

**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 such 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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## Uncontrolled closure of a hatch cover resulting in one crew fatality on the cargo vessel *SMN Explorer* Alexandra Dock, King's Lynn on 1 February 2018

### SUMMARY

On 1 February 2018, a crewman from the cargo vessel *SMN Explorer* was fatally crushed while working on deck when a stowage space hatch cover fell on him. The weight of the crewman climbing up the inside of the open hatch cover after its locking pins had been removed caused it to topple forward and slam shut.

The accident was the result of procedural inadequacies and a lapse of supervision. The investigation identified that the vessel's safety management system was immature and the safety culture on board the vessel was weak. Risk assessments had not been conducted for routine tasks and a safe system of work had not been developed for opening and closing the forecastle (fo'c's'le) stowage space hatch cover.

Recommendations have been made to the vessel's managers, Sky Mare Navigation Co, to: improve the system of work for closing *SMN Explorer's* foredeck hatch; and, across its managed fleet, take steps both to improve the safety culture on board and, specifically, improve the maintenance management of lifting appliances.



### FACTUAL INFORMATION

#### NARRATIVE

At 0620<sup>1</sup> on 31 January 2018, the Liberia registered general cargo vessel *SMN Explorer* berthed at Alexandra Dock, King's Lynn, England. At 0800, the port's stevedores commenced discharging the vessel's cargo of packaged timber from

<sup>1</sup> All times stated are local time (UTC).

the deck. On completion, the vessel's chief officer (C/O) opened the cargo hold hatch covers and the stevedores began to discharge the timber from the ship's hold. At 1700, the stevedores left the vessel and cargo operations ceased for the day.

At 0815 the following morning the port's stevedores recommenced discharging the timber from *SMN Explorer's* cargo hold. At about 0900, the C/O went to the fo'c's'le and started the foremast crane, which he used to open the hatch to the fo'c's'le stowage space. With the hatch cover resting on its backstops and its lifting slings still attached to the crane hook, the C/O took the locking pins from the port and starboard anchor cable guillotine stopper bars<sup>2</sup> and inserted them into holes in the hatch cover hinges (**Figure 1**). He then disconnected the crane hook and hung the lifting slings over the top edge of the open hatch cover. The C/O raised the crane hook out of the way, stopped the crane's hydraulic powerpack and left the fo'c's'le.

The discharging of cargo was completed at 1100 and a dockside crane was then used to lift the ship's cargo slings back on board. At 1105, the C/O, assisted on the fo'c's'le by the vessel's second officer (2/O) and an able seafarer (AB), arranged the cargo slings in the stowage space (**Figure 2**). At 1120, the vessel's second AB, Alfred Ismaili, who was also the ship's cook, arrived on the fo'c's'le and announced that lunch was ready. A discussion took place between the crew and the decision was made to finish stowing the slings before eating lunch. Alfred remained on the fo'c's'le and helped to stow the remaining slings.

At 1124, the 2/O climbed down to the fo'c's'le head space, started the foremast crane hydraulic powerpack and passed the crane's remote control box to the C/O. Meanwhile, Alfred walked around the starboard side of the open hatch cover and seeing this the other AB then walked around the port side. Each AB removed the locking pin from the hatch cover hinge closest to them and placed them back in the anchor cable guillotine stopper bars.

As the C/O lowered the crane hook, Alfred climbed over the fo'c's'le stowage space hatch combing and walked over the cargo slings to the hatch cover. Alfred then climbed up the inside of the hatch cover, using the framing as hand and foot holds, and reached up to grab the lifting slings (**Figure 3**). As he did so the hatch cover fell forward, trapping him between the hatch cover and the hatch coaming.

The C/O and the other AB tried desperately to manually lift the hatch cover to release Alfred, but it was too heavy. The deck crew raised the alarm and attracted the attention of the dockside crane driver, who immediately swung his crane jib back over the fo'c's'le. At 1126, the hatch cover was raised by the dockside crane and Alfred was lifted unconscious on to the deck, where he received first-aid. At 1140, paramedics arrived on board *SMN Explorer*, but they were unable to revive Alfred and he was later declared deceased at the scene.

