

Report on the investigation of
a chief officer's fall from
a hatch cover on board the general cargo ship

Norjan

at Southampton, United Kingdom

18 June 2014



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 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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GLOSSARY OF ABBREVIATIONS AND ACRONYMS

COSWP	-	Code of Safe Working Practices for Merchant Seamen
CSAP	-	Cargo safe access plan
CSM	-	Cargo securing manual
CSS Code	-	Code of Safe Practice for Cargo Stowage and Securing
ILO	-	International Labour Organization
IMO	-	International Maritime Organization
LOLER	-	Merchant Shipping and Fishing Vessels (Lifting Operations and Lifting Equipment Regulations) 2006
m	-	metre
MCA	-	Maritime and Coastguard Agency
MGN	-	Marine guidance note
MIN	-	Marine information note
MSC	-	Marine Safety Committee
Peters & May	-	Peters & May Limited
PPE	-	Personal protective equipment
Normed	-	Normed International B.V.
RES	-	Reederei Erwin Strahlmann e.K.
SMM	-	Safety management manual
SMS	-	Safety management system
SOLAS	-	International Convention for the Safety of Life at Sea, 1974, as amended
t	-	tonne
TEU	-	Twenty-foot equivalent units
VHF	-	Very high frequency
VLR	-	Very low risk

TIMES: all times used in this report are UTC+1 unless otherwise stated

SYNOPSIS



At 1445 on 18 June 2014, the chief officer of the general cargo ship *Norjan* was injured when he fell 2.4m from the ship's cargo hatch cover to the main deck.

Norjan was berthed in Southampton and was loading a cargo of privately owned motor yachts. The cargo operation was organised by the specialised transportation company Peters and May Ltd, and was overseen by one of its loadmasters. The chief officer was acting as the ship's cargo officer and was supervising the operation in consultation with the loadmaster.

During the final stages of loading the first motor yacht the loadmaster asked the chief officer to check and adjust the yacht's alignment with its cradles. To do this, the chief officer went to the stern of the yacht, which was close to the unfenced edge of the hatch cover, and grabbed hold of its rudder. Once the yacht was lowered onto its cradle chocks the chief officer went to return to his previous position on the deck and, as he did so, he stumbled and lost his balance. Realising that he was about to fall off the hatch cover, he twisted his body and oriented himself to land feet-first on the deck below. The chief officer suffered multiple fractures to both of his ankles on impact, and was unable to return to work for 12 months.

Norjan's hatch covers were regularly used to carry containerised and non-standardised deck cargo, and the crew treated them as normal working decks. Work at height and the management of fall hazards during cargo operations were discussed in the vessel's safety management and cargo securing manuals. Furthermore, the company's generic risk assessment for deck cargo operations prescribed the use of temporary barriers to prevent falls from height. However, *Norjan* did not carry portable barriers or temporary fencing equipment and no fall prevention or fall arrest equipment was used during the loading operation.

It was apparent that both the crew and the Peters & May loadmaster had a very limited perception of the potential risks involved in the cargo loading operation: a detailed loading plan had not been produced; the crew had not been properly briefed; and the roles and responsibilities of the chief officer and loadmaster were confused. Had a task-specific risk assessment been carried out and a cargo securing safe access plan been developed, danger zones could have been identified and appropriate controls put in place.

Following the accident, *Norjan* was detained by the UK's Maritime and Coastguard Agency, and its crew painted the edges of the hatch covers yellow and fabricated an ad-hoc portable fencing system for use during deck cargo operations. Recommendations to ensure that the safety lessons identified in this report are addressed at a company level have been made to *Norjan's* managers, Reederei Erwin Strahlmann GmbH & Co. KG and Peters & May Ltd.

SECTION 1 - FACTUAL INFORMATION

1.1 PARTICULARS OF NORJAN AND ACCIDENT

SHIP PARTICULARS	
Vessel's name	<i>Norjan</i>
Flag	Luxembourg
Classification society	Germanischer Lloyd
IMO number	9347633
Type	General cargo with container capacity
Registered owner	Universal Shipping B.V.
Manager(s)	Reederei Erwin Strahlmann e.K. ¹
Construction	Steel
Year of build	2007
Length overall	129.49m
Registered length	121.32m
Gross tonnage	8407
Minimum safe manning	11
Authorised cargo	General and containers
VOYAGE PARTICULARS	
Port of departure	Bremen, Germany
Port of arrival	Southampton, UK
Type of voyage	International
Cargo information	None standardised; motor yachts
Manning	16
MARINE CASUALTY INFORMATION	
Date and time	18 June 2014 1445
Type of marine casualty or incident	Less serious marine casualty
Location of incident	Southampton
Place on board	No.2 Hatch cover/main deck
Injuries/fatalities	1 injury
Damage/environmental impact	Not applicable
Ship operation	Cargo loading
Voyage segment	In port
External & internal environment	Wind NNE, Beaufort Force 2. Daylight, dry with light cloud cover.
Persons on board	18

¹ On 1 May 2015, company name changed to Reederei Erwin Strahlmann GmbH & Co. KG

1.2 NARRATIVE

Norjan left Bremen, Germany on the afternoon of 14 June 2014, bound for Southampton where it was due to load three high-value motor yachts for delivery to ports in the Mediterranean.

On 16 June, *Norjan's* master received an email from the yacht transportation specialists, Peters & May Limited (Peters & May), informing him of the proposed loading operation. A cargo loading diagram (**Figure 1**) showing the stowage positions of the three motor yachts, with details of their dimensions and weights, was attached to the email. The master, having dealt with Peters & May in the past, accepted the plan as suitable and passed it to the chief officer. The chief officer checked the plan and found nothing of concern.

Norjan arrived in Southampton at 1914 on 17 June. At about 0800 the following morning, a loadmaster from Peters & May arrived on board to co-ordinate the cargo loading operation and to ensure the yachts were stowed and secured in accordance with his company's plan. The loadmaster discussed the loading operation in general terms with the master before meeting with the chief officer in the ship's cargo office. The loadmaster and the chief officer discussed and confirmed the loading sequence. There were no shore appointed stevedores to undertake the cargo handling operation; the work was to be done by the ship's crew under the direction of the chief officer.

Following his meeting with the chief officer, the loadmaster returned to the weather deck to supervise the loading of the boat's cradles and lashing equipment. The ship's cranes lifted the equipment from the lorries on the quayside and lowered it onto *Norjan's* hatch covers. The cradles were then positioned by the ship's crew under the direction of the loadmaster.

At about 1330, the aft ship's crane was slewed out over the port side of the vessel and the hoisting gear was lowered into the water in preparation for the arrival of the first yacht. When the yacht came alongside, a diver² entered the water and helped position the lifting strops around the boat's hull. Once the diver and the yacht's crew were satisfied that the strops were in the correct position, the hoisting gear was tensioned. With the load on the crane, the diver and yacht's crew climbed on board *Norjan*.

At about 1400, the yacht was lifted from the water (**Figure 2**) and slewed inboard. The lift was supervised by the chief officer, who communicated with the crane operator by hand-held VHF radio. The ship's crew used tag lines attached to the yacht to keep it steady and prevent it rotating in the wind. Once in position, the yacht was lowered slowly towards its cradles.

As the yacht was lowered towards the cradles, the ship's crew made small positional adjustments by pushing and pulling on its hull with their hands. The loadmaster, who was standing on the hatch cover next to the master, asked the chief officer to check that the yacht's keel was aligned fore and aft with the cradle blocks. The chief officer, who had been standing clear from the area to supervise the lifting operation, moved to the aft end of the yacht.

² The diver was contracted by Peters & May through a specialist diving company.

