

**Report of the investigation into
the accident on board the private pleasure yacht**

KIBO

**while at anchor in Majorca on 03 May 2015
resulting in a crew member suffering serious injuries**



KIBO

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NOTE

from the Merchant Shipping (Marine Casualty Reporting and Investigation) Regulations, 2018

“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.”

This Report is not written with liability in mind and is not intended to be used in court for the purpose of litigation. In accordance with regulation 22 of the Merchant Shipping (Marine Casualty Reporting and Investigation) Regulations, 2018, this report is inadmissible in any judicial proceedings whose purpose, or one of whose purposes, is to attribute or apportion liability or blame. It endeavours to identify and analyse the relevant safety issues pertaining to the specific accident, and to make recommendations aimed at preventing similar accidents in future.

January 2019.

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GLOSSARY OF ABBREVIATIONS AND ACRONYMS

3/O	Third Officer
AED	Automated External Defibrillator
C/O	Chief Officer (or Chief Mate), senior deck officer and second in command.
CCTV	Closed Circuit Television
CISR	Cayman Islands Shipping Registry
CoC	Certificate of Competency
CPR	Cardiopulmonary resuscitation
DH	Deckhand
GT or gt	Gross Tonnage
ISM Code	“International Management Code for the Safe Operation of Ships and for Pollution Prevention”, known as the “International Safety Management Code”
ISPS Code	International Ship and Port Facility Security Code
LDH	Lead Deckhand
MLC	Maritime Labour Convention, 2006
OOW	Officer of the Watch (i.e. a deck officer)
OPA	Oropharyngeal Airway
PPE	Personal Protective Equipment
PTW	Permit to Work
REG	The Red Ensign Group of British Shipping Registries ¹
SCUBA	Self Contained Underwater Breathing Apparatus
SEA	Seafarers Employment Agreement
SMS	Safety Management System

¹ The REG is made up from the United Kingdom, the Crown Dependencies (Isle of Man, Guernsey and Jersey) and the UK Overseas Territories (Anguilla, Bermuda, British Virgin Islands, Cayman Islands, Falkland Islands, Gibraltar, Montserrat, St Helena and the Turks & Caicos Islands) which operate shipping registers from their jurisdiction.

SOLAS	International Convention for the Safety of Life at Sea, 1974
SOP	Standard Operating Procedure
STCW	International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978
MCA	The Maritime and Coastguard Agency, an Executive Agency of the UK Department for Transport.
MRCC	Maritime Rescue Co-ordination Centre
VHF	Very High Frequency

SYNOPSIS

On the morning of 03 May 2015, the large private yacht KIBO was at anchor off Portals Nous in the island of Majorca. A party of 6 guests were on board.

As was the normal practice when guests were on board, the work day started early by cleaning the exterior of the yacht and preparing various equipment and facilities for the use of the guests. It was decided that this would be a suitable opportunity to clean the rubbing strakes (known as “rub rails”) on the yacht’s hull approximately 3m above the waterline. This work involves a crew member working over the side of the yacht supported by a safety harness and a “bosun’s chair” that were secured to the yacht’s bulwarks. A deckhand / assistant engineer (“the Deckhand”²) was chosen for the cleaning duties and commenced the oversee work, under the supervision of the Chief Officer (C/O) and the Third Officer (3/O).

After working over the side for approximately 50 minutes, the Deckhand fell from the worksite into the water and sank below the surface. An on board rescue was commenced, and the Deckhand was recovered from water. The time from the Deckhand falling from the worksite to being recovered back on board the yacht was approximately 13 minutes. First aid was administered, and an ambulance was arranged from shore. With first aid continuing, the Deckhand was transferred to shore in the yacht’s tender where he was transferred to a local hospital for treatment.

Due to being deprived of oxygen while under water, the Deckhand suffered hypoxic brain injuries and was left severely disabled. On 07 June 2017 the Deckhand died of bronchial pneumonia brought on by his immobility following the accident. A ruling of accidental death was recorded following an inquest at Birmingham Coroner’s Court.

The investigation found that the primary cause of this accident was poor working practices on board and a failure to follow the yacht’s documented safety management system (SMS).

² This crew member was employed on board in a dual capacity as a “deckhand / assistant engineer”. As he was undertaking the duties of a deckhand when the accident occurred, any reference to “the Deckhand” is a reference to the “deckhand / assistant engineer” who was injured in the accident.

