to work.

The electrical supplies to both port and starboard fans came from a common starter panel on the main switchboard. It was not possible to isolate the fans individually at the switchboard and the only electrical isolation conducted was the opening of the local isolation switch in the fan room. No signage was posted on this switch, nor at the starter panel in the switchboard to indicate that the fan motor had been disconnected.



Figure 10: Pallet on the fan pedestal in the position it was reported to have been found

⁵ A standard European pallet weighed approximately 25kg and measured 0.8m in width, 1.2m in length and 0.15m in height.

The electrical safety procedures on board *Equinox Seas* indicated that electrical equipment should be disconnected before undertaking any work and restored on completion. No risk assessment or procedure was made available to the MAIB investigation detailing the shipyard's requirements for electrical safety.

1.6 EQUINOX MARITIME

1.6.1 General

Equinox Maritime was established in 2001 and provided technical ship management services in the dry bulk market from its offices in Athens. The company managed a total of 21 ships, including *Equinox Seas*.

Equinox Maritime had a long-standing relationship with the shipyard and the technical management team was familiar with its capabilities and working practices. In the 3 years before the accident, Equinox Maritime had used the services of the shipyard 21 times.

1.6.2 Safety management system

Equinox Maritime maintained a safety management system (SMS) in compliance with the requirements of the International Management Code for the Safe Operation of Ships and for Pollution Prevention (ISM Code)⁶. The SMS contained procedures for safety critical operations on board, including *working aloft and overside*, and a system for assessing the risk of work activities undertaken by the crew. The SMS had last been externally audited on 30 January 2023. This audit was completed by Lloyd's Register on behalf of the flag Administration for the annual endorsement of the Document of Compliance (DOC)⁷ held by the company.

The SMS required the completion of permits to work for certain tasks to verify that the safety requirements associated with the task were in place. The SMS procedure for safe working practices concerning the risks associated with falls from height⁸ stated that:

Special preparations must be implemented for work in areas where personnel may be exposed to danger by falling down, including safety of personnel passing under such areas. [sic]

To support this procedure, a *work aloft/over side checklist* was provided.

The system that retained the electronic records of the permits issued on board *Equinox Seas* showed that permits to work were being routinely issued before the ship's arrival at Syros, the most recent permit to work at height having been issued on 22 March 2023. No permits had been issued while *Equinox Seas* was in the shipyard.

⁶ The ISM Code was mandatory under chapter IX of the International Convention for the Safety of Life at Sea (SOLAS), 1974 as amended.

⁷ A DOC was issued to a company when the company aspects of the SMS were assessed as being compliant with the requirements of the ISM Code. It was valid for 5 years and subject to annual verification.

⁸ SMS reference: VOP-S-03, section 1.5

1.6.2.1 Crew induction

The Equinox Maritime SMS required newly joined crew members to undergo a period of familiarisation. The induction process was overseen by the C/O and covered the basic safety and emergency requirements for crew members, including:

explanation of the duties in accordance with the respective position description and safety methods in work and the prevention of accidents. [sic]

The fitter's familiarisation was recorded as having been completed on 3 April 2023.

1.6.2.2 Personal protective equipment

The Equinox Maritime SMS contained a table that listed personal protective equipment (PPE) requirements while undertaking particular tasks. The table set out the PPE to be used by the crew when on ships in dry dock, which included:

- safety helmet
- safety shoes
- overalls/boilersuit
- leather gloves
- safety glasses

The table noted the need for safety goggles and ear defenders as required for the activity being undertaken.

1.6.2.3 Safety management in the shipyard environment

The SMS of Equinox Maritime did not include any procedures or risk assessments specific to a shipyard setting nor did it define the division of responsibilities for the management of safety while *Equinox Seas* was undergoing repair, except for the PPE requirements for use in a dry dock.

There was no extraordinary health and safety meeting before *Equinox Seas* arrived at the shipyard for the repair period, nor were any routine safety inspections conducted by the crew during the period in the shipyard.

The work being undertaken by the shipyard was managed between the ship repair manager and the technical superintendent. Equinox Maritime staff worked on the principle that the responsibility for safety while *Equinox Seas* was in the ship repair facility, including alongside the berth, resided with the shipyard. There was no agreement in place between Equinox Maritime and the shipyard that defined the responsibility for safety, other than the general terms of the contract between the two parties.

Following the accident it was noted that personnel from the shipyard, the ship's crew, and Equinox Maritime staff did not follow the PPE requirements of the ship's SMS or shipyard signage.

1.7 ONEX SYROS SHIPYARDS S.A.

1.7.1 General

ONEX Syros Shipyards S.A. provided shipbuilding and ship repair services to bulk carriers, oil tankers, military ships and commercial yachts.