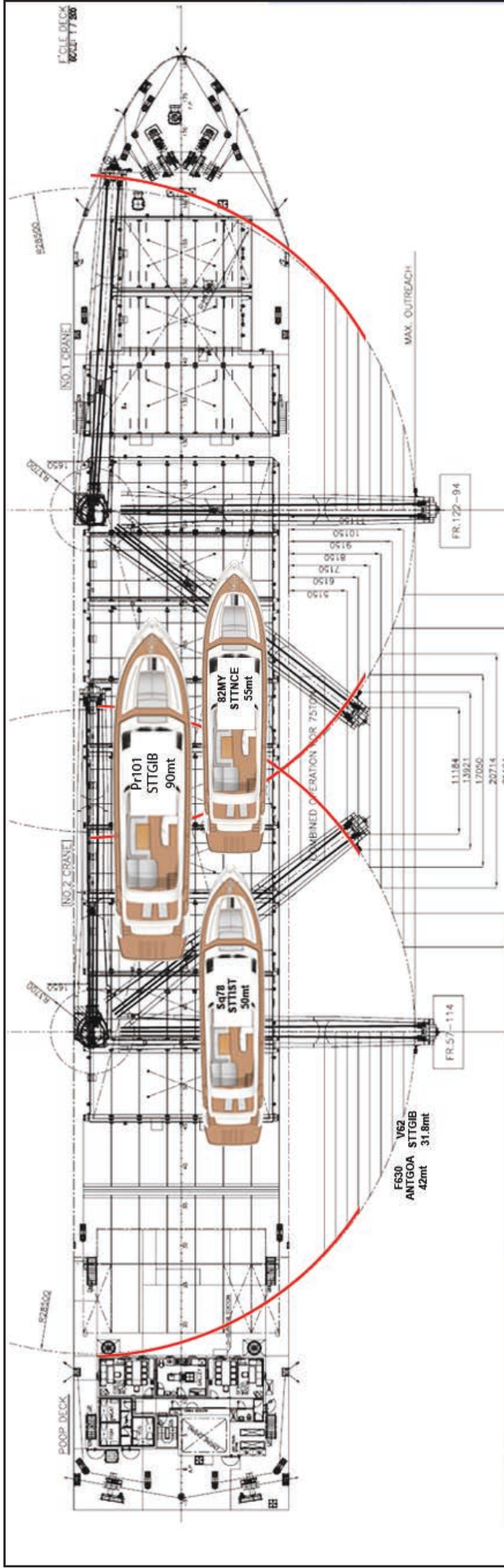
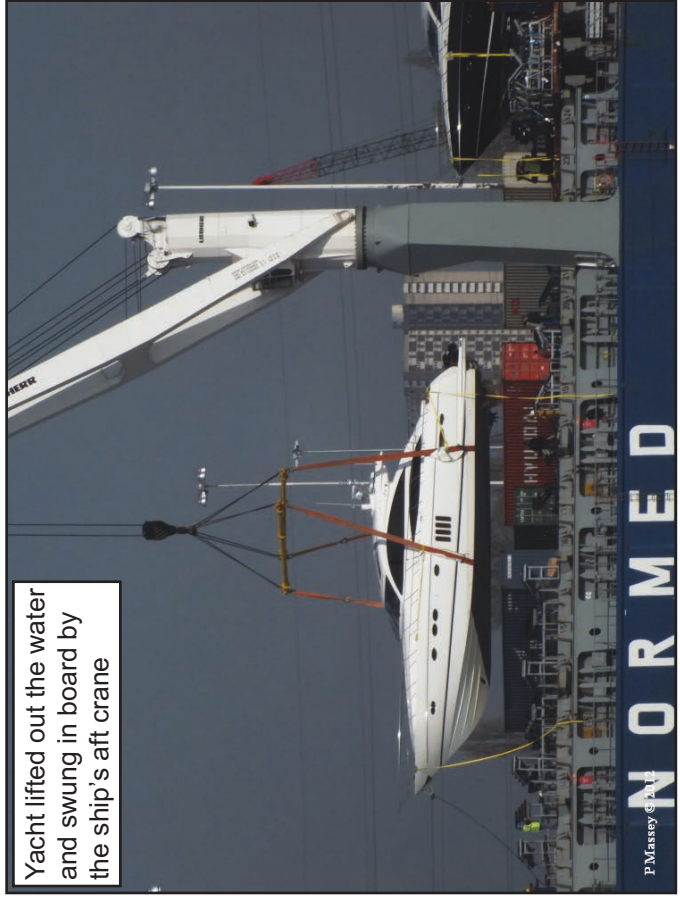


Figure 1: Peters & May cargo loading diagram



Images courtesy of P. Massey
Lifting straps positioned around the boat's hull by the diver and yacht's crew



Yacht lifted out the water and swung in board by the ship's aft crane

Figure 2: Example of a previous yacht loading operation on board *Normed* in Southampton

The chief officer grabbed one of the yacht's rudders and looked along its keel to check its alignment (**Figure 3**), while the loadmaster used hand signals to direct the crane operator. Once the boat had been lowered to its final position the chief officer turned to go back towards his control position. As he turned, he tripped and stumbled towards the edge of the hatch cover. Realising that he was going to fall off the hatch cover, the chief officer twisted his body towards the direction of his fall and jumped towards a clear area on the main deck 2.4m below (**Figure 4**).

The chief officer, screaming out as he fell, landed feet-first and collapsed onto his knees. Having heard the chief officer's scream, the master and nearby crew attended to him and administered first-aid. The chief officer had broken both his ankles and was in severe pain. The loadmaster telephoned for an ambulance using his mobile phone.

Within 5 minutes, an ambulance and a specialist team of paramedics had arrived. The paramedics and ambulance crew put the chief officer on a stretcher and lifted him ashore using the ship's crane. The ambulance then transferred him to the local hospital.

Following the accident, the Maritime and Coastguard Agency (MCA) conducted a port state control inspection. The MCA identified various deficiencies, primarily relating to cargo operations and personnel, and detained *Norjan*. The ship, in rectifying the deficiencies, produced a cargo loading plan, painted a yellow strip around the outer edge of the hatch covers, and fabricated stanchions that enabled guard ropes to be rigged around the hatch cover working area (**Figure 5**).

The chief officer had shattered several bones in both of his ankles and was hospitalised for several weeks.

1.3 ENVIRONMENTAL CONDITIONS

The accident occurred during daylight hours; it was a dry day with light cloud cover and the visibility was very good. The wind was north-north-easterly Force 4. The berth was sheltered and water within the port was calm.

1.4 CREW

1.4.1 Manning

Norjan's crew had been supplied by Global Crewmanagement B.V. and comprised Russian, Ukrainian and Filipino nationals. *Norjan's* complement of 16 exceeded the minimum of 11 required by its safe manning certificate.

The master was Russian and was 48 years old. He held an STCW³ II/2 Master Unlimited Certificate of Competency. He had been on board *Norjan* for 6 days and it was his first voyage on the ship. The master had previous experience of loading yacht cargoes on similar vessels.

The chief officer was Russian and was 38 years old. He had served on board *Norjan* for nearly 3 months and held an STCW II/2 Chief Mate Unlimited Certificate of Competency. He had no experience of loading yachts but he had been employed on other multi-purpose vessels that carried non-standardised⁴ cargo on deck.

³ International Convention on Standards of Training, Certification and Watchkeeping for Seafarers 1978, as amended.

⁴ Non-standardised cargo means cargo which requires individual stowage and securing arrangements.



Figure 3: Position of the chief officer as he checked and adjusted the alignment of the yacht's keel