SECTION 1 – FACTUAL INFORMATION

1. Particulars of KIBO (IMO 1012294)

Vessel Details:

Owner	:	A&NN Marine Limited, British Virgin Islands.
Ship Manager (ISM Company)	:	YCO S.A.M.
Port of Registry	:	George Town
Flag	:	Cayman Islands
Ship Type	:	Private Pleasure Yacht
Year Built	:	2012
Year of Delivery	:	2014
Classification Society	:	Lloyd's Register
Length	:	73.94 m
Gross Tonnage	:	2,306

Accident Details:

Date and Time	:	1058h on 03 May 2015
Location (ship)	:	At anchor, Portals Nous, Majorca.
Location (on board)	:	Working over the side.
Fatalities / Injuries	:	One serious injury (subsequently deceased on 07 June 2017).
Damage	:	Ship – None, Environment – None

2. Narrative

(all times are Local Time)

2.1 Prior to the Accident

The yacht KIBO had been in Majorca for approximately 2 weeks prior to the accident. During the week before the accident, the owner had informed the yacht that he would be visiting with a party of guests for a “weekend stay” commencing on the evening of Thursday 30 April 2015. On that day, the yacht relocated to and anchored off Es Portixol (a small port next to the airport) and the first of the guests arrived late that night. The remaining guests joined the yacht the following day. Including the owner, there were 6 guests on board KIBO.

On Saturday 02 May 2015, the yacht moved from Es Portixol to Portals Nous where it remained at anchor until after the accident. The water depth where KIBO anchored was approximately 18m. On the day of the accident (03 May 2015) the plan was to take the guests ashore at around 1030h for a shopping trip.

2.2 The day of the accident (Prior to the accident)

As was the normal practice when guests were on board, the work day started early. The owner was expected to rise at around 0600h, so the Chief Officer (C/O) started work around 0530h. Many of the crew had also arisen early to watch a world title boxing match on satellite TV.

With guests on board, the work consisted of cleaning the exterior of the yacht and preparing various equipment and facilities for use by the guests during the day. As the owner and his guests did not arise at 0600h as expected, the atmosphere was relaxed, and the work was progressing well.

The Deckhand started work at 0900h and joined the rest of the crew already working on deck. The deck officers and other deck crew members on duty at this time were:

- The Chief Officer (C/O);
- The Third Officer (3/O);
- The Lead Deckhand (LDH); and
- Three other Deckhands (DH A to C).

The Deckhand was joined by the 3/O and the C/O to discuss working arrangements for the day. The weather was fine and the sea extremely calm with a sea temperature of 19°C. It was decided that this would be a good opportunity to clean the stainless steel parts of the rubbing strakes (referred to on board as “rub rails”) attached to the yacht’s hull (see figure 1). The rub rails are located just below the main deck level, approximately 3m above the waterline. It was agreed that the Deckhand would perform the work under the supervision of the 3/O and C/O. The

intention was to clean the rub rails on both sides of the hull, commencing with the rub rail on the port side.

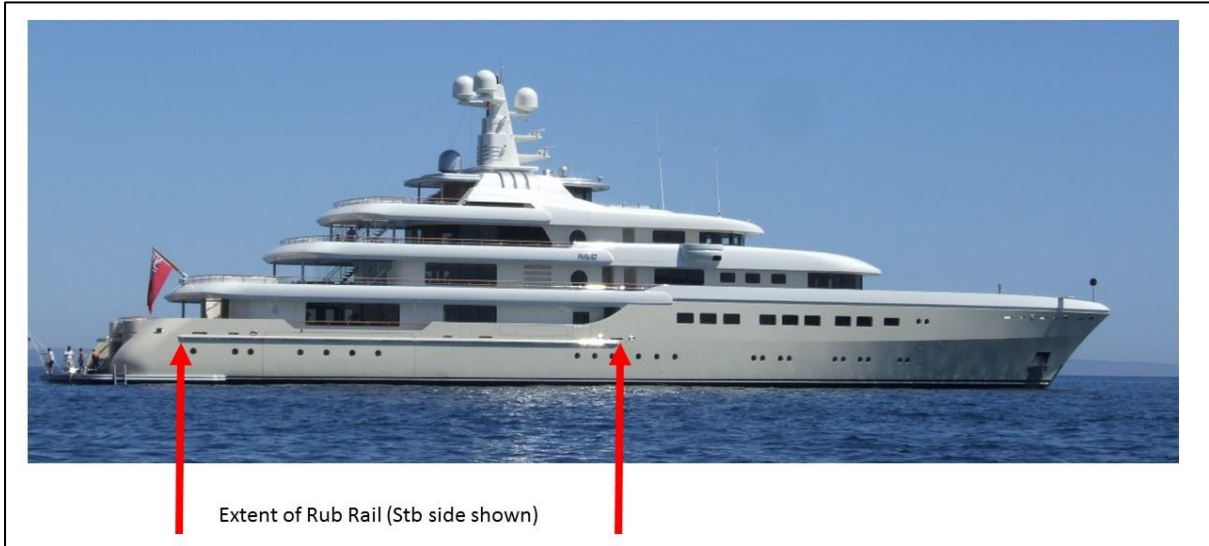


Figure 1

A Permit to Work (PTW) to cover the work was issued and signed by the 3/O as the “Responsible Officer”. The PTW form completed for this work required the use of safety shoes and a safety harness when carrying out the work. However, the completed PTW form did not require a lifejacket or other buoyancy aid to be worn.