After the accident, the deck crew were subject to onboard alcohol<sup>3</sup> breath testing by the vessel's master, in accordance with *SMN Explorer's* drugs and alcohol policy. The results for each crew member were negative.

A postmortem examination identified that Alfred's death was caused by a severe blunt force injury to the chest. Toxicology tests identified that Alfred had a blood alcohol level of 75mg/100ml, the drugs screening results were negative.

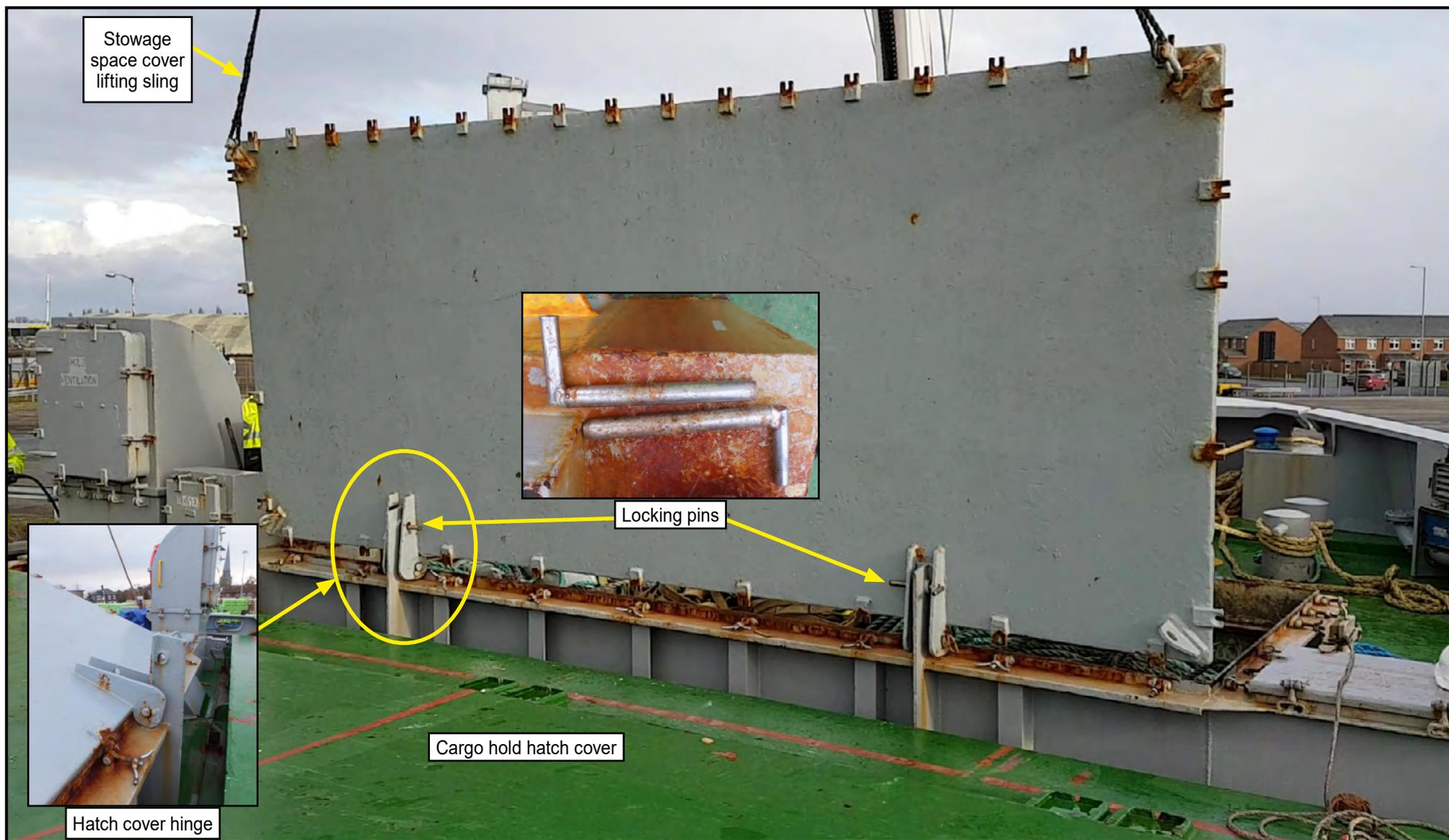
## **SMN EXPLORER**

*SMN Explorer* was owned by Explorer Ships S.A. and managed by Sky Mare Navigation Co (SMN). It was operated on a 3-year time charter by its previous owners, Scotline Ltd. *SMN Explorer* operated on a North Sea trading route and its cargoes consisted mainly of packaged timber, steel plate and bulk grain.