Figure 4: Area of main deck where the chief officer landed after his fall

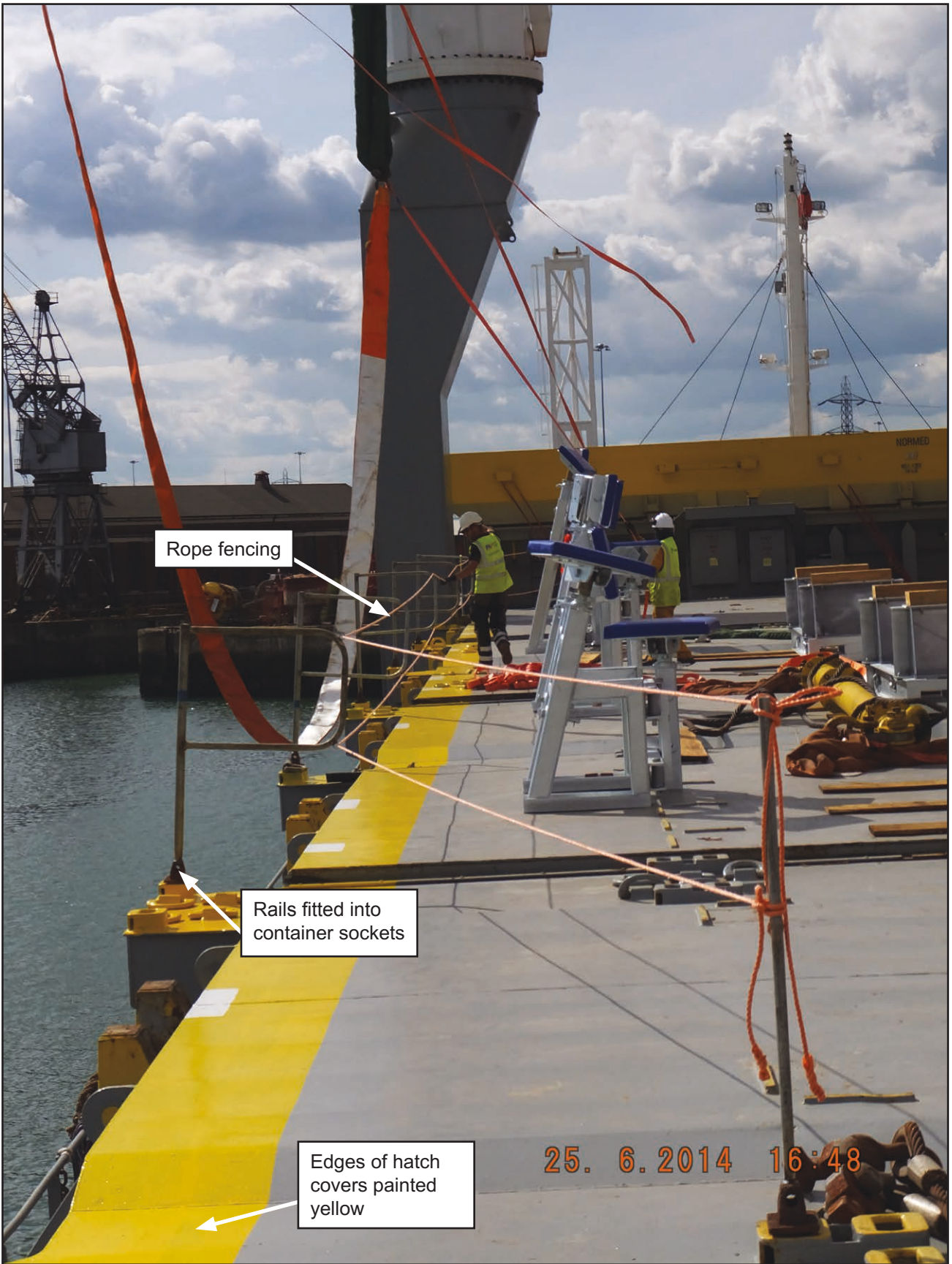


Figure 5: Delineation of deck edge and rigging of temporary fencing

1.4.2 Role as cargo handlers

In general, the loading and discharging of cargo in ports is carried out by dock workers and shore stevedores. During the cargo loading operation in Southampton the ship's crew, acting as 'charterer's servants', were tasked to carry out the cargo handling duties under the guidance of the loadmaster. This arrangement can be beneficial to the shipper, who can save on costs, and also to the crew, who may receive a cash payment.

The use of ship's crew to handle cargo is only possible where national, port, and local labour rules permit. The port of Southampton did not have any requirement to use shore stevedores for cargo handling operations.

1.5 NORJAN

1.5.1 General background

Norjan was owned by Universal Shipping B.V. and was registered as a general cargo ship in Luxemburg. It was on charter to Normed International B.V. (Normed) and was managed by Reederei Erwin Strahlmann e.K (RES). *Norjan* was one of three ships operating as multi-purpose vessels on Normed's trading routes between northern Europe and the eastern Mediterranean.

Built in 2007, *Norjan* was primarily designed to transport bulk⁵ dry cargoes and could carry up to 14,237 cubic metres of grain in its two cargo holds. It was also equipped to carry up to 671 twenty-foot equivalent units (TEU) of containerised cargo; 272 TEU in the holds and 399 TEU on deck. *Norjan* had a self-loading and self-discharge capability. Its two Liebherr heavy-lift deck cranes were each capable of lifting loads of up to 60t; when used in combination, loads of up to 120t could be lifted.

1.5.2 The hatch covers

Non-standardised cargo such as yachts, locomotives and steel coils were regularly carried on *Norjan*'s deck and in its holds (**Figure 6**). The deck cargo was stowed on top of the vessel's hatch covers and container loading platforms. *Norjan*'s pontoon-type hatch covers had been strengthened to support heavy loads and were fitted with raised sockets and D-rings for the securing of containers. The D-rings were also used to secure non-standardised cargo.

The hatch covers were accessed from the main deck via the hatch coaming. Vertical ladders (**Figure 7**) were welded to the sides of the hatch coaming but no stanchions or grab rails had been provided above them to help people climb onto the hatch coaming or hatch covers. Fold-away cargo viewing platforms and grab rails were located adjacent to each of the vertical ladders.

The top of the hatch coaming was about 2m above the main deck, and the height between the top of the hatch cover and the deck, where the chief officer fell, was approximately 2.4m. There were several container securing sockets, D-rings and a sloped section of deck on the hatch cover close to where the chief officer tripped (**Figure 8**). The raised sockets were marked with yellow paint but the D-rings were the same colour as the deck.

⁵ Bulk cargo is unpackaged material such as grain, gravel, coal or wood pellets.

Images courtesy of Juergen Braker/Fleetmon.com



Images courtesy of Bosphorus Strait news



Figure 6: Examples of non-standardised cargoes on board *Norjan*

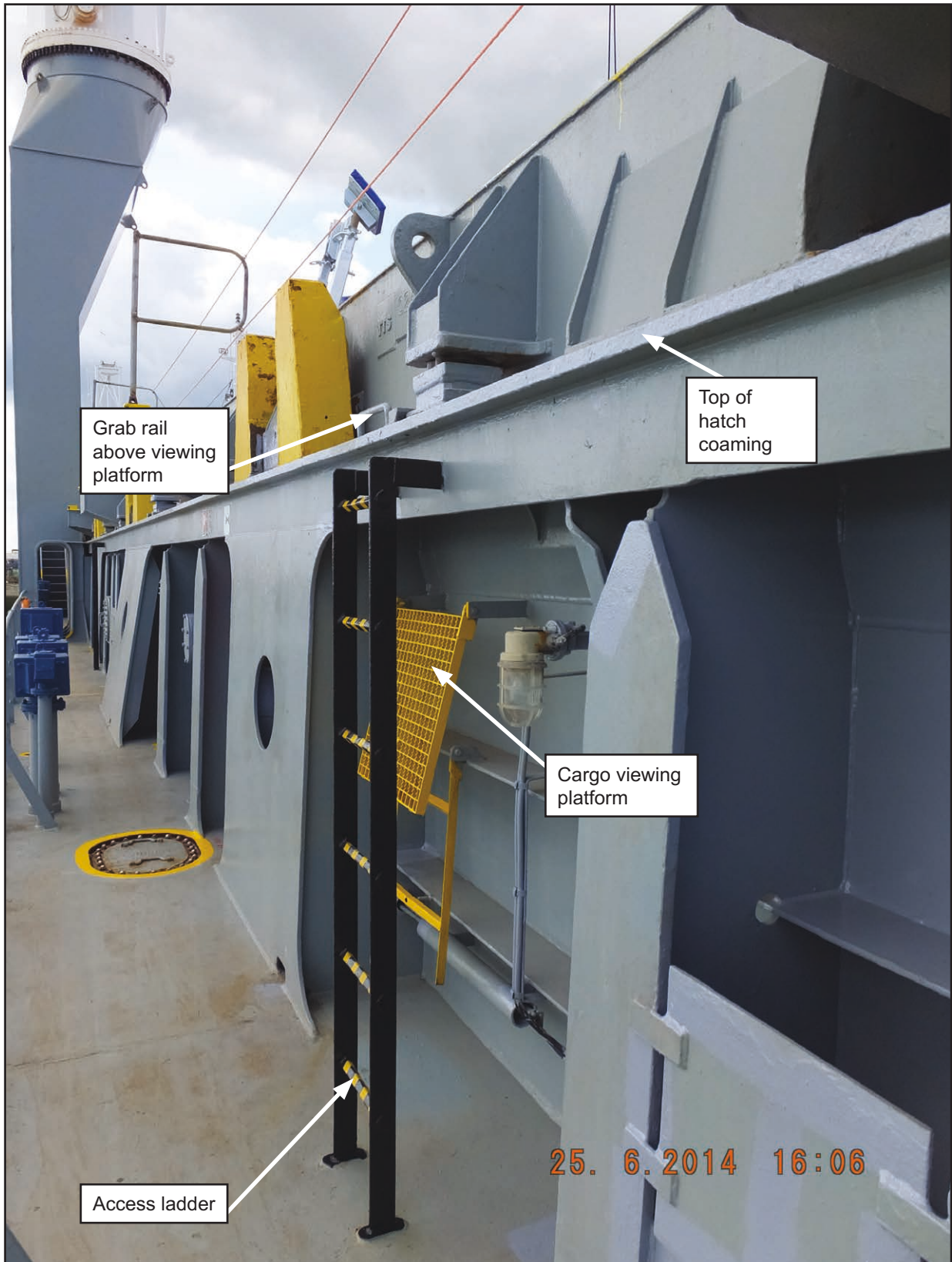


Figure 7: Access and egress route for hatch covers

Several additional trip hazards (**Figure 8**) had been created on the surface of the hatch covers during the cargo loading operation; these included: lifting strops, rope, wooden planks and chocks, and portable ladders. Access routes and safe areas had not been designated and no provision had been made for the rigging of temporary fencing⁶ around the exposed edges of the hatch covers.