At 1002h, the Deckhand made his way to the portside main deck and donned the safety harness in preparation for commencing the work. He was joined by the 3/O who checked the fitting of the safety harness and attached the bosun’s chair. The safety harness was to be attached to a fender hook on the port side bulwark by a rope fitted with an “Ascender / Descender” device for controlling the working position of the wearer (see figure 2).

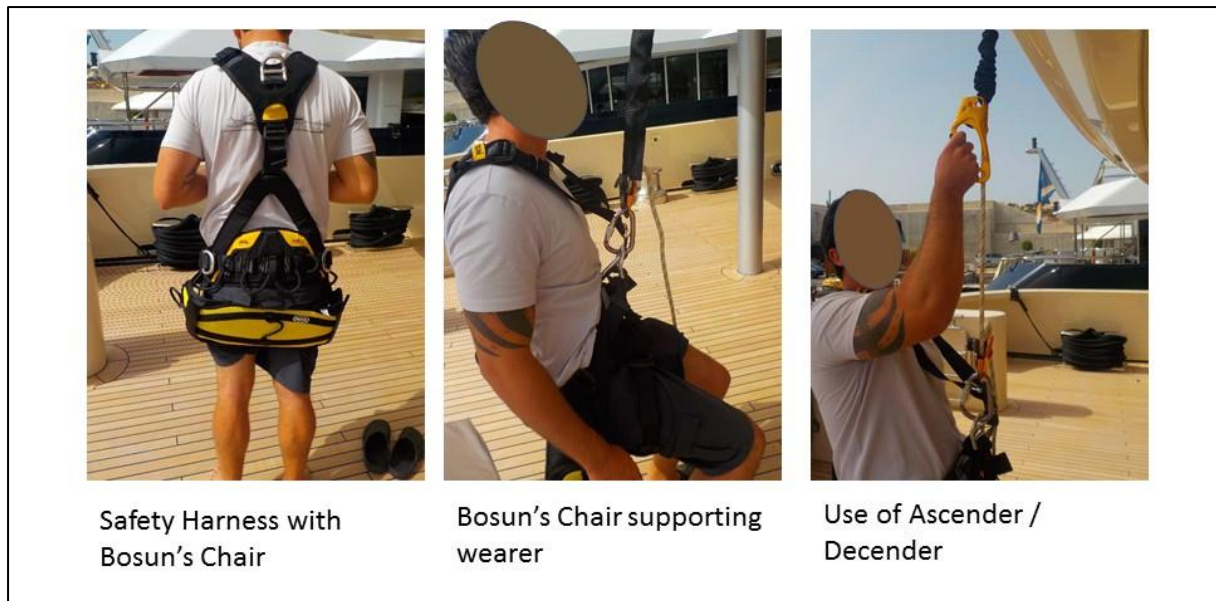


Figure 2

The Deckhand then changed into appropriate footwear for working over the side while the 3/O checked the fender hook and rope which were already in place on the port side bulwark. The arrangement of safety harness / bosun's chair / support line / fender hook comprised the Deckhand's "means of support" and no additional safety line was rigged.

At 1009h, the Deckhand climbed over the bulwark to stand on the rub rail and moved forward until he was positioned outboard of the fender hook and supporting line. The 3/O then rigged the support line into the fender hook and attached the free end of line to the safety harness. After confirming that the Deckhand was able to properly work the Ascender / Descender device, the 3/O collected a bucket containing rags and polish to be used in cleaning the rub rail. This bucket was passed over the bulwark to the Deckhand who clipped it to the safety harness.

The Deckhand then commenced cleaning the rub rail while the 3/O attended to some minor housekeeping tasks in the area. The 3/O was in full communication with the Deckhand and monitoring his progress.

At 1021h the 3/O was called away from the worksite to take a party of guests ashore in the yacht's tender. Before leaving the area the 3/O confirmed that the Deckhand was comfortable and had no concerns over the work being undertaken. Over the next 10 minutes, several crew members walked past the worksite without interacting with the Deckhand who was working out of sight below the bulwark.

At 1032h, the C/O arrived at the worksite to check on the Deckhand. As the C/O was not present when the 3/O demonstrated the use of the Ascender / Descender device, she asked the Deckhand to demonstrate its proper operation. Satisfied that the Deckhand was proficient in its use and that the Deckhand had no other concerns, the C/O left the worksite to fetch some sun screen for the Deckhand. The

C/O returned with the sun screen which she passed to the Deckhand before leaving to attend to an issue elsewhere on deck.

Over the next 15 minutes the C/O made further checks on the Deckhand. At 1050h the Deckhand returned to deck level and repositioned the fender hook aft by sliding it along the bulwark while standing on the rub rail. Towards the end of this repositioning he was joined once again by the C/O.

At 1056h the 3/O returned from shore in the tender. At 1057h the C/O returned to the worksite and witnessed the fender hook detaching from the bulwark with the Deckhand still attached to the fender hook by the supporting line.