The shipyard's engagement with the accident investigation was limited, and safety documentation covering the work on the engine room fans was not provided.

As part of the contractual requirements between the shipyard and Equinox Maritime, the shipyard required the presence of a fire and safety watchman on board at all times. The shipyard did not provide the investigation with any information detailing the responsibilities of the fire and safety watchman.

Following the accident the shipyard stated that the terms of the contract remained extant at the time of the accident, limiting the extent of work able to be carried out on board by the crew. In a public statement, the management made clear its belief that *the incident took place outside and beyond the jurisdiction, operation and institutional texts governing the shipyard*⁹.

1.8 REGULATION AND GUIDANCE

1.8.1 Regulation in a shipyard environment – ships not in operation

While ships were in a floating dock in a shipyard, the local regulations on the health and safety of workers applied. The Greek regulations, among others, incorporated the framework contained in the European Union (EU) Council Directive 89/391/EEC on the introduction of measures to encourage improvements in the safety and health of workers at work¹⁰. The regulations set out, inter alia, a mandatory framework for the assessment and management of risks to workers.

The directive required an employer to be in possession of an assessment of the risks to safety and health at work, including those facing groups of workers exposed to particular risks. The responsibility extended to the need to define the measures to be taken and, if necessary, the protective equipment to be used.

1.8.2 Regulation in a shipyard environment – ships in operation

From the time *Equinox Seas* left the floating dock, it was a ship in service under the control of the master. The legislation of the flag Administration applied, with Greek legislation for foreign ships in a port in Greece overlapping these requirements¹¹.

⁹ TradeWinds article: *Filipino seafarer falls to his death on Equinox bulker in Greece*; dated 21 April 2023, updated 24 April 2023 <https://www.tradewindsnews.com/casualties/filipino-seafarer-falls-to-his-death-on-equinox-bulker-in-greece/2-1-1438658>

¹⁰ Transposed into Greek legal framework by Presidential Decree 17/1996 – *Measures to enhance the safety and health of workers during work in compliance with directives 89/391/EEC and 91/383/EEC*.

¹¹ Presidential Decree 1349/1981 – Regulation for the prevention of accidents on board ships.

While a ship was in a port in Greece, ships' crews were not allowed to carry out work that was classified as repair or conversion¹² but could carry out minor maintenance work, including:

Cleaning of accommodation spaces, engine room, auxiliary machinery, storage areas excluding cargo spaces, as well as external areas of the ship;

Rust removal and painting with hand tools in identified spots of limited extent; and

Maintenance of parts of main and auxiliary systems.

Such tasks were required to follow measures in line with the health and safety provisions for maritime labour applicable to foreign ships. These provisions included a requirement for the evaluation and mitigation of risk.

1.8.2.1 The International Management Code for the Safe Operation of Ships and for Pollution Prevention

The SOLAS requirements for the management of risk stemmed from Chapter IX of the convention that implemented the ISM Code. This was reflected in Cayman Islands maritime legislation¹³. Section 1.2.2 of the ISM Code stated that the safety management objectives of the company should:

Provide for safe practices in ship operation and a safe working environment; and

Assess all identified risks to its ships, personnel and the environment and establish appropriate safeguards.

The ISM Code also placed a responsibility on the company to ensure that *applicable codes, guidelines and standards recommended by the organization, administrations, classification societies and maritime industry organizations* are taken into account. [sic]

1.8.2.2 The Maritime Labour Convention

While the ISM Code set out the structure for the safety management of a ship, the requirements of the ILO's MLC standard 4.3 required the flag Administration to adopt laws for:

The...effective implementation and promotion of occupational safety and health policies and programmes...including risk evaluation as well as training and instruction of seafarers; and

reasonable precautions to prevent occupational accidents, injuries and diseases on board ship.

In implementing these requirements, the Cayman Islands passed the *Merchant Shipping (Maritime Labour Convention) (Health and Safety) Regulations, 2014*. These regulations, applicable to *Cayman Islands ships, wherever they may be*,

¹² Joint Ministerial Decision (Government Gazette B' 3831/2017).

¹³ Cayman Islands Merchant Shipping Act (2021 Revision) – Section 183(4).

placed responsibilities on the shipowner¹⁴ to ensure that seafarers lived, worked and trained on board in a safe and hygienic environment. In so doing, the regulations required the shipowner and master *to take into account the guidance contained in the Code of Safe Working Practices*¹⁵, referencing the code produced by the UK Maritime and Coastguard Agency. Its carriage was a mandatory requirement for ships registered in the Cayman Islands.