⁶ Fencing is a generic term for guardrails, safety rails, safety barriers and similar structures that provide protection against people falling.



Area where chief officer tripped



Hatch covers looking forward - lashing gear, electric cables, wooden planks etc on deck

Figure 8: Trip hazards on the hatch covers

1.6 NORJAN'S SAFETY MANAGEMENT SYSTEM

1.6.1 General

RES managed over 50 vessels and issued a common safety management system (SMS) to each of them. The company's SMS was documented in two manuals: the *Safety Management Manual (SMM)* and the *Emergency Response Manual*.

The SMM comprised three main sections: general information, procedures and instructions, and management forms. The procedures and instructions section contained chapters on *risk assessment, loading and discharging vessels, and safety at work*.

The chapter on loading and discharging vessels explained that the master had overall responsibility for the loading and discharging of the vessel. It also stated that either the master or the chief officer could assume the role of the cargo officer. The cargo officer was required to stow and secure cargo in accordance with the guidance contained in the ship's Cargo Securing Manual (CSM). The cargo officer was also directed to pay particular attention to the information exchange process with freighters and cargo loaders prior to arrival in port. Although the master was on deck when the accident happened, the chief officer was acting as the cargo officer.

According to the SMM, the officer of the watch was responsible for the supervision of the safety measures during cargo operations. The chapter on safety at work stated that:

Each employee is himself responsible and accountable for adherence to the safety at work regulations, as e.g. MCA (Maritime and Coastguard Agency) "Code of Safe Working Practices for Merchant Seamen" [sic]

The safety at work instructions also stated that the International Labour Organization's (ILO) *Accident prevention on board ship at sea and in port* was available on board and had to be observed.

1.7 RISK ASSESSMENTS

Guidance on RES's risk assessment process was contained in the SMM. The company had compiled a list of activities (**Annex A**) connected with the key shipboard operations of its vessels, and carried out initial risk assessments for each of them. These generic risk assessments were annexed to the SMM. The company also provided blank risk assessment forms to allow its ships' crew to conduct additional ship and task-specific risk assessments.

To assist the risk assessment process, RES provided a list of generic hazards on its risk assessment forms and a list of generic control measures (**Annex B**). The generic hazards listed on the risk assessment forms included *falls from height and slips/falls on the level*.

Four generic risk assessments relating to *cargo operation and handling of lifting gear* were listed in the SMM; these were:

- 3.1 - *Operation of lifting gear,*
- 3.2 - *Container securing,*
- 3.3 - *Hatch cover operation-pontoons, and*
- 3.3 - *Receiving of stores and provisions.*

There was also a risk assessment for *working aloft on ship's masts, posts etc.* [sic]

The SMS required ships' masters, which were employed on board for 2 months or more, to conduct at least one review of the vessel's risk assessments. The risk assessments were also reviewed annually by the company's Designated Person or Safety and Securing Director.

Generic risk assessment 3.2 *Container securing* was last reviewed on 20 May 2013 and had been renamed *Securing of deck cargo (Annex C)*. For the hazard *falls from height* the following description was given:

Acting on top container tier or close to open hatches

The generic control measures listed were:

- 1 – *Instructing of relevant crew members regarding the activity/matter in question and providing of directives and working instructions to inform and advise the crew members concerned.*
- 10 – *Wear the particular personal protective equipment (PPE) or other clothing subject to the activity to be performed.*
- 13 – *Mounting of appropriate fencings or barriers to keep crew members away from danger zones.*

For the hazard *slips/falls on the level* the following description was given:

Coming across items laying/mounted on deck.

The generic control measures listed were:

- 11 – *Care for transit areas and work places free of obstructions and tidied up.* [sic]
- 12 – *Prompt removal of any slip danger causing substances from anywhere.* [sic]

Risk assessment 3.3 *Hatch covers operations-pontoons* also identified falls from height as a hazard when persons stood on top of stacked pontoons. The prescribed control measures were instructions to crew and use of PPE.

The generic risk assessments for *cargo operation and handling of lifting gear* rated the residual risk, with the prescribed control measures in place, as very low for all the hazards identified. None of the crew on board *Norjan* (or the loadmaster) wore fall prevention or fall arrest PPE, and no fencing was erected around any part of the hatch cover edges.

1.8 CARGO STOWAGE AND SECURING

The International Maritime Organization (IMO) provides safety guidance for cargo stowage and securing in its Code of Safe Practice for Cargo Stowage and Securing (CSS Code). In accordance with the International Convention for the Safety of Life at Sea, 1974 (SOLAS) Chapters VI and VII, and the CSS Code, cargo units must be stowed and secured in accordance with a CSM that has been approved by the vessel's flag administration.

Norjan's CSM was compiled in 2007 and was approved by Germanischer Lloyd. It had been specifically prepared for the vessel's role as a container ship but also included guidance for the stowage and securing of non-standardised cargo.

The CSM comprised 4 chapters and 16 annexes: Chapter 1 provided general information; Chapter 2 described the securing equipment; Chapter 3 discussed the requirements for non-standardised cargo; and Chapter 4 covered stowage and securing of containers. Chapters 3 and 4 included sub-chapters that provided cargo handling guidance and instructions to help protect the safety of those involved in the stowage and securing of cargo.

The introduction to Chapter 3, *Stowage and securing of non-standardised cargo (general cargo)*, stated:

This ship is preferably carrying containers in a standardised stowage and securing system as described in Chapter 4 of this manual.

In very rare cases oversized and/or heavy cargo units may be carried on platforms or on platform based containers (flat racks). These cargos have to be secured under the responsibility of the master...

The safety instructions in this chapter were very brief and fall hazards were not discussed.

The hazards considered in Chapter 4 (**Annex D**) included falls from height. The safety instructions determined that a fall hazard was to be assumed whenever:

...Personnel is required to work within 0.9m of the unprotected edge of a work surface which is 3m or more above the adjoining surface and 0.3m or more, horizontally, from the adjacent surface. [sic]

The sub-chapter also discussed the specific hazards associated with working on top of containers and the use of fall protection equipment.

1.9 PETERS & MAY

1.9.1 General

Peters & May, based in Southampton, has provided a global boat transfer and marine freight service for over 25 years. By 2014, the company was delivering more than 3000 yachts annually throughout the world and had extensive experience of working with high-value boats. The company appointed a loadmaster to oversee all aspects of its boat delivery operations.

The role of the loadmaster was to liaise with the boat owners and ship's crew at the point of loading and discharge. His duties were to co-ordinate the loading and positioning of the cradles and lashing equipment, ensure that the yachts were loaded and unloaded without damage, and that they were secured effectively to his, and the master's, satisfaction.

1.9.2 The loadmaster

The loadmaster on board *Norjan* was British and was 48 years old. He had a military logistics background and had extensive experience of transporting high-value boats.

1.9.3 Safety management system

Peters & May's SMS for its yacht transportation operations contained a set of standard operating procedures, generic risk assessments and safe systems of work. The activities for which standard operating procedures had been produced included:

- *Lifting a boat*
- *Placing a boat into a cradle*
- *Securing a boat and cradle*
- *Working at height – restraint system*
- *Lifting a boat from water in the port of Felixstowe*

The company's procedures, with the exception *Lifting a boat from water in the port of Felixstowe*, stated that its loadmasters will have overall control of lifting a boat, placing it in a cradle, and securing it and its cradle to the ship. The procedure for the port of Felixstowe reflected the port's requirement for its shore stevedores to conduct the cargo loading operations. The procedure stated that the port's chargehand would have overall control of the lift.