2.2 Post accident response

As soon as the C/O realised that the Deckhand had fallen from the worksite into the sea, she moved to the bulwark and established visual contact with the Deckhand. The Deckhand was seen on the surface of the water as he started swimming slowly towards the stern of the yacht. The Deckhand was described as looking shocked, but aware of his surroundings. When asked if he was "OK" the Deckhand nodded to the C/O. The C/O asked again, and again the Deckhand nodded. The C/O then told the Deckhand that she was going to get another crewmember to enter the water to assist the Deckhand to swim back to the stern of the yacht. At the stern of the yacht there was a platform (swim platform) with a swim ladder already deployed. The C/O then moved aft to the swim platform, breaking visual contact with the Deckhand.

On arrival at the swim platform the C/O told one of the deckhands (DH A) that the Deckhand had fallen into the water and needed assistance in getting back to the yacht. DH A then entered the water and started to swim towards the location where the Deckhand was last seen. DH A could not see the Deckhand on the surface of the water. The time between the C/O leaving the worksite and DH A entering the water was 29 seconds.

When the Deckhand could not be seen on the surface of the water, the seriousness of the situation became apparent to all involved.

A second deckhand (DH B) entered the water to assist DH A. At the same time the 3/O ran from the swim platform to the worksite. On arrival at the worksite the 3/O stood on the bulwark and searched for the Deckhand in the water. The 3/O was joined at the bulwark by the remaining deckhand on duty (DH C). The 3/O had sight of the Deckhand below the surface of the water and dived from the main deck bulwark to try and reach the Deckhand.

By this time the C/O had raised the alarm throughout the yacht and all crew began to muster. The master was in the crew mess when the alarm was raised and immediately made his way to the swim platform. Amongst the mustering

crewmembers, one of the stewardesses (who was a fully qualified nurse³) took charge of the medical response to the emergency. Once the master and nurse were in attendance on the swim platform, the C/O left the scene and proceeded to the bridge to alert the shore side authorities. She made a general distress call on the yacht's VHF radio which was answered by MRCC Palma and ambulances were arranged.

The 3/O was unable to reach the Deckhand from the surface of the water and the Deckhand was lost to sight below the surface. While attempts at rescue were being attempted by the crew members in the water, preparations were underway to search for and recover the Deckhand by a SCUBA equipped diver. SCUBA gear was prepared and donned by the master who entered the water in search of the Deckhand.

The Deckhand was located lying face down on the seabed and brought to the surface by the master. Once on the surface, the Deckhand was brought on board the yacht at the swim platform and handed over to the care of the nurse who was being assisted by other crew members. The elapsed time from the Deckhand falling from the worksite until first aid commenced on the yacht was 13 minutes and 23 seconds.

2.3 On board medical response

When the alarm was raised by the C/O, the nurse was alerted by a radio call from the Chief Stewardess. On being informed that the Deckhand was in the water and had been lost to sight, the nurse immediately made her way to the port side main deck locker and collected a "CrashPAC"⁴ and a medical oxygen kit then made her way to the swim platform.

On arrival at the swim platform she noted persons in the water and others preparing SCUBA diving equipment for the master. She asked the C/O if a boat was coming to transport the Deckhand to shore. At this point, the C/O departed for the bridge to coordinate the shore response and passed the medical response efforts to the nurse and on scene command to the master. The nurse requested that all medical equipment from the bridge be brought to the swim platform and ran to the bridge to collect the Automatic External Defibrillator (AED).

When the nurse returned with the AED, she immediately commenced preparing the AED and medical oxygen. At this time, she also prepared an oropharyngeal airway⁵ (OPA) in anticipation of treating an unconscious person.

³ This crew member was employed on board primarily as a Stewardess and recorded as such on the Crew List. As she was fully qualified to and undertaking the duties of a nurse after the accident occurred, any reference to "the nurse" is a reference to this Stewardess.

⁴ A medical emergency trauma response pack produced by MedAire.

⁵ A device intended to keep the airway of an unconscious person free of obstruction

While the Deckhand was being recovered, but still in the water, the nurse made a visual assessment of his condition. Once the Deckhand was recovered to the swim platform, the nurse immediately commenced administering medical oxygen. She instructed another crew member to attach the AED⁶ while she managed the Deckhand's airway. Cardiopulmonary resuscitation (CPR) was also commenced.

While oxygen was being administered and CPR performed, the AED went through a number of analytic cycles. After each analysis, the AED reported "No Shock" indicating that there was no detection of an abnormal heart rhythm.

With the nurse's agreement, the decision was made to move the Deckhand to the yacht's tender for transfer to shore. The Deckhand was placed on a backboard, moved to the tender and taken to shore to meet the ambulance arranged by the C/O. Seven minutes had elapsed between the Deckhand being recovered onto the yacht and the tender leaving for shore. The transfer to shore took approximately three minutes. Under the supervision of the nurse, CPR and oxygen were maintained throughout the transfer.

On arrival at the shore there was an approximate 5 minute wait for the ambulance to arrive. CPR and oxygen continued to be administered by the yacht crew.