The regulations also required anyone working on board who was not the operator of the ship to inform them of any risks to health and safety arising out of the work they were carrying out on board.

1.8.3 The Code of Safe Working Practices for Merchant Seafarers

The Code of Safe Working Practices for Merchant Seafarers (COSWP) was carried on board *Equinox Seas*. The COSWP provided guidance on a wide range of activities and ship operations and the management of risk on board, including that:

- *Anyone working in a location where there is a risk of falling may be regarded as working at height, noting that Work at height should be subject to risk assessment, and suitable control measures should be taken to protect those who may be put at risk.*
- *Stages and staging that are not suspended should always be secured against movement.*

The COSWP further guided that a lock-out, tag-out (LOTO) procedure¹⁶ should be in place when working on machinery and power systems and that safety signs should be used, displayed and understood.

The COSWP noted that there could be *circumstances where the fittings of the ship may not be within the control of the ship*, in which case it imposed a duty on the company to:

ensure that safety signs are displayed where appropriate. If the Company is not in a position to provide signs (e.g. where the fittings of the ship are not within their control), they should ensure that signs are in place before allowing any relevant work to take place. The Company should also ensure that the system of signs in use is clearly understood. [sic]

The COSWP stated that *Yellow signs are advisory and mean be careful or take precautions*. Such warning signs were based on a yellow triangle with a black border, with the symbol for the specific hazard shown in black.

¹⁴ As identified on the Maritime Labour Certificate or, if different, any other organisation or person that has assumed responsibility for the operation of the ship from the owner. The shipowner of *Equinox Seas*, according to the MLC definition, was Equinox Maritime Ltd.

¹⁵ At the time of the accident the Code of Safe Working Practices for Merchant Seafarers 2015 edition – Amendment 7, October 2022 was extant.

¹⁶ A safety procedure that required energy sources to be isolated and rendered inoperative with a lock and tag, preventing its operation and identifying the responsible worker, before starting work on the equipment (COSWP Chapter 20, section 20.13).

1.8.4 Guidance on the management of safety in shipyards

1.8.4.1 International Labour Organization

In 1973 the ILO adopted the code of practice on *Safety and health in shipbuilding and ship repair*. The revised code of practice was adopted in 2018¹⁷ to account for technological and other developments in the industry.

The code was not legally binding but specified *the principles and processes that could be implemented to promote decent work in particular workplaces or contexts* and captured good industry practice. The code outlined the responsibilities, duties and rights of shipowners, employers, workers, and all other parties involved in workplace hazards and to improve the management of risks. It was applicable to all ship repair facilities.

The code set out requirements for cooperation between all parties involved in a ship repair activity and that shipowners should include occupational safety and health criteria in procedures for evaluating and selecting ship repair facilities. The code included a requirement to provide *all necessary information as is available and required for the evaluation of any hazards or risks to safety and health that might result from a particular hazardous factor*.

For any identified hazard the code highlighted the requirement contained across the health and safety regulations to *take all reasonable, practicable and feasible measures to eliminate or, if this is not possible, control risks to safety and health identified in a risk assessment, in order to reduce exposure*.

Section 7.12 of the code dealt specifically with precautions against falls, highlighting the need for the shipyard to *define barricading requirements where there is a risk of falling over an unprotected edge and barricading or protective covers where there is a risk of falling through an opening*.

The code noted that:

where elimination of the fall risk is not possible, there should be a process to reduce the risk of falling by using fall-prevention measures that include:

a) fixed and temporary work platforms, access ways, barriers, and so forth, including scaffolding, mobile work platforms, among other things; and

b) fall restraint, which should only be used when elimination of the fall risk, the use of work platforms or hard barricading cannot be used. Fall restraint should prevent a person reaching a position at which there is a risk of a fall.

Further, the code stated that:

wherever practical, a safe working area should be provided by means of work platforms or scaffolds that have complete floors, guardrails, toe-boards, and safe access and egress.

¹⁷ Safety and health in shipbuilding and ship repair (Revised edition), published 19 February 2019.

Only where fall prevention strategies could not be used, did the code indicate the use of fall protection or fall arrest systems. The code included guidance on electrical safety, setting out a LOTO requirement that:

Electrically powered equipment should be de-energized before mechanical work is done on such equipment. Power switches should be locked out or, where not possible, other measures taken to prevent the equipment from being energized without the knowledge of the persons working on it. Suitable warning notices should be posted at the power switch and signed by the persons who are to do the work. Such locks, notices or preventive devices should be removed only by the persons who installed them or by authorized persons.[sic]

Section 8.3 of the code identified both work at height and electrical work as being high-risk and provided guidance on the implementation of a permit to work system to inform people of the *hazards associated with the high-risk work and the precautions they have to take*.