Prior to each job, Peters & May issued a tasking order to the loadmaster that provided the relevant information needed for each lift. The loadmaster was then required to verify the information and deliver a toolbox talk to all personnel involved in the lift.

The company had produced three risk assessments and safe systems of work for working at height. They covered the specific tasks of de-rigging the lifting gear, access and egress of a boat ashore or on a ship, and moving around a boat to hang lashings.

The company's standard operating procedure for working at height focused on the task of removing the lifting gear from yachts on ships. This work required the use of Peters & May's personal fall restraint equipment, which comprised: *harness, rope, locking device, carabineers* and *1m lanyard*. The procedure stated that the loadmaster would assess each vessel to be worked on and then apply the correct risk assessment and safe system of work. The loadmaster had authority to cease operations if he deemed it was unsafe or impractical.

The loadmaster did not deliver a toolbox talk to the ship's crew prior to the loading operation commencing and no fall restraint equipment was used on board *Norjan*.

1.10 REGULATIONS AND GUIDANCE

1.10.1 General

The master and crew of *Norjan*, and Peters & May, had specific duties to comply with the requirements of health and safety legislation regarding working at height and lifting operations. The master and crew had to comply with UK legislation because *Norjan* was in a UK port; and Luxembourg's merchant shipping legislation because of their flag of registry. Both the work at height and lifting operations compliance requirements were similar, as the UK and Luxembourg fulfilled the requirements of the relevant EU Directives. Peters & May was required to comply with UK shore health and safety legislation, which was very similar to the maritime regulations.

1.10.2 Work at height regulations

The UK's Merchant Shipping and Fishing Vessels (Health and Safety at Work) (Work at Height) Regulations 2010⁷ were introduced to satisfy the requirements of the EU work at height Directive. The regulations define work at height as:

work in any place on a ship.....where, if the measures required by these Regulations were not taken, a person could fall a distance liable to cause personal injury

The regulations require that work at height is properly planned by a competent person, appropriately supervised, and carried out in a safe manner.

The regulations also require that employers ensure that risks are minimised and, specifically, that where necessary appropriate safeguards are put in place to prevent falls, or where that is not possible, to arrest falls should they occur.

The MCA provided details and guidance on its interpretation of the regulatory requirements in its Marine Guidance Note (MGN) 410 (M+F) and its Code of Safe Working Practices for Merchant Seamen (COSWP).

⁷ The equivalent UK shore health and safety regulations were *The Work at Height Regulations 2005*.

1.10.3 Lifting operations regulations

The UK's Merchant Shipping and Fishing Vessels (Lifting Operations and Lifting Equipment Regulations) 2006⁸ (LOLER) were introduced to fulfil the requirement of European Directives 89/655/EC and 95/63/EC. The MCA provided details and guidance on the interpretation of the LOLER requirements in its MGN 332 (M+F).

The regulations place duties on personnel who have control of lifting equipment and lifting operations, and require employers to comply with the principles and guidance contained in Chapter 21 of the COSWP. As with the work at height regulations, LOLER states that all lifting operations must be properly planned, appropriately supervised and carried out in a safe manner.

1.10.4 Code of Safe Working Practices for Merchant Seamen

The COSWP is produced by the MCA and provides guidance on the safe conduct of the most common hazardous activities carried out on board ships. The MCA maintains and publishes COSWP primarily for use by merchant seamen employed on board UK registered ships, and it is a mandatory requirement for COSWP to be carried on UK registered ships. In the interests of promoting safety at sea, COSWP is available to download free of charge on the MCA's website. It is commonly carried by many foreign flagged ships and, as on board *Norjan*, is often referred to in those vessels' SMSs.

Section 21.12.7 of COSWP, titled *Lifting plant: Lifting operations*, stated that:

Loads should if possible not be lifted over a person or any access way, and personnel should avoid passing under a load that is being lifted.

Chapter 15 of COSWP, entitled *Safe systems of work*, suggested control measures that could be taken to protect those at risk in some key areas on board ship. Sub-chapter 15.2, entitled *Working aloft or outboard*, provided guidance on working at height (**Annex E**) and gave the following definition:

Anyone working and not standing on level ground or at deck level is working at height. Also undertaking work inside a tank, near an opening, such as a hatch, or on a fixed stairway may be regarded as working at height if there is a danger of injury if the worker fell.

The guidance explained that, as with all hazardous activities, working at height should always be avoided if an alternative option is available. The guidance went on to explain:

Where work must be carried out at height, the employer must ensure that such work is properly planned, appropriately supervised and carried out in as safe a manner as is reasonably practicable. In this context, planning should include the carrying out of a risk assessment in accordance with regulation 7 of the MS (Health and Safety at Work) Regs 1997 No 2962 which might include considering potential risks from falling objects or fragile surfaces.

⁸ The equivalent UK shore health and safety regulations were *The Lifting Operations and Lifting Equipment Regulations 1998*.

Chapter 4 of COSWP provided information and guidance on the use of PPE and sub-chapter 4.10.1 discussed protection from falls. It stated that all personnel who were working aloft, outboard or below decks, or in any area where there was a risk of falling more than 2m, should:

wear a safety harness (or belt with shock absorber) attached to a lifeline.

The COSWP also contained a suggested minimum list of work activities that should be subject to a ship's permit to work system. Working aloft or over the ship's side was included in the list. The stowing and securing of cargo on *Norjan's* hatch covers was not subject to the ship's permit to work system, and none of the crew or shore contractors wore personal fall protection equipment during the cargo loading operation.

1.10.5 The International Labour Organization's accident prevention code of practice

The ILO's publication *Accident prevention on board ship at sea and in port* is a code of practice that contains practical advice on shipboard health and safety. It is not a legally binding document and is not intended to supersede national laws or regulations.

Much of the guidance and advice contained in the ILO's accident prevention code of practice was similar to that in the MCA's COSWP. The guidance explained that all cargo operations should be under the control of a responsible officer or experienced seafarer, and the officer with primary responsibility for cargo operations should:

Check that all safety features are in place and that any possible hazards are clearly marked and otherwise dealt with to prevent injury to any persons who may be working on board the vessel.

The section covering working on deck or in cargo spaces recommended that:

loads being lowered or hoisted should not pass or remain over any person engaged in loading or unloading or performing any other work in the vicinity.

1.11 SIMILAR ACCIDENTS

1.11.1 Falls from height

The statistics compiled by the UK government's Health and Safety Executive for accidents ashore consistently show that falls from height are the biggest cause of workplace fatalities within the UK. Since 2001, an average of 50 people have died each year in the UK as a result of a fall from height, and between 4,000 and 5,000 have suffered major injuries. Over 80% of those major injuries were caused by *low falls* (below 2m).

1.11.2 Accidents to persons during cargo stowage and securing operations

In 2008 the IMO's Marine Safety Committee (MSC) highlighted that injuries to dockworkers while lashing or unlashng containers to the decks of visiting ships, accounted for the majority of accidents that occurred within container ports. It also warned that ships' crew engaged in similar operations faced the same dangers. In June 2010, the IMO issued MSC.1/Circ.1352 *Amendments to the Code of Safe*

Practice for Cargo Stowage and Securing (CSS Code). The aim of the amendments was to ensure that persons engaged in carrying out container securing operations on deck have safe working conditions, in particular safe access to lashing positions, appropriate equipment and safe places of work.

The additional safety requirements and guidance were inserted into the CSS Code as Annex 14: *Guidance on providing safe working conditions for securing of containers on deck*. The entire Annex 14 amendments apply to container ships, whose keels were laid on or after 1 January 2015; the principles contained in Sections 6 (Design) and Section 7.2 (Operational procedures) apply to existing ships such as *Norjan*.

Section 6 provided guidance on the application of a risk assessment process in the development of a Cargo Safe Access Plan (CSAP). The hazards to be assessed included *slips, trips and falls*; and *falls from height*. The general safety controls identified included the provision of non-slip surfaces, the delineation of walkways on deck by painted lines, and the provision of fencing. Section 7.2.1 *Container deck working* emphasised the need to keep transit areas safe and clear, and the importance of fencing for the prevention of falls.