When the ambulance arrived, the nurse briefed the paramedics and doctor in attendance and the Deckhand was handed over to their care. Once transferred to the care of the shore side medical responders, the Deckhand was intubated while sedatives and a paralytic were administered intravenously. After approximately five minutes of care in the ambulance, the monitors in the ambulance detected a pulse and the Deckhand was then transferred to a local hospital's Intensive Care Unit.

3. CCTV coverage on board KIBO

The interior and exterior of KIBO are covered by 14 CCTV cameras which record when activated by motion. Each camera has a "motion detection zone" set, and only motion in this zone will trigger a recording to be made. This is to prevent the available storage space for recordings to be expended by recording extraneous movements such as wave motions or passing small craft.

Timings from the "Narrative" section, above, are taken from these CCTV recordings. Unfortunately, the accident itself was not recorded on CCTV as the Deckhand was

⁶ Automatic External Defibrillators, or AEDs, are small computerized devices that analyse heart rhythms and provide the "shock" needed for defibrillation. Through electrodes placed on a patient's chest a processor inside the AED analyses the victim's heart. The machine will not shock unless it is necessary; AEDs are designed to "shock" only when Ventricular Fibrillation (VF), a common cause of cardiac arrest, is detected.

working over the side of the yacht and outside of the motion detection zone (see figure 3).

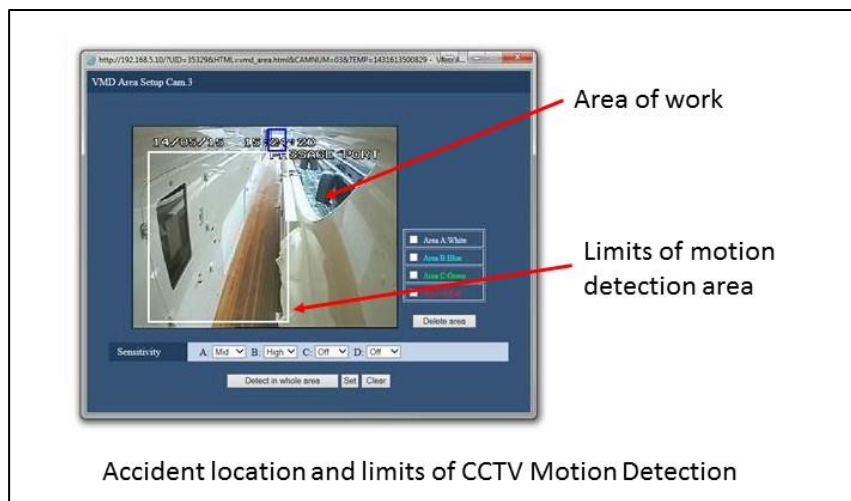


Figure 3

The Deckhand was last recorded by CCTV at 10:51:04h where he is visible working over the side of the yacht (but outside of the CCTV motion detection zone). There then follows a gap in the recording of 6 minutes 25 seconds before recording resumes at 10:57:29h. Recording resumes when the C/O enters the motion detection zone, immediately after the Deckhand has fallen from the worksite.

4. Fender Hook

A fender hook is a device used to hang inflatable fenders from the bulwarks of a yacht. The fender hook sits over the top of the bulwarks and a rope attached to the fender is led through guides on the hook and secured by a double cam cleat. The fender hook consisted of a steel bracket with an upper leather covering and a lower lining of lambswool. Compression of the lambswool lining serves to secure the fender hook on the bulwark (while allowing lateral positioning along the length of the bulwark) and to prevent surface damage to the bulwark. The cam cleats and rope guides are attached to the outer surface of the fender hook. (See figures 4 and 5).

The approximate overall dimensions of the fender hook are:

Length – 48cm
Height – 24cm
Width – 12cm

The mass of the fender hook was verified as 5.5kg.