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<sup>2</sup> A guillotine stopper bar is a locking device that prevents an anchor cable from paying out.

<sup>3</sup> SMN's drugs and alcohol policy included a ban on alcoholic beverages on board, a zero alcohol limit while carrying out duties, and a periodic and random testing routine.



**Figure 1:** Stowage space hatch cover in opened position



Figure 2: Snapshot taken from dockside crane camera

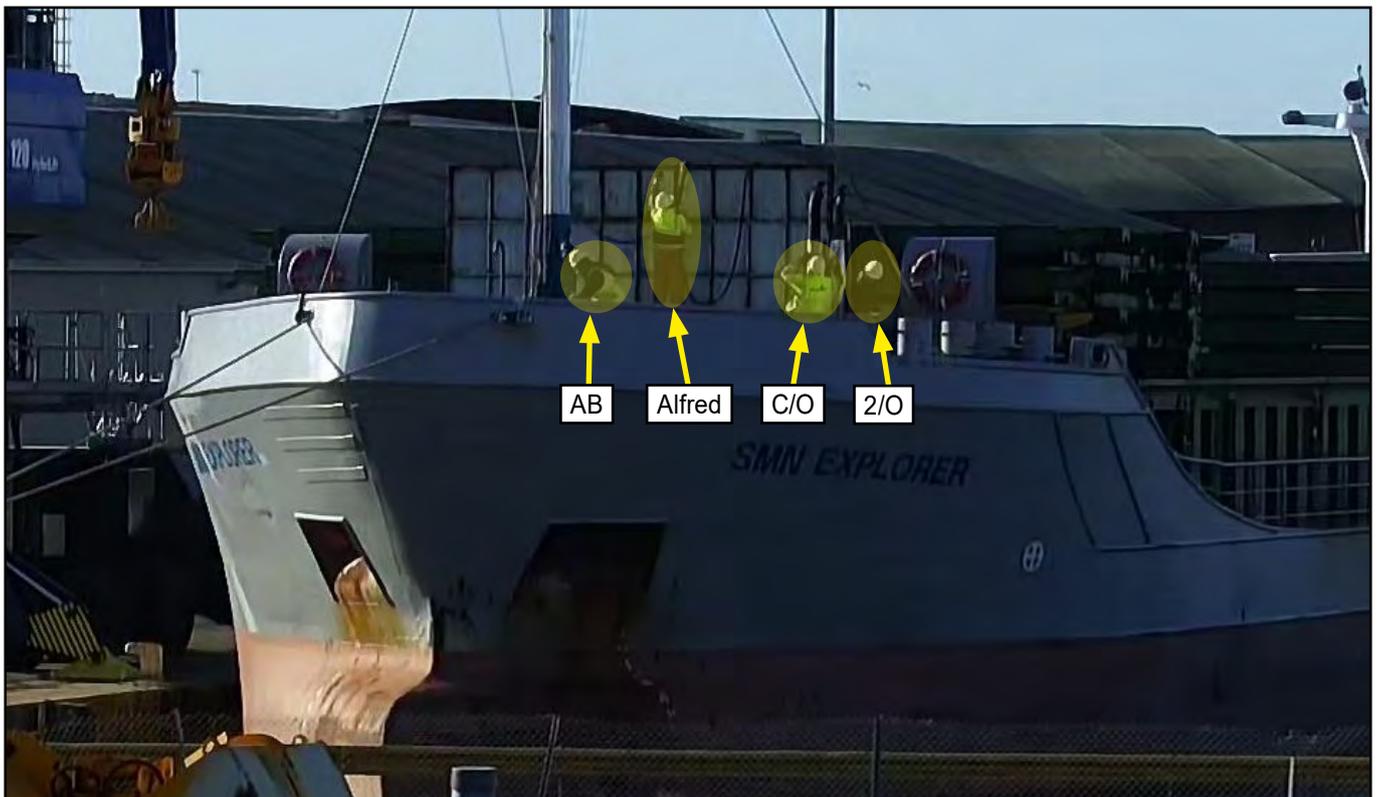


Figure 3: Position of the deck crew as Alfred climbed up the underside of the stowage space cover