The IMO invited member governments to bring the CSS Code amendments to the attention of ship owners, ship operators, crews and other parties concerned. In August 2012, the MCA met this requirement by issuing its Marine Information Note (MIN) 439 (M). The MCA issued a second MIN (491 (M)) in August 2014 and provided its interpretation of the requirements for existing container ships in MGN 531 (M)⁹. The amendments became mandatory on 1 January 2015.

1.11.3 MAIB statistics and investigations

The MAIB has conducted several investigations where crew members have fallen from hatch covers into holds and overboard.

On 17 December 2011, a crewman fell approximately 25m into a partially open hold on board the container vessel *Tempanos* while it was berthed in the port of Felixstowe, England. There were no witnesses to the accident, but the available evidence indicated that the crewman probably slipped on a patch of ice while walking across a hatch cover.

The investigation¹⁰ found that *Tempanos's* SMS did not contain sufficient guidance or instructions to the crew about the hazards of walking on partially open hatch covers. A recommendation was made to the ship's management company to review its safe systems of work.

⁹ MGN 531 (M): CARGO STOWAGE AND SECURING – Code of Safe Practice for Cargo Stowage and Securing (CSS Code) – Guidance on application of section 6 of Annex 14 for existing container ships.

¹⁰ MAIB report No.20/2012: MV *Tempanos* - Fatality from fall into cargo hold Felixstowe on 17 December 2011.

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 THE ACCIDENT

Norjan's chief officer fell off the edge of the hatch cover while supervising the cargo loading operation, and suffered multiple fractures to his ankles that prevented him working for almost a year. Following the instructions of the Peters & May loadmaster, he had positioned himself under the stern of a suspended motor yacht close to the unfenced edge of the aftermost hatch cover (**Figure 3**). Having helped guide the suspended yacht into its cradle, the chief officer turned to walk back towards his original control position. As he turned, he tripped, lost his balance and fell to the deck below.

There were several trip hazards close to where the chief officer had been standing and the surface of the hatch cover was slightly uneven, but no one saw him fall and it is uncertain what caused him to stumble. The chief officer might have tripped on a raised container deck socket or a D-ring, or he might simply have dragged his feet and stumbled as he tried to walk up the inclined section of the hatch cover.

Once the chief officer lost his balance, there were no safeguards in place to prevent him from falling off the hatch cover. Having fallen, the chief officer was injured because there was nothing in place to arrest his fall. Had the chief officer not been able to twist his body and position himself to land feet-first on a clear section of deck, it is likely that he would have suffered a more serious injury.

2.3 THE CARGO STOWAGE AND SECURING OPERATION

2.3.1 Working on the hatch covers

Norjan was operated by Normed as a multi-purpose vessel and was regularly scheduled to carry non-standardised cargo in its holds and on its hatch covers. As such, the stowage and securing of deck cargo on the hatch covers was a frequent activity for the crew and the hatch covers were treated as a normal working deck.

Although primarily built to carry bulk dry cargo, *Norjan* was designed and equipped to carry containers and non-standardised cargo on its deck. This meant that the ship's crew and dockworkers were expected to gain access to and work on the hatch covers during loading and discharging operations. The many raised container deck sockets and D-rings on the hatch covers presented a trip hazard and most were painted yellow to make them stand out. However, the risk of tripping was significantly increased by the amount of loose materials and dunnage left lying about on the deck during the loading operation.

The chief officer's accident demonstrated the ease with which a person can simply trip or stumble on a flat surface. As permanent guardrails had not been fitted around the edges of the hatch covers, the risk of falling 2.4m to the deck below, or even overboard, was ever present and had to be managed on board. A similar situation

existed on the container flat rack platforms aft of the hatch covers, which were also used to stow motor yachts (**Figure 9**), but the height above deck level was even greater.

Images courtesy of P Massey



Figure 9: Motor yachts loaded onto *Norjan's* aft container landing platforms

2.3.2 Perception of risk

It was apparent that the free movement of personnel on *Norjan's* hatch covers was not considered to be particularly hazardous. This was evident during the loading operation when the crew continually walked and worked close to their unfenced edges; as did the loadmaster and other shore-based workers (**Figure 10**). It was also apparent that the perception of the crew was that personal care and vigilance was sufficient to avoid tripping on, or falling off the hatch covers.

Personal care and vigilance must always be exercised when working cargo; this is particularly so during lifting operations and when personnel are exposed to fall hazards. However, when a person is required to undertake work in a hazardous environment, it is difficult for them to give full attention to the task while at the same time guard themselves against danger. This was the case when the chief officer was tasked to align the motor yacht in its cradle, and therefore additional precautions should have been taken.

It is possible that the crew and loadmaster's perception of risk had been influenced by the quality of the information and guidance provided in their SMSs. However, the reality was, they had paid little attention to the safety instructions provided by their companies and they gave very little regard to the risks posed when working on the hatch covers and loading deck cargo.



Figure 10: People walking and working close to the exposed edges of the hatch covers

2.4 SAFE SYSTEMS OF WORK

2.4.1 Lifting the yachts on board

In accordance with LOLER, all lifting operations need to be properly planned, appropriately supervised and carried out in a safe manner. The COSWP and the ILO accident prevention code of practice both warn that loads being lowered or hoisted should not pass or remain over any person engaged in loading or unloading.

The lifting operation on board *Norjan* was not properly planned, appropriately supervised or carried out in a safe manner. The fall hazards had not been identified, the deck was untidy, roles and responsibilities were unclear and personnel were routinely required to work under the suspended motor yachts.

2.4.2 Work at height

Seafarers have traditionally categorised work at height as either working aloft (e.g. climbing masts) or working over the ship's side. Working in close proximity to the unfenced edges of the hatch covers was not specifically discussed as an activity in *Norjan's* SMM nor was it identified as a hazard in its risk assessments. For container securing operations, the vessel's CSM stated that:

a fall hazard was to be assumed whenever personnel were required to work within 0.9m of an unprotected edge of a work surface which was 3m or more above the adjoining surface.

This guidance was probably based on the standard height of an ISO container and aimed at protecting personnel who were required to work on the top of a container. However, it was not in accordance with the work at height regulations or the instructions and definitions provided in COSWP. COSWP advised that personnel who were working in any area where there was a risk of falling more than 2m, should wear a safety harness and lifeline with shock absorber.

According to the UK government's Health and Safety Executive (**Paragraph 1.10.1**) falls from height on land are the single biggest cause of workplace fatalities and major injuries. Furthermore, over 80% of the major injuries recorded were the result of falls from heights of below 2m.

Although minimum heights are often used as a benchmark to define working aloft or working at height, this approach can be too simplistic and can inadvertently affect a worker's perception of the risk he/she faces. It is important to remember that the likelihood of falling off an unprotected edge remains the same regardless of height; however, the consequences can differ dramatically depending not only on the height of the fall, but also the conditions below.

2.4.3 Precautions to be taken when working at height

Whenever people are required to work in an area where there is a reasonable risk that they could fall a distance liable to cause personal injury, as was the case during the cargo loading operation on board *Norjan*, their tasks should be properly planned and supervised. During the planning stage, appropriate control measures should be identified and precautions put in place to protect those undertaking the work and anyone that may be affected by the work. When identifying the safety controls required to minimise the risk of falling from height, the simple hierarchical principle¹¹ of **avoid**, **prevent** and **minimise** should be applied:

- **Avoid** – if you do not have to go up there, then do not.
- **Prevent** - if it is not possible to avoid work at height, use work equipment or other measures to prevent falls; for example, rig temporary fencing or use fall prevention PPE.

¹¹ The application of the hierarchical control principle of *avoid*, *prevent* and *minimise* is discussed in the UK Health and Safety Executive's publication *Working at height – a brief guide* (INDG40).

- **Minimise** - if the risk of a fall cannot be eliminated, use work equipment or other measures to minimise the distance and consequences of a fall should one occur; for example, rig safety nets or air bags, or use fall arrest¹² PPE.

Equipment used for work at height must be the most suitable for the task in hand, and priority should be given to protecting all those working in the area (collective protection) over protecting individuals (personal protection). Examples of collective protection measures include the rigging of temporary fencing, toe boards and safety nets (**Figure 11**). Personal protection is provided through the use of safety harnesses and lanyards (**Figure 12**).