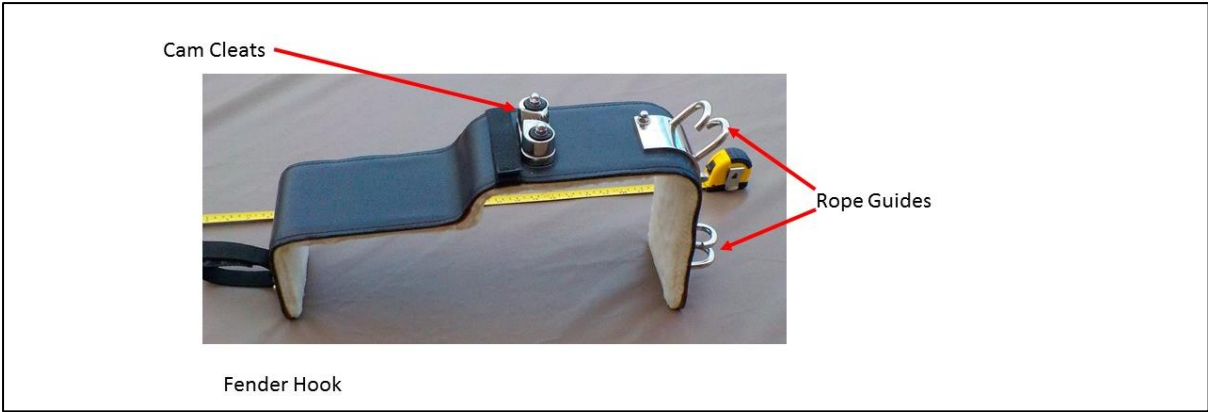


Figure 4



Figure 5

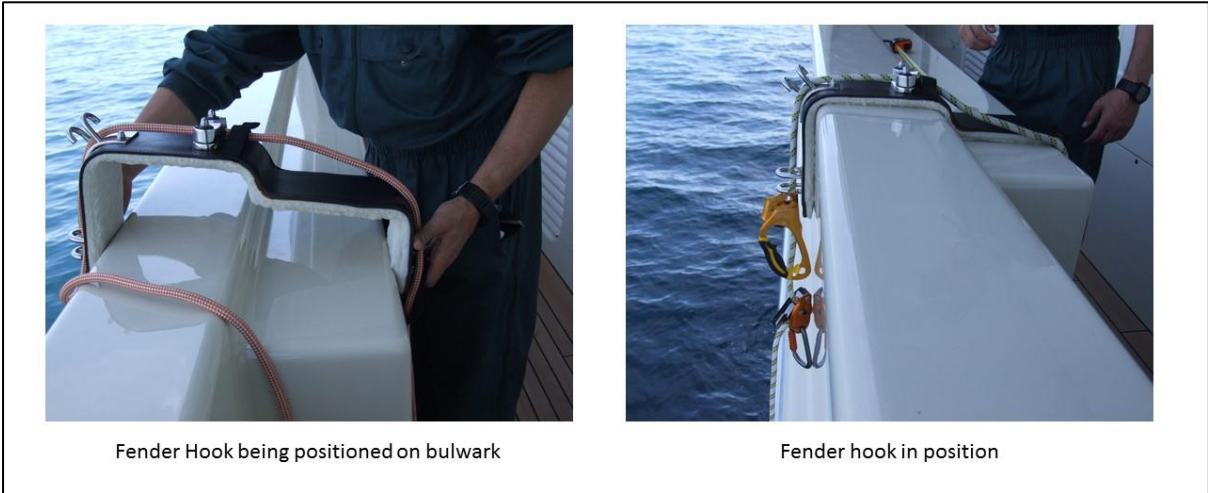


Figure 6

At the time of the accident, the Deckhand was only supported by the single line attached to the fender hook.

5. Rubbing Strakes or “Rub Rails”

Rubbing strakes (or “rub rails”) are attached to the hull of a boat, yacht or ship to prevent damage to the hull when coming alongside. They run the length of the exposed hull and may be made of rubber (boats and small yachts) or steel (large

yachts and conventional ships). On KIBO the rub rails run along the aft part of the hull and are made of steel. An unpainted stainless steel rail is fitted to the outboard profile of the rub rail. This stainless steel rail serves little “protective” purpose and is fitted for mainly cosmetic reasons. The rub rails are fitted approximately 3m above the waterline.

Because the stainless steel parts of the rub rail are exposed to the elements they quickly tarnish and require cleaning with metal polish to retain their cosmetic appeal.