When SMN took over the management of *SMN Explorer* on 23 November 2017, the vessel was placed on the Liberian register of shipping and issued a 6-month interim Safety Management Certificate. It was classed by the Indian Register of Shipping.

## CREW

*SMN Explorer* was manned by a crew of six: master, C/O, 2/O, chief engineer and two ABs. The crew joined the vessel together on 23 November 2017 in Rotterdam and had completed eight voyages.

Alfred was a 36 year old Albanian national. He held an STCW<sup>4</sup> II/5 Able Seafarer Deck Certificate and had been employed as an AB by SMN since 2014.

The C/O was a Ukrainian national and had been employed by SMN since 2016. *SMN Explorer* was his second contract as C/O.

The 2/O was an Albanian national. He qualified as a 2/O earlier in the year and it was his first contract with SMN.

The second AB was a Ghanaian national. He had been a seafarer for 11 years and it was his first contract with SMN.

## FORECASTLE STOWAGE SPACE

The fo'c's'le stowage space was 2m long, 5m wide and 2m deep, and was used to stow the vessel's cargo lashing slings, tarpaulins and ropes. The stowage space hatch coaming protruded 1m above the fo'c's'le deck. The bottom of the stowage was formed of closely fitted wooden boards to create a floor, which could be removed to allow access to the machinery spaces below.

The stowage space hatch cover formed a watertight seal with the hatch coaming and was secured in the closed position by 35 dogs. It weighed approximately 0.9 tonne and had a lifting eye plate welded at each corner. The cover was hinged on the aft side. The hatch cover hinge pins could be removed to allow the whole cover to be craned clear of the hatch.

In the open position, the hinged cover rested in a vertical position on its backstops and was locked in place by two locking pins. The stowage space hatch cover's original locking pins had been discarded due to corrosion, and new pins were on order. As an interim measure, the crew used the anchor guillotine locking pins to secure the cover in its open position.

The foremast crane had a safe working load (SWL) of 0.9 tonne and could be slewed and luffed using its hydraulic powerpack. Its hoisting winch was located at the top of the mast. The slings used to open the hatch were permanently shackled to the cover's forward lifting eyes and were joined by a lifting ring (**Figure 4**). At sea, the crane hook was permanently attached to the lifting ring, with the slings under tension, to form a backstay for the foremast.



**Figure 4:** Hatch cover slings attached to crane hook

<sup>4</sup> STCW - International Convention on Standards of Training, Certification and Watchkeeping for Seafarers.

## FORECASTLE STOWAGE SPACE HATCH OPENING AND CLOSING PROCEDURE

The crew had opened and closed the stowage space hatch cover several times during their 2-month period on board, but the vessel did not have a written procedure for the operation. Immediately after the accident, the master instructed the C/O to write one. The procedure for opening the hatch, which was subsequently demonstrated to MAIB inspectors, included the following steps:

- Release foremast securing stays.
- Start foremast crane hydraulic power pack.
- Lower crane hook to release tension on hatch cover lifting slings.
- Release the hatch cover dogs.
- Lift open the hatch cover with the crane.
- Secure the hatch cover in its open position with its locking pins.
- Lower the lifting slings (aft of the hatch cover), disconnect the crane hook and place the slings onto the deck (**Figure 5**).
- Luff in the foremast and secure the crane hook clear of the stowage space hatch.

To close the stowage space hatch, the crew climbed onto the cargo hold hatch covers, connected the crane hook to the lifting ring, tensioned the slings, and removed the locking pins. The stowage space hatch cover was then lowered slowly to its closed position and the dogs were reapplied.