If working close to the unfenced edge of the hatch cover could not have been avoided, then steps to prevent a fall should have been taken. Had the crew fenced off the exposed edges of the hatch covers or used a fall prevention PPE the chief officer would not have fallen off the hatch cover. Had safety nets, air bags or other fall arrest equipment been rigged, the chief officer might not have been injured.

2.5 ROLES AND RESPONSIBILITIES

Peters & May's procedures for loading the motor yachts onto *Norjan* in Southampton, stated that its loadmaster would have overall control of lifting the yachts, placing them in their cradles, and securing them and their cradles to the ship. However, *Norjan's* master had overall responsibility for the cargo loading operation and the safety of all those working on board his vessel; the loadmaster was employed to provide his expertise.

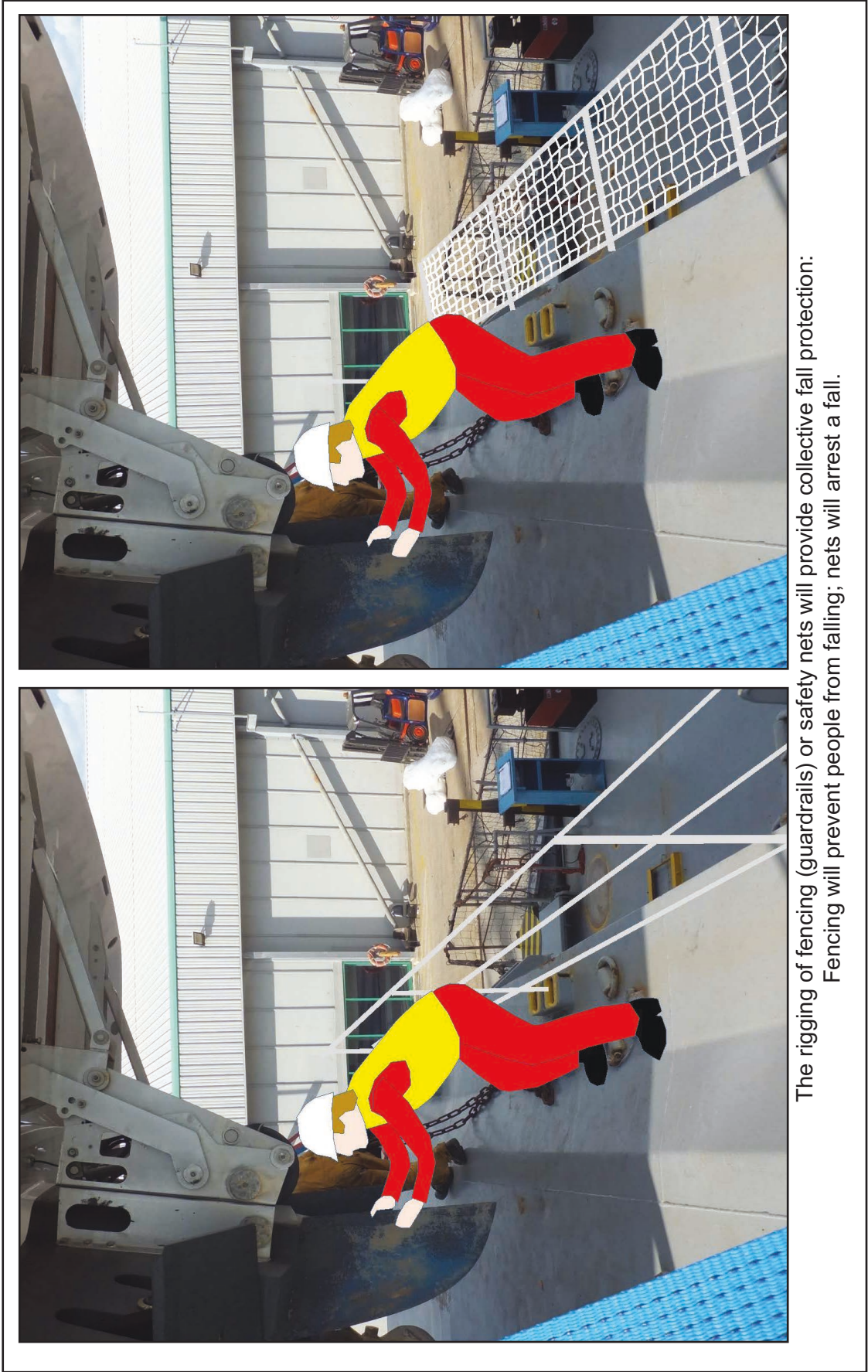
As a contractor working on board a merchant vessel, the loadmaster was required to follow *Norjan's* safety procedures and work within the constraints of its SMS. He also had an obligation to implement his company's standard operating procedures and comply with UK shore based health and safety legislation.

The master was on deck at the time of the accident but the chief officer had assumed the role of the ship's cargo officer. As such, the chief officer was responsible for ensuring the cargo was stowed and secured in accordance with the guidance contained in the ship's CSM. However, the respective roles and responsibilities of the key personnel were ambiguous, with the result that none of them took responsibility for safety. Specifically:

- The loadmaster did not brief the crew prior to the operation.
- The chief officer did not demand a briefing before work started.
- When the chief officer became actively involved in aligning the yacht, he ceased to participate in controlling the operation and overseeing safety.

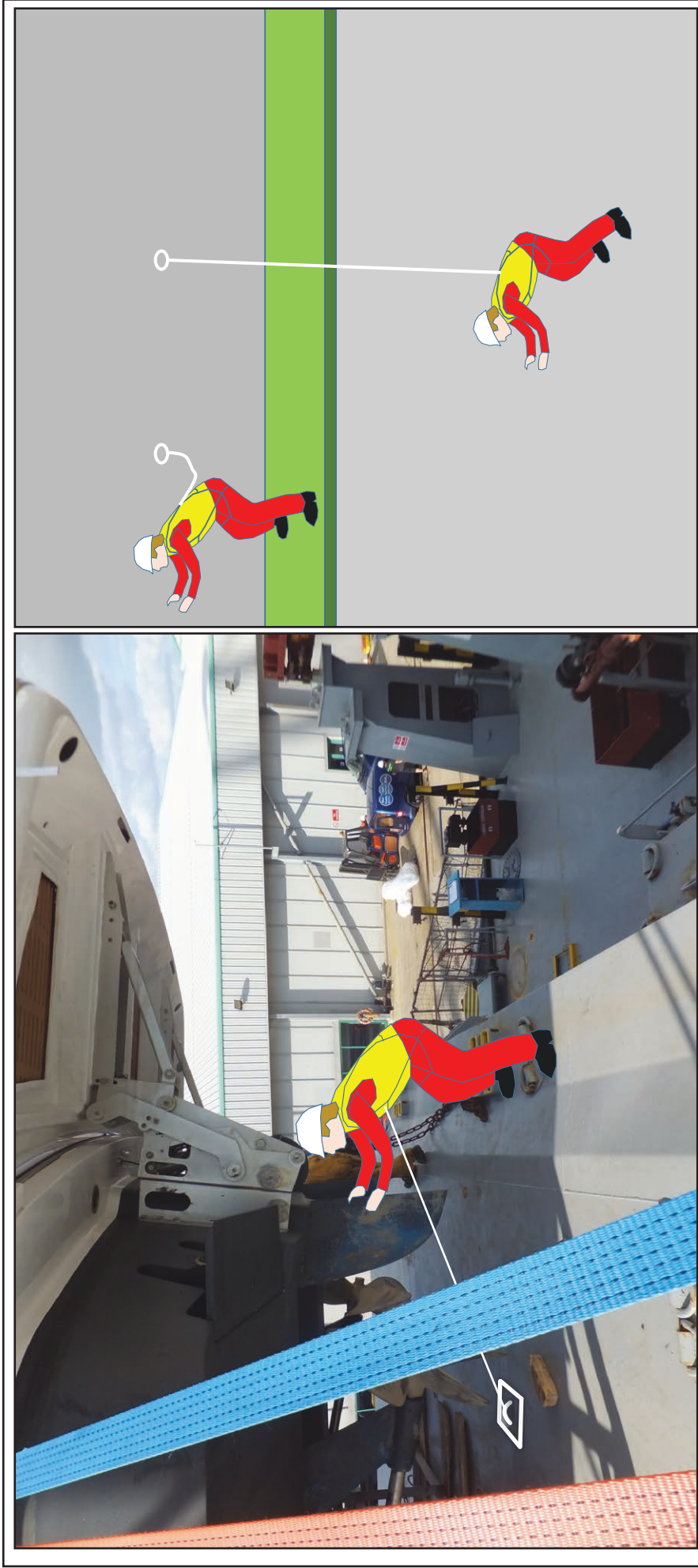
Had procedures been in place that allowed Peters & May to monitor the performance of its loadmasters and verify that its procedures were being implemented, a loading plan and crew briefing might have been delivered. A detailed loading plan and a crew briefing would have avoided any confusion and might have resulted in the operation being conducted in a safer manner.