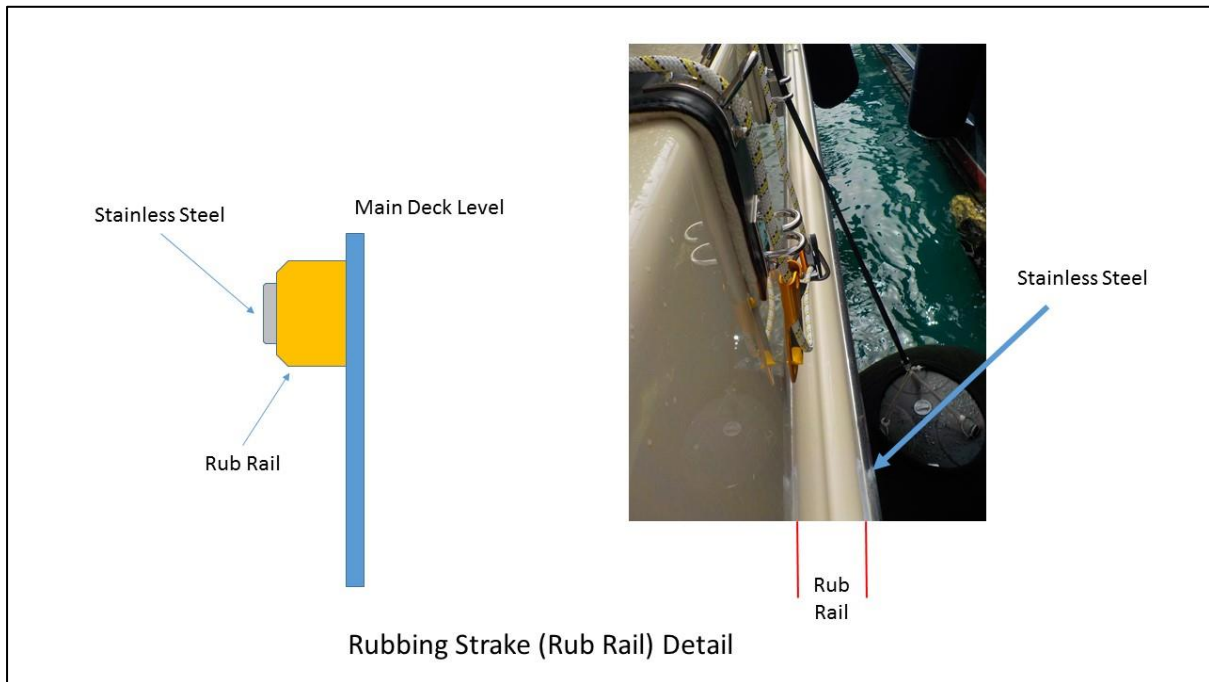


Figure 7

6. Exterior access arrangements on KIBO

During the construction of KIBO, provision was made for safe access to the exterior of the yacht. These arrangements consist of a number of fixed pad eyes and lengths of fixed tracks for attaching safety harnesses and lifelines.

These arrangements are to allow safe access while workers are either aloft or over the side for routine maintenance and cleaning tasks. Such tasks include washing exterior windows and gaining access to the mast and equipment mounted there. Cleaning of the rub rails does not appear to have been specifically considered when determining these arrangements, although there are a number of pad eye fixing points in the area where the accident occurred. Available pad eye locations cover less than half the length of the rub rail that was being cleaned.

These access arrangements are shown in construction drawing 6497/0750-08-10 (“Maintenance Plan”). This drawing was approved by the Cayman Islands Shipping

Registry (CISR) as complying with the requirements of section 22.3⁷ of the Large Commercial Yacht Code⁸ on 28 August 2013.