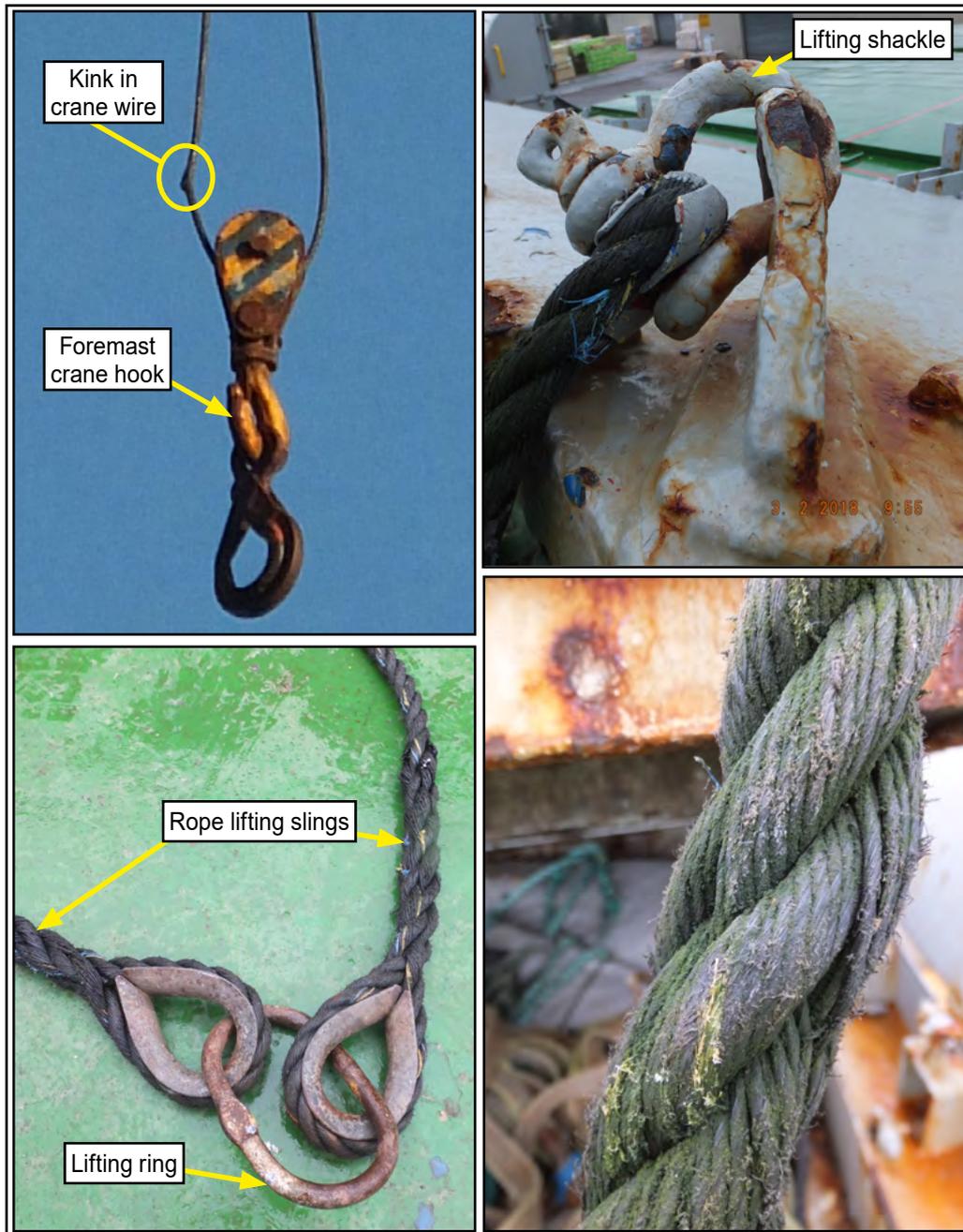
**Figure 5:** Crew demonstrating revised procedures after accident

## POST-ACCIDENT INSPECTION OF THE STOWAGE SPACE COVER AND LIFTING ARRANGEMENTS

During the inspection of the accident site and the vessel's hatch cover lifting gear, the following observations were made:

- Numerous hand and foot marks were present on the stowage space hatch cover's internal frames.
- The anchor guillotine locking pins were a loose fit in the hatch cover and backstop locating holes, and had no means of being locked in place.
- The rope lifting slings appeared to be in poor condition.