¹² Personal fall arrest lanyards and shock absorbers typically require the user to be working at a minimum height to prevent them hitting the deck or any other objects below as they fall.



The rigging of fencing (guardrails) or safety nets will provide collective fall protection:
Fencing will prevent people from falling; nets will arrest a fall.

Figure 11: Examples of collective fall protection



Safety harness and lanyard used for personal fall prevention length of lanyard prevents the worker from reaching the expose edge of the deck and therefore prevents him reaching a position from where he can fall.

Safety harness and lanyard (with shock absorber) used for personal fall arrest

Figure 12: Examples of personal fall protection equipment

2.6 SAFETY MANAGEMENT SYSTEMS AND RISK ASSESSMENTS

Norjan's SMS contained a set of generic risk assessments that were originally generated by the vessel's managers to cover the key activities the crew were expected to undertake on board. Four of *Norjan's* risk assessments related to cargo operations and the handling of lifting gear, one of which was for the securing of deck cargo. The risk assessments specifically identified working on top of containers and stacked pontoons, and working close to open hatches as activities that presented fall hazards. The control measures listed in the risk assessments included the rigging of temporary barriers and the use of PPE.

Peters & May's SMS contained three risk assessments for activities that identified falls from height as being a hazard. All three involved tasks where people had to work on top of the yachts. As a control measure, the company provided personal fall prevention safety harnesses and lanyards.

Norjan's risk assessment for the securing of deck cargo and Peters & May's safe systems of work did not specifically identify falling off the hatch covers as a hazard. However, the risk of falling off the unfenced edges during cargo operations was obvious. It was standard practice for the loadmaster to require someone to align the suspended boats with their cradle chocks (**Figure 13**). Therefore, given the stowage plan, it was entirely foreseeable that someone would be tasked to work close to the after edge of the hatch covers.

The vessel's SMM included procedures for the periodic review of its generic risk assessments and guidance on the conduct of task specific risk assessment. Had the ship's crew and the loadmaster conducted a task specific risk assessment, it is likely that the fall hazard would have been identified. Had that been the case, controls might have been put in place to minimise the risk to those involved in the cargo operation.

Following the MCA's port state control intervention, the ship's crew fabricated and erected a temporary fencing system similar to that prescribed in one of *Norjan's* generic risk assessments. Had RES provided the vessel with a ready use portable fencing system, its use would have prevented this accident.

2.7 CARGO SECURING MANUAL AND CARGO SAFE ACCESS PLANS

2.7.1 Cargo securing manual

In recognition of the enhanced dangers faced by those engaged in the stowing and securing of deck containers, the IMO introduced revised guidelines for container ship design, the application of CSAPs and the development of CSMs. The new guidelines were set out in 2010 as an amendment to the CSS Code, and had to be applied in its entirety for container ships, the keels of which were laid on or after 1 January 2015. As an existing general cargo ship designed and equipped to carry containers, *Norjan's* owners were required to comply as far as reasonably practicable with the new design and operational procedures guidelines.

Norjan's CSM was developed primarily to satisfy the international standards required of a ship equipped to carry containers. It contained some information about non-standardised cargo but its cargo handling and safety instructions focused almost entirely on the stowage and securing of containers.



Figure 13: Examples of final keel alignment procedure

The CSM had not been revised or amended to reflect the IMO's CSAP guidance and its safety instructions were limited and lacked detail. Safe access routes and danger zones had not been identified: specifically; the risk of falls from the hatch covers had not been considered (so the edges of the hatch covers had not been marked), and the collective fall protection equipment (temporary barriers) identified as a control measure, had not been provided.

The CSM did not accurately reflect *Norjan's* role as a multi-purpose vessel or address the latest container vessel safety standards. Importantly, they did not reflect the guidance recently issued by the IMO in the CSS Code, and there was no requirement for the crew to generate a CSAP for loading non-standardised cargo.

2.7.2 Cargo Safe Access Plans

The specific aim of the IMO's new guidelines was to provide safe working conditions and, in particular, safe access, appropriate securing equipment and safe places of work for those involved in the securing of deck containers.

Norjan's application of the CSAP process would provide an opportunity to identify areas where minor design alterations would improve the level of safety for the ship's crew and any other people tasked to work on the hatch covers. For example, the access and egress route for the hatch covers was unnecessarily difficult and could be made significantly easier, and therefore safer, by simple design improvements.

Although targeted at container ships, the CSAP principles are equally valid for the stowage and securing of non-standardised cargoes. However, the nature of *Norjan's* operations as a multi-purpose vessel carrying a wide variety of non-standardised cargo would require its crew to remain flexible and develop cargo-specific safe access plans. Regardless, the process would also have probably identified the edges of the hatch covers as danger zones and highlighted the need for fencing (temporary or permanent) in certain commonly accessed areas.

The implementation of the amended CSS Code requirements would address many of the issues identified in this report. There is therefore a compelling case for the principles of a CSAP to be applied to the stowing and securing of non-standardised cargo on board *Norjan*.

SECTION 3 - CONCLUSIONS

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

1. The chief officer fell from the hatch cover to the main deck 2.4m below because he stumbled and lost his balance while working close to the unfenced edge of *Norjan's* hatch covers. [2.2]
2. The chief officer was injured because there was nothing in place to arrest his fall. [2.2]
3. Working on the hatch covers was a day to day activity; without edge protection, the risk of falling off the hatch covers was ever present. [2.3.1]
4. The crew and the loadmaster gave insufficient regard to the risks posed when working on the hatch covers; their perception was that the risk of falling off the hatch covers could be controlled by remaining alert to the hazard and taking care when working close to the edges. [2.3.2]
5. The lifting operation on board *Norjan* was not properly planned, appropriately supervised or carried out in a safe manner. [2.4.1]
6. The roles and responsibilities of the loadmaster and the ship's cargo officer were unclear to the crew. A detailed loading plan and a crew briefing would have avoided any confusion and might have resulted in the operation being conducted in a safer manner. [2.5]
7. The vessel did not carry the type of ready use portable safety barriers prescribed in its risk assessments; had it done so the likelihood of the crew fencing off the exposed edges of the hatch covers; and therefore preventing the accident, would have increased. [2.6]

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

1. The access and egress route for the hatch covers was unnecessarily difficult and could be made significantly easier, and therefore safer by simple design improvements. [2.7.2]
2. The implementation of the cargo safe access plan requirements set out in Annex 14 of the amended CSS Code would have addressed many of the issues identified in this report. [2.7.2]

SECTION 4 - ACTION TAKEN

Reederei Erwin Strahlmann GmbH & Co. KG has:

- Conducted a review of its SMS and provided additional specific guidance for the loading of deck cargoes and yachts.
- Issued a fleet circular highlighting the requirement for task-specific risk assessments to be carried out where operations are not fully covered by its generic risk assessments.
- Specifically, on board *Norjan*:
 - Painted a yellow hazard warning band around the outer edges of all hatch covers.
 - Fabricated portable safety railing stanchions, made to fit into the container deck sockets, to allow the crew to fence off danger zones.

SECTION 5 - RECOMMENDATIONS

Reederei Erwin Strahlmann GmbH & Co. KG is recommended to:

- 2015/160** Implement the applicable additional requirements for ships equipped to carry containers in the amendments contained in Annex 14 of the CSS Code.
- 2015/161** Apply, as far as is reasonably practicable, the principles of a cargo safe access plan to its non-standardised cargo stowage and securing operations.
- 2015/162** Provide work at height awareness training for its crews.

Peters & May Ltd is recommended to:

- 2015/163** Review its risk assessments and amend its standard operating procedures to ensure that the safety issues discussed in this report are addressed; in particular:
- Increased focus on the information exchange process
 - Clarification of roles and responsibilities
 - The formulation of task-specific cargo safe access plans
 - The risk of working in close proximity to unprotected deck edges.

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