1.8.4.2 Oil Companies' International Marine Forum guidance

In 2003, the Oil Companies International Marine Forum (OCIMF)¹⁸ produced guidance on the *Health, Safety and Environment at New-building and Repair Shipyards and During Factory Acceptance Testing*.

The OCIMF guidance noted that, while in a ship repair facility, the safety of the ship and the people on board it was generally dependent on the shipyard's SMS. The guidance recognised that a ship might take on an unfamiliar status during a repair period and, consequently, both the ship and the people on board it could be exposed to unexpected and unfamiliar risks and hazards.

The OCIMF guidance advised that a shipyard should develop an *interface document* or *management plan* to clearly identify how the SMS of the ship and shipyard would interlink during the repair period, detailing key roles and responsibilities, communications, and procedures.

The guidance provided a framework for safety procedures, including:

- the use of PPE;
- periodic safety and progress meetings;
- safety inspections; and
- lines of communication.

The OCIMF guidance further noted that:

Shipbuilding or repair activity invariably results in the ship's structure being incomplete, thus there are likely to be a large number of openings through which a person might fall. This includes shipside rails or rails in the engine room, missing blocks, access holes cut to facilitate work, removal of gratings and ladders, lightening holes in the structure and corroded areas. Company personnel should be particularly alert to the fact that, despite precautions being taken, unexpected hazards may still arise.

¹⁸ A voluntary association of oil companies with an interest in the shipment and terminalling of crude oil, oil products, petrochemicals and gas.

This was supported by a housekeeping checklist in an appendix to the guidance that stated, *openings in decks, platforms and other structures are to be properly and adequately indicated and fenced (including corroded areas that will no longer support any weight).*

1.8.4.3 Protection and Indemnity Club Guidance

Equinox Maritime was a member of Gard Protection and Indemnity (Bermuda) Ltd. (Gard P&I club)¹⁹, which produced a range of guidance to support the safe operation of ships. Part of the Gard P&I club *guidance to masters*²⁰ concerned a ship's *stay in shipyard or dry-dock* and stated:

When the vessel is to stay in a shipyard or a dry-dock, the Master and his/her officers should maintain the same safety and security standards as if in port. The Master and his/her officers should request that the same level, if not increased, safety precautions and safe working practices should be strictly applied by the dockyard workers to prevent not only personal injuries but also damage to the vessel itself, such as a fire or stability accidents. Close co-operation between the vessel's deck and engine officers and the shipyard engineers is required.

1.8.5 Signage and barriers

The signage requirements applicable to the ONEX Syros shipyard were set out in EU Council Directive 92/58/EEC²¹, a daughter directive to the framework Directive 89/391/EEC, and reflected in Greek law²². The directive set out the minimum requirements for the provision of safety and/or health signs at work.

Annex V to the directive indicated a minimum requirement for the marking of obstacles and dangerous locations, including:

Places where there is a risk of colliding with obstacles, of falling or of objects falling should be marked with alternating yellow and black, or red and white stripes in built-up zones in the undertaking to which workers have access during their work.

As listed in the directive, the colours black and yellow in combination provided a warning indication. The directive permitted the use of a safety colour or a signboard to mark places where there was an obstacle or a drop.

Section 9 of the COSWP, providing guidance on *safety signs and their usage*, did not specifically identify black and yellow striped tape as a hazard indicator but did reference Marine Guidance Note (MGN) 556 (M+F)²³. The contents of MGN 556 (M+F) did not wholly match those in EU Council Directive 92/58EEC. Annex V of the MGN identified black and yellow markings only as indicating obstacles or dangerous locations *where there is a risk of colliding with obstacles, or of objects falling.*

¹⁹ A Protection and Indemnity (P&I) Club was a mutual insurance association that provided risk pooling, information and representation for its members.

²⁰ <https://gard.no/rules-statutes-and-guidances/#Guidances>

²¹ Council Directive No. 58, dated 24 June 1992, on the minimum requirements for the provision of safety and/or health signs at work (Ninth individual directive within the meaning of Article 16 (1) of directive 89/391/EEC).

²² EUR-Lex document number 31992L0058 <https://eur-lex.europa.eu/legal-content/EN/NIM/?uri=CELEX%3A31992L0058>

²³ MGN 556 (M+F) Amendment 1 – The Merchant Shipping and Fishing Vessels (Safety Signs and Signals) Regulations 2001.