- Much of the lifting gear examined on the fo’c’s’le deck was found to be in a similarly poor state (**Figure 6**).
- There was no lifting appliance register on board.



**Figure 6:** Stowage space cover lifting gear

## SAFETY MANAGEMENT

*SMN Explorer* was provided with a copy of SMN’s generic safety management system (SMS). The SMS contained several risk assessments for cargo and mooring operations, including one for the operation of the cargo hold hatch covers. However, the vessel did not have a risk assessment for opening and closing the fo’c’s’le stowage space hatch or the operation of the foremast crane. The previous managers, Scotline Ltd, had not conducted risk assessments for these activities and had not written safe operating procedures.

The Liberian Maritime Authority’s marine notice MLC-005 Rev 2/17 required all its shipowners, operators, masters and officers to adopt and effectively implement an occupational health and safety programme. The programme had to take account of the International Labour Organization (ILO)<sup>5</sup> code of practice

<sup>5</sup> International Labour Organization - A tripartite UN agency, the ILO brings together governments, employers and workers, to set labour standards, develop policies and devise programmes promoting decent work for all women and men.

for *Accident prevention on board ship at sea and in port*. Chapter 20 of the ILO's code of practice related to working on deck and in cargo spaces; section 20.3 specifically covered lifting equipment. The requirements of this section were, inter alia, that lifting gear is:

- Tested and examined, free from defects and properly maintained.
- Clearly marked with safe working load.
- All lifting gear should be included in a register of ships' lifting appliances.
- Persons engaged in work should not pass or remain under any loads.

Section 20.1 also states that:

- All operations should be under the control of a responsible officer, who should provide instruction and draw attention to any hazards associated with the operation.

A copy of the *Accident prevention on board ship at sea and in port* code of practice was not held on board *SMN Explorer*.

*SMN Explorer* did not have on board any records or certification for the lifting equipment used to open and close the hatch cover. The foremast crane was marked with an SWL of 0.9 tonne but there was no valid certificate of examination or test held on board the vessel. The lifting slings and shackles were not marked with SWL or identification numbers.

## COMPANY INVESTIGATION REPORT

SMN tasked an external consultant to investigate the circumstances of the accident and produce an independent incident investigation and root cause analysis report. The report concluded that the cause of the accident was an '*improper attempt to save time and avoid discomfort*' in conjunction with '*improper performance*' (i.e. the removal of the locking pins before the crane hook had been attached). The contributing factors identified in the report included; no warning signs, inadequate supervision and inadequate communication.

The report identified the need to improve the levels of safety culture on board SMN managed vessels. It also included a recommendation to alter the opening arrangements for the stowage locker, and suggested that the hinges be moved to the front of the hatch to allow the crane hook to remain attached throughout all cargo operations.

## ANALYSIS

### HATCH COVER FALL

The hatch cover fell on top of Alfred because he put his weight on the inside of the open cover after its locking pins had been removed and before the crane hook had been attached to the lifting slings and tensioned. This procedural lapse occurred because a safe system of work had not been developed for opening and closing the hatch cover and because the operation was not properly supervised. Factors that contributed to this include:

- time pressure or a sense of urgency
- alcohol consumption
- an immature safety management system
- a weak safety culture.

A sense of urgency might have had an impact on the way this operation was executed and on Alfred's actions in particular. Alfred was the ship's cook and he had prepared lunch, which was ready to eat and probably getting cold. This could have caused him and the crew to rush and try to do several tasks simultaneously.

Alfred's blood alcohol level of 75mg/100ml was 50% higher than the mandatory 50mg/100ml limit set for seafarers in the Manila amendments to STCW Regulation VIII/1 (Fitness for Duty). Given the time of the accident, it is likely that Alfred had drunk alcohol on board that morning.