1.9 PREVIOUS ACCIDENTS

Accidents that happen on board ships while in operation may be investigated under the responsibility of a flag Administration to investigate casualties occurring on its ships. Where a ship is not in operation, the maritime obligations may not be extant, and accidents that happen in a shipyard may not have been reported to, or have been subject to, an investigation by a flag state.

1.9.1 *BW Havfrost* – fall from height

On 9 June 2014, a seaman died when he fell through an unguarded hatch into a cargo tank on board the Norwegian registered ship *BW Havfrost* while the ship was moored beside a quay in a shipyard awaiting docking. The accident was investigated by the Accident Investigation Board Norway (AIBN)²⁴.

The accident report (Marine report 2016/08²⁵) noted that the cargo tank had been prepared for entry and an entry permit issued by the shipyard. The permit indicated that safety measures had been implemented; however, the investigation identified that these measures had not been put in place and that their absence was a contributory factor in the accident. The investigation was unable to determine the reason for the movement of the casualty immediately before his fall through an unguarded hatch.

The investigation identified that the shipping company's SMS considered the relevant shipyard's safety requirements as applicable during dry-docking, but that a yard stay did not alter the ship master's responsibility for safety.

1.9.2 *Seatruck Pace* – fall from height

On 17 December 2018, the assistant bosun on board the freight ferry *Seatruck Pace* fell through an open ramp hatch after crossing a temporary rope barrier onto a narrow section of deck between the ship's side and the hatch. The investigation (MAIB report 9/2019²⁶) found that the task allocated to the assistant bosun did not require him to access the unprotected deck edge beyond the barrier and it is unknown why he entered the hazardous area.

The actions taken by the company in response to the accident included:

- Reminding its masters of the dangers of bypassing safety control measures and prompting them to review the safety of deck openings;
- Providing safety chains, fittings and warning signs for use on the temporary barriers; and
- Reviewing its risk assessment and permits to work concerning working at height.

²⁴ The AIBN became the Norwegian Safety Investigation Authority in July 2020.

²⁵ <https://www.nsia.no/Marine/Published-reports/2016-08-eng>

²⁶ <https://www.gov.uk/maib-reports/fall-from-height-on-ro-ro-freight-vessel-seatruck-pace-with-loss-of-1-life>

SECTION 2 – ANALYSIS

2.1 AIM

The purpose of the analysis is to determine the contributory causes and circumstances of the accident as a basis for making recommendations to prevent similar accidents occurring in the future.

2.2 OVERVIEW

The fitter was fatally injured when he fell approximately 10m down the ventilation trunk leading from the starboard engine room fan to the plenum chamber at its base. To access the fan room the fitter passed hazard warning tape that shipyard staff had placed over the entrance to the fan room following removal of the fan for maintenance.

This section of the report will consider the circumstances of the accident, the measures put in place to prevent it occurring, including the regulatory framework and available guidance, and the response to the accident.

2.3 FATIGUE

The fitter had been on board *Equinox Seas* for 15 days since travelling to Greece from the Philippines and was working to a schedule that provided adequate periods of rest. The accident occurred during the early afternoon dip in alertness experienced as a natural consequence of circadian rhythm²⁷.

It is therefore unlikely that the fitter was fatigued due to a lack of effective rest, but it is possible that a reduction in alertness due to the time of day contributed to the decision to enter the fan room.

2.4 THE ACCIDENT

2.4.1 Entry into the fan room

There was no discussion about the ongoing work in the fan room between the fitters on board *Equinox Seas* before the accident, and no jobs associated with the engine room fans were allocated to them.

The reasoning behind the fitter entering a space that had no relation to any assigned work is speculative, and the decision made by the fitter to make the entry could not be determined. To have fallen into the fan pedestal the fitter passed beyond the tape placed by shipyard personnel over the opening to the fan room following the removal of the fan.

The height of the louvre door sill and the lack of a means of access to the fan room made it likely that the fitter entered the fan room either by making his way head-first through the tape barrier, or by stepping over the barrier after climbing up onto the sill. Had the fitter accessed the deck in the fan room adjacent to the fan pedestal, its height, and the depth of the pedestal flange would have made it unlikely, though not impossible, for him to overbalance and fall into the pedestal from a standing position. It was not possible to determine which way the fitter entered the fan room.

²⁷ The circadian rhythm is a 24-hour cycle responsible for regulating periods of wakefulness throughout each day. The rhythm naturally dips and rises to align an individual's alertness to environmental cues, with a low in the early hours of the morning and a lesser dip in the early afternoon.

2.4.2 The fall

The dimensions of the pallet that had been placed over the fan pedestal meant that it would not provide a stable working platform unless centrally positioned such that all four corners of the pallet rested on the pedestal flange. Without being secured in position, the application of a transverse force on the pallet would almost certainly have moved it into a position where one corner of the pallet would come off the pedestal flange, allowing the pallet to tip.

When entering the fan room the fitter would likely have placed his weight on the pallet with a lateral force that moved a corner of the pallet off the pedestal flange, causing the pallet to rotate and the fitter to fall into the fan pedestal and onto the fire damper below.

With the fire damper actuator removed, the damper disk was free to rotate. The arrangement of the damper against its sealing faces meant that weight acting on the aft inboard half of the damper disk would act to open the damper, allowing the fitter to fall into the trunk below.

2.4.3 Cause of death

The fitter died as a result of the serious injuries sustained during the 10m fall down the ventilation trunk to the plenum chamber at its base. The dimensions of the trunk were sufficient to allow the fitter to rotate during the fall. His orientation at entry to the fan pedestal cannot be determined from the position he was in when found.

At the time of the accident the fitter was not wearing the safety helmet required by the Equinox Maritime SMS and the shipyard gangway safety signage. Given the nature of the fitter's injuries it is very unlikely that the omission of this PPE would have affected the outcome of the accident.

2.4.4 Emergency response

The alarm was raised almost immediately after the accident. The rapid determination of the location of the fitter, the summoning of the emergency services, and the extraction of the fitter from the plenum chamber allowed the fitter to be quickly placed into the care of the medical services.

The proximity of the hospital to the shipyard influenced the prompt response from shore-based emergency services. The response from *Equinox Seas'* crew and the shipyard's fire and safety watchmen was immediate and effective in both identifying the nature and location of the accident and quickly summoning shore assistance.

The speed of the response to the accident from all the organisations involved was commendable.

2.5 THE VENTILATION FAN REMOVAL

2.5.1 Specific risks

When the starboard fan was removed from the fan room the uncovered fan pedestal created a fall from height risk. The length of the open trunk was not visible to the casual observer when the pedestal fire damper was in the closed position, so it is likely the fitter was unaware of the substantial risk of falling further than the visible

short distance to the fire damper at the base of the fan pedestal. The deck crew wore safety harnesses when painting in the fan room. It was unclear whether this was in recognition of the risk of a fall down the trunk, or to mitigate falling from the fan pedestal to deck level; however, the lack of a safety harness indicated that the fitter might not have recognised the risk of falling that existed in the space when he entered it.

The fan's electrical isolation was achieved by opening the circuit breaker in the fan room. In the absence of signage at the switchboard or the fan room, and without the implementation of any LOTO procedure, the safety of the electrical isolation was wholly reliant on the knowledge and familiarity of personnel who might have operated the equipment. There was a risk of electric shock.

Neither the shipyard nor the ship's crew had carried out any risk assessment associated with the work to remove the engine room ventilation fans for overhaul. Consequently, the hazard of falling into the ventilation trunk was not identified or mitigated and exposed the crew to an unacceptable risk of harm.

2.5.2 Barrier controls

The purpose of a barrier is to separate a person from a hazard. The shipyard workers had placed the black and yellow tape across the access to the starboard engine room fan room with the expectation that it would deter access. The use of such tape to warn of a hazard followed the EU directive requirements and national law; however, it did not specify the nature of the hazard it was indicating. By reference to MGN 556 (M+F), the COSWP identified that the use of black and yellow markings could be interpreted as warning of a dangerous location but did not necessarily identify the presence of a fall or electrical hazard. It is possible that the fitter might have taken the tape as denoting only the presence of the wet paint evident in the space.

Without additional signage to indicate the nature of the hazards present in the fan room, the tape alone was insufficient as a control to prevent the space being accessed.

The use of an unsecured pallet from which to work when painting the fan room did not meet the guidance contained in either the COSWP or the ILO code of practice for the provision of a safe working area. Further, it did not provide an effective barrier to falling into the ventilation trunk.

The accident on board *Seatruck Pace* provided an example of where a limited temporary barrier without signage as to the hazard it was managing did not deter a crew member from passing through into an area containing a drop hazard. It demonstrated the need for an effective barrier between workers and a hazard. Similarly, on *Equinox Seas* the barrier controls in place in the fan room were insufficient to mitigate the risk of falling from height.

2.6 SHIPBOARD SAFETY MANAGEMENT

2.6.1 Shipyard environment

It is likely that a shipyard period will require crew and shipyard workers to undertake tasks not necessarily carried out during normal ship operation. The increased on board workforce and the diversity of the work carried out will create additional hazards on board and heightened vigilance towards safety and the management of hazards will be required.