The effects of alcohol on the human body are well documented. Dependent on a person's metabolism, at 75mg/100ml the effect can lead to increased self-confidence and decreased inhibitions, as well as reduced attention span, judgment and control<sup>6</sup>. All of this could have affected Alfred's judgment and his decision to climb up the hatch cover framing after the locking pins had been removed. While the master's onboard alcohol tests indicate that Alfred was the only person affected by the influence of alcohol, the other AB also removed a locking pin before the hook had been attached. He also did not appreciate the risk, as he walked across the lashings in the stowage space and under the unsecured hatch cover.

## FORECASTLE STOWAGE SPACE OPENING AND CLOSING PROCEDURE

Once the stowage space cover was opened, the crane hook needed to be released from the lifting slings and the foremast moved clear of the hatch. This was required to allow the cargo slings to be lifted in and out of the stowage using a dockside crane. When the C/O did this earlier in the day, it was apparent that his intention was for a crew member to walk across the stowed lashings and climb up the inside of the open hatch cover to reconnect the crane hook. This was evident because:

- The C/O had hung the lifting slings in a way that allowed this to be done.
- The hand and foot marks on the frames of the cover showed that this had been done in the past.

This method of closing the stowage hatch cover relied almost entirely on procedural compliance and following the correct sequence of events. This was because the area under the open hatch cover was a significant danger zone whenever the locking pins were removed.

The C/O had a clear view of the stowage space and his deck crew when the hatch cover locking pins were removed, and was aware that one of his ABs would need to climb up the inside of the hatch cover to unhook its lifting sling ring. However, the C/O did not realise that the locking pins had been removed when Alfred approached the hatch cover. This was because he and the 2/O were focusing on the operation of the foremast crane when the ABs removed the locking pins.

After the accident, the C/O wrote and demonstrated a procedure that removed the need to enter the stowage space while opening and closing its hatch cover. The revised procedure required the crew to climb on top of the cargo hold hatch covers instead. This procedural approach might seem obvious; it certainly removed the need to enter a potential danger zone, walk on uneven surfaces and climb up the underside of the cover. Nevertheless, it is understandable why this procedure was not adopted previously by *SMN Explorer's* crew. On the day of the accident four of the vessel's cargo hold hatch covers had been stacked on top of each other behind the fo'c's'le stowage space. This made access behind the open cover difficult (**Figure 7**). On other occasions the forward cargo hold hatch covers could be stowed aft, creating a serious fall hazard.



**Figure 7:** Gap between the open stowage space cover and the stacked cargo hatch covers

<sup>6</sup> [www.nhs.uk/conditions/alcohol-misuse/risks](http://www.nhs.uk/conditions/alcohol-misuse/risks)

An over reliance on procedural controls when conducting complex work activities often results in accidents. In many cases, hazards can be removed by simple engineered solutions. It was not appropriate to require *SMN Explorer's* crew to routinely climb on to hatch coamings and squeeze into tight spaces, or to walk across uneven surfaces and climb up the inside of the hatch cover when opening and closing the fo'c's'le stowage space. Had this operation been thoroughly reviewed, alternative solutions could have been identified and put in place.

## **SAFETY AND MAINTENANCE MANAGEMENT**

*SMN Explorer's* recent change of ownership, management and Flag State initiated the introduction of a new SMS and the issuing of an interim Safety Management Certificate. The SMS was generic in nature and contained a limited amount of vessel-specific guidance and instructions. This, coupled with the appointment of an entire new crew, led to the development of ad hoc local working practices.

The opening and closing of the fo'c's'le stowage space hatch cover was a lifting operation and, as such, it should have been properly planned and executed. Furthermore, the equipment used to lift the cover should have been subject to strict maintenance and testing routines that should have been recorded in a lifting appliance register. This was not the case; the SMS contained no guidance for planning lifting operations or the maintenance of lifting equipment. The vessel held no certification for the foremast crane and the condition of much of the lifting gear inspected by the MAIB was poor.

Interim Safety Management Certificates are issued to vessels for a limited duration, to allow new owners and managers time to develop and implement a satisfactory SMS. In such circumstances it would be appropriate for purchasers to engage closely with previous owners to obtain maintenance records and copies of operating procedures. This would help ensure that their crews can operate the vessel and its equipment in a safe manner during this initial transitional period.

## **SAFETY CULTURE**

Safety culture defines the ways in which safety is managed on board a vessel and is reflected in the shared attitudes, beliefs, perceptions and values of the crew in relation to safety. Vessel owners, managers and masters have the pivotal role of embedding and driving a strong safety culture among their crews. If they do not portray a positive approach towards safety management, then it is likely their crew will adopt similar attitudes, and a poor safety culture will result.

The strength of the prevailing safety culture within an organisation or on board a vessel can often be difficult to measure or quantify. The way people carry out work tasks when left alone or unsupervised can provide a powerful indication of both localised and widespread safety culture. Other typical indicators include accident rates, levels of procedural compliance, and the priority given to cost and time over safety.

It was evident that the safety culture on board *SMN Explorer* was weak. Priority was given to getting the job done, rather than developing and promoting safe working practices. This was probably due, to a large degree, to the lack of a mature SMS, vessel-specific guidance and management oversight. It is apparent that targeted interventions by SMN are needed to promote and build a stronger safety culture on board *SMN Explorer* and its other vessels.

## **CONCLUSIONS**

- *SMN Explorer's* fo'c's'le stowage space hatch cover fell on top of Alfred because he climbed on it after its locking pins had been removed. This action was the result of inadequate procedures.
- Factors that might also have influenced Alfred's actions included a sense of urgency and the effects of alcohol.

- Alfred was allowed to enter the danger zone because he and the other crewman did not realise the risk and because the operation was not being adequately supervised.
- The C/O's focus on operating the foremast crane distracted him from his supervisory role.
- *SMN Explorer's* SMS was immature. Risk assessments had not been conducted for some routine deck operations, a safe system of work for opening and closing the stowage space cover had not been developed, and maintenance routines were not in place for lifting appliances.
- The practice of climbing up the inside of the opened stowage space hatch cover was inherently unsafe and reflected the weak safety culture that was evident on board the vessel.

## ACTION TAKEN

**Sky Mare Navigation Co** has:

- Issued a fleet-wide letter to the masters of its managed vessels highlighting the circumstances of the accident.
- Conducted a task-specific risk assessment and produced a written procedure/checklist for the opening and closing of the hatch cover.
- Placed warning signage on the stowage space hatch cover promoting the use of the locking pins.
- Provided a set of dedicated locking pins for the hatch cover.
- Delivered onboard training to *SMN Explorer's* deck crew.
- Initiated a safety campaign promoting safe working practices on deck.
- Had its foremast crane surveyed and certified.

## RECOMMENDATIONS

**Sky Mare Navigation Co** is recommended to:

- |                 |  |
|-----------------|--|
| <b>2018/134</b> | Take appropriate action to remove the need for deck crew to climb onto the stowage hatch coamings and cover, and walk across uneven surfaces to routinely attach and disconnect the foremast crane hook. |
| <b>2018/135</b> | Ensure that <i>SMN Explorer</i> and all its managed vessels have systems in place to manage and record the maintenance of lifting appliances.  |
| <b>2018/136</b> | Take appropriate actions to improve the level of safety culture on board <i>SMN Explorer</i> and its other managed vessels.  |

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

## SHIP PARTICULARS

Vessel's name	<i>SMN Explorer</i>
Flag	Liberia
Classification society	Indian Register of Shipping
IMO number	9137193
Type	General Cargo
Registered owner	Explorer Ships S.A.
Manager(s)	Sky Mare Navigation Co
Year of build	1996
Construction	Steel
Length overall	81.85 metres
Registered length	81.85 metres
Gross tonnage	1882 tonnes
Minimum safe manning	5
Authorised cargo	Packaged timber

## VOYAGE PARTICULARS

Port of departure	Varberg, Sweden
Port of arrival	Alexandra Dock, King's Lynn
Type of voyage	Short sea trade
Cargo information	Packaged timber
Manning	6

## MARINE CASUALTY INFORMATION

Date and time	1 February 2018, 1126
Type of marine casualty or incident	Very Serious Marine Casualty
Location of incident	Alexandra Dock, King's Lynn
Place on board	Fo'c'sle
Injuries/fatalities	1 fatality
Damage/environmental impact	Not applicable
Ship operation	Discharging cargo
Voyage segment	Alongside
External & internal environment	Wind: F4 westerly, clear
Persons on board	6