2.6.2 Management of safety on board *Equinox Seas* in the shipyard

When *Equinox Seas* was in the floating dock it was a workplace within the shipyard and fell under the local health and safety regulatory framework, which required the employer to assess and manage the risks present.

The contract between the shipyard and Equinox Maritime specified limitations of crew activities on board and a requirement for fire and safety watchman to be present. It did not specify how responsibility for the safety of crew was to be managed. Little information was provided to the investigation by the shipyard detailing how risks were assessed or how any identified risks were intended to be managed and coordinated with the crews of any ships using the shipyard. By not positively identifying the reason for placing the tape over the entrance to the fan room and identifying the risks in the space to the ship's management, the shipyard was not meeting its safety obligations to cooperate and coordinate its actions in matters of the protection and prevention of occupational risks. This is similar to the *BW Havfrost* accident where the safety of crew members was reliant on the actions and procedures of the shipyard, which proved to be inadequate.

It was evident that the ship's SMS was effective before *Equinox Seas'* arrival at the shipyard. Since there was a widely held perception on board *Equinox Seas* that the responsibility for safety lay with the shipyard while the ship was in the shipyard facility, it is possible that this was the reason Equinox Maritime did not impose the requirements of the SMS for managing safety on board as the ship returned to normal operation. Further, Equinox Maritime managers were familiar with the shipyard's mode of operation having routinely used the facility before the docking of *Equinox Seas*.

It is possible that the approach to safety in the shipyard environment had become normal to the Equinox Maritime managers. It is apparent that safety on board *Equinox Seas* was not effectively managed during the entire stay at the shipyard facility.

2.6.3 Communication and coordination

There was no specific agreement on the management of safety between Equinox Maritime and the shipyard before *Equinox Seas'* arrival at the shipyard.

During the period *Equinox Seas* was in the shipyard coordination of the work activities was carried out at the daily work planning meetings between the shipyard's repair manager and the senior Equinox Maritime staff on board. The meetings were conducted predominantly in Greek, taking advantage of the common language between the shipyard, the Equinox Maritime superintendent and the master who was on board when *Equinox Seas* arrived at the shipyard. It is likely the effectiveness of the meetings reduced because the incoming master could not speak Greek.

The work meetings provided the opportunity to liaise on matters of safety. However, with neither a written agenda nor representative from the shipyard safety department, the meetings focused solely on the technical progress of the work being completed. It is therefore unsurprising that safety lapses were not rectified by either the ship or the shipyard.

It is evident that ineffective communication and coordination between the shipyard and ship's staff meant that deficiencies in the management of safety on board *Equinox Seas* were not addressed.

2.6.4 Crew management

The outgoing master issued some instructions directly to the ship's crew without recourse to the lines of responsibility contained in the SMS. The painting of the engine room fan rooms was one such instruction. The reason for the fitter's visit to the fan room just before the accident was not known to the senior officers who ultimately held responsibility for his conduct. It is possible the outgoing master's presence and input into the management of the crew on board *Equinox Seas* created a disparate management chain. This lack of clarity in the management of the work being undertaken was possibly exacerbated by the predominant use of the Greek language in the work planning meetings.

It is possible that the fragmented organisation on board contributed to the suboptimal management of safety while *Equinox Seas* was at the shipyard.

2.7 GUIDANCE AND REGULATION

2.7.1 Guidance to shipyards

The guidance on safety in a shipyard environment contained in the ILO code of practice on *Safety and health in shipbuilding and ship repair* provided a framework for safe operations on board ships undergoing repair. Though focused on the operation of the shipyard, it provided specific guidance on the management of safety in a shipyard environment relevant to *Equinox Seas*. As a sectoral code, it was neither mandatory nor widely known within the shipping industry. Its use within the shipyard as a reference document could not be determined.

The observed arrangements for the management of safety in the shipyard were not aligned with the guidance provided in the ILO code of practice and likely led to the disparate organisation of the management of safety.

2.7.2 The Code of Safe Working Practices for Merchant Seafarers

The COSWP was a widely available and familiar document used by seafarers to access guidance on safe working practices on board a ship. The code provided detailed guidance on the identification of hazards and the management of risks.

While the guidance in the ILO code of practice recognised the need for specific guidance in a shipyard, the COSWP did not address either the specific hazards ship repair activities create or amplify, or the need for the establishment of responsibilities, duties and rights for all parties involved in ship repair.

2.7.3 The Oil Companies International Marine Forum

The guidance provided by OCIMF on *Health, Safety and Environment at New-building and Repair Shipyards and During Factory Acceptance Testing* set out practical measures for the coordination of activities between the shipyard and ship, including a formal definition of the safety responsibilities between the two parties. The guidance recognised that activities in shipyards could involve widespread alterations to the structure of a ship and highlighted the need for openings to be adequately indicated and fenced, and for effective permit to work systems to be in operation.

As the shipyard had undertaken work on oil tankers it is likely that it had experience of working to the guidance produced by OCIMF but it was not possible to confirm this during the investigation.

The OCIMF guidance related to the tanker operator market. It is reasonable that Equinox Maritime, as a company operating solely in the dry bulk market, would be unaware of the document.

2.7.4 Guidance to masters

The guidance provided to masters by Gard P&I club was limited in respect of operations in a ship repair facility, but did highlight the need for close cooperation and coordination between the ship's crew and the shipyard.

The guidance was relevant and available but, with no mandatory carriage requirement unless an individual were to seek it out, neither the managers of Equinox Maritime nor masters on board *Equinox Seas* would be readily aware of its content.

SECTION 3 – CONCLUSIONS

3.1 SAFETY ISSUES DIRECTLY CONTRIBUTING TO THE ACCIDENT THAT HAVE BEEN ADDRESSED OR RESULTED IN RECOMMENDATIONS

1. The barrier controls in place in the fan room were insufficient to mitigate the risk of falling from height, resulting in the fitter sustaining fatal injuries when he fell approximately 10m down the ventilation trunk. [2.4.3, 2.5.2]
2. The specific risks associated with the fan removal were not assessed and so put staff at risk from those hazards present in the fan room. [2.5.1]
3. The intensity and diversity of shipyard work can create a wide range of hazards, and an enhanced awareness of safety is required to mitigate risk. [2.6.1]
4. It is apparent that safety on board *Equinox Seas* was not effectively managed during the entire stay at the shipyard facility. [2.6.2]
5. Ineffective communication and coordination between the shipyard and ship's staff meant that deficiencies in the management of safety on board *Equinox Seas* were not addressed. [2.6.3]
6. The fragmented organisation on board contributed to the suboptimal management of safety while *Equinox Seas* was at the shipyard. [2.6.4]
7. Relevant industry guidance on the management of safety in a shipyard environment was not incorporated into the working practices of the shipyard. [2.7.1, 2.7.3]
8. The availability of relevant shipyard safety guidance from the P&I Club of which Equinox Maritime was a member was limited on board *Equinox Seas*. [2.7.4]

3.2 OTHER SAFETY ISSUES DIRECTLY CONTRIBUTING TO THE ACCIDENT

The accident occurred during the afternoon dip in alertness experienced as a natural consequence of circadian rhythm. [2.3]

3.3 SAFETY ISSUES NOT DIRECTLY CONTRIBUTING TO THE ACCIDENT THAT HAVE BEEN ADDRESSED OR RESULTED IN RECOMMENDATIONS

The Code of Safe Working Practices for Merchant Seafarers did not contain any guidance related to the risks created or amplified on ships in a shipyard environment. [2.7.2]

3.4 OTHER SAFETY ISSUES NOT DIRECTLY CONTRIBUTING TO THE ACCIDENT

1. The fan's electrical isolation did not mitigate the risk of electric shock. [2.5.1]
2. Although unlikely to have affected the outcome, the fitter was not wearing the personal protective equipment required by the safety management system of Equinox Maritime at the time of the accident. [2.4.3]

SECTION 4– ACTIONS TAKEN

4.1 ACTIONS TAKEN BY OTHER ORGANISATIONS

The **Maritime and Coastguard Agency** has initiated a work item to consider the development of guidance to highlight the hazards specific to, and those amplified by, ships undergoing maintenance in ship repair facilities. This guidance is to be considered for inclusion in future amendments to the Code of Safe Working Practice for Merchant Seafarers.

Equinox Maritime Ltd has updated its SMS to incorporate:

- A shipyard safety checklist detailing matters related to the safety provisions and the means of communication and coordination with the shipyard.
- Crew safety training before entering a shipyard to specifically raise awareness of the hazards encountered during a maintenance period in a ship repair facility.
- Requirements for safety meetings before, and during, dry dock periods.
- The inclusion of safety matters in the daily work planning meetings between the ship's management and the shipyard, and the need to minute such meetings.

SECTION 5 – RECOMMENDATIONS

ONEX Syros Shipyards S.A. is recommended to:

- 2024/133** Update its safety management and communication procedures to ensure that risks created by the work carried out in its shipyards are effectively managed and coordinated with the relevant ship's crew and that the delineation of responsibility for safety on board is clearly understood between all parties.

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