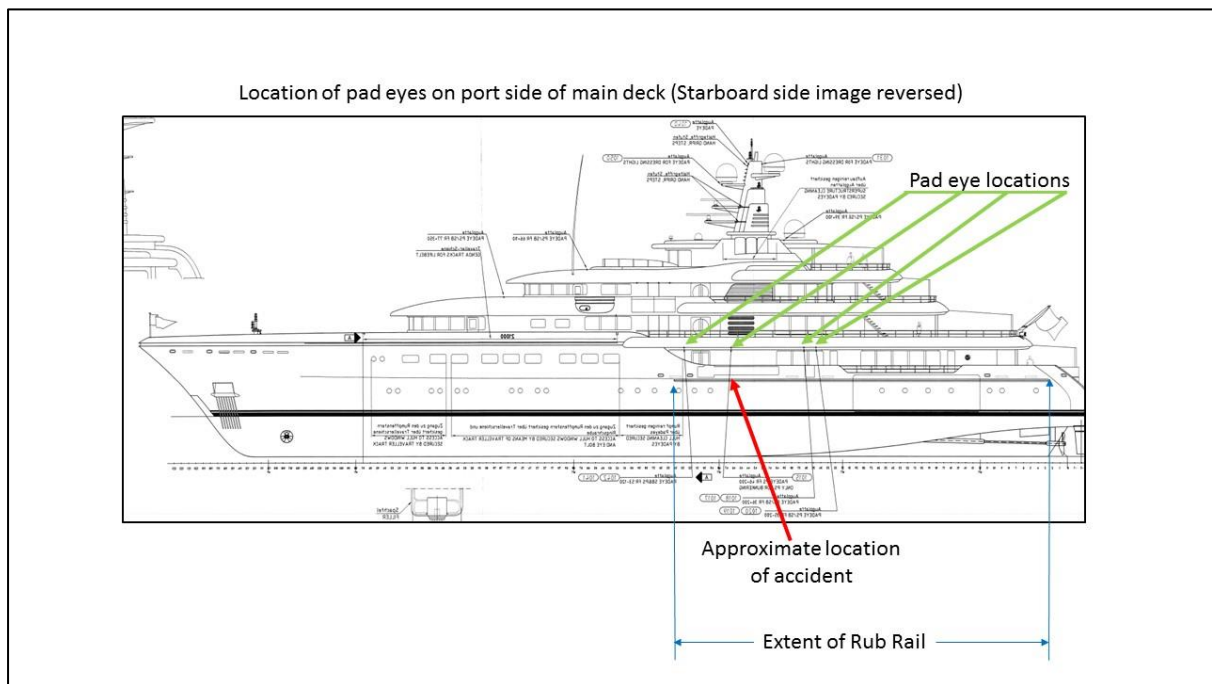


Figure 8

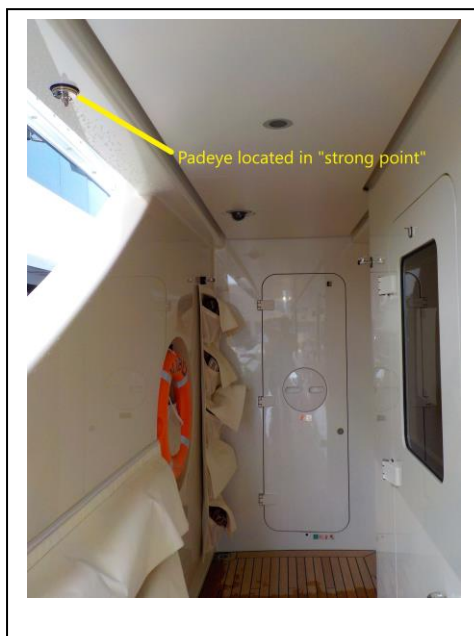


Figure 9

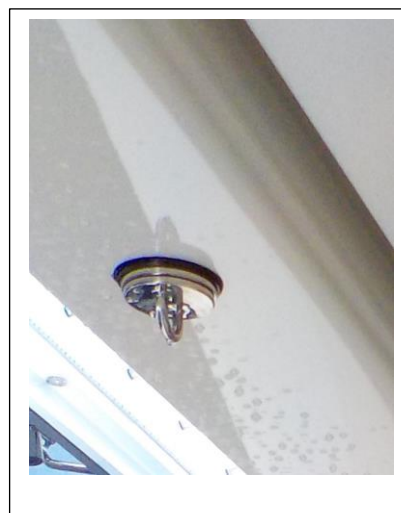


Figure 10

Typical padeye suitable for anchoring safety lines in the vicinity of the accident location

⁷ Section Title: "Safe Work Aloft, Overside, and on the Bowsprit of Sailing Vessels"

⁸ A code developed by the UK MCA and notified to IMO as, inter alia, providing an equivalent standard of safety to SOLAS for large commercial yachts.

7. Laws, Regulations and other applicable Statutory Requirements

As KIBO is considered a “pleasure yacht not engaged in trade”, the majority of the requirements of the International Convention on the Safety of Life at Sea (SOLAS) are not applicable to the operation of the yacht. SOLAS Regulation I/3 states (emphasis added):

(a) The present regulations, unless expressly provided otherwise, do not apply to:

(i) Ships of war and troopships.

(ii) Cargo ships of less than 500 gross tonnage.

(iii) Ships not propelled by mechanical means.

(iv) Wooden ships of primitive build.

(v) Pleasure yachts not engaged in trade.

(vi) Fishing vessels.

(b) Except as expressly provided in chapter V, nothing herein shall apply to ships solely navigating the Great Lakes of North America and the River St Lawrence as far east as a straight line drawn from Cap des Rosiers to West Point, Anticosti Island and, on the north side of Anticosti Island, the 63rd meridian.

Similarly, much of the Cayman Islands Merchant Shipping Law, and associated regulations, are also disapplied for pleasure yachts not engaged in trade.

However, the owners of KIBO have chosen to be surveyed and certificated against a number of codes and standards on a voluntary basis:

The Large Commercial Yacht Code (LYC);

The International Safety Management Code (ISM Code);

The International Ship and Port Facility Security Code (ISPS Code);

The Maritime Labour Convention, 2006 (MLC) and

The International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1995 (STCW).

Other guidance applicable to the operation of KIBO includes the Code of Safe Working Practices for Merchant Seafarers⁹ (COSWP).

⁹ As published by the UK MCA.

8. Mandatory Safety Training

The International Convention on Standards of Training, Certification and Watchkeeping (STCW) requires all seafarers with safety or pollution prevention duties to undergo basic safety training in the following areas:

- Personal Survival Techniques;
- Fire Prevention and Fire Fighting;
- Elementary First Aid; and
- Personal Safety and Social Responsibilities.

The Deckhand completed this mandatory training with the UKSA¹⁰ during February 2014 and was awarded a certificate of proficiency on 28 February 2014.

The ISM Code (Section 6.3) and STCW also requires that seafarers are given proper familiarization with their duties in relation to safety and the protection of the environment. On board KIBO, each crew member undertook a program of supervised familiarization training on joining the yacht. The Deckhand completed this on board familiarisation training when the yacht entered service. This training covered a number of on board safety and pollution prevention activities and included *“Permit to work explained and understood (incl. entry into enclosed space, hotworks (sic) and working aloft/overside), and actions to be taken in case of breach relating to permit to work system”*. The record for this training was signed by the Deckhand on 22 July 2014 and countersigned by the master on 23 July 2014.

9. Safety Management System

As part of the voluntary compliance with the ISM Code, operations on board KIBO are controlled by a documented Safety Management System (SMS). The following SMS requirements and elements have been considered as part of this investigation.

9.1 Risk Assessments

Clause 1.2.2.2 of the ISM Code requires that companies *“assess all identified risks to its ships, personnel and the environment and establish appropriate safeguards”*. Such a risk assessment was undertaken for working over the side of the ship on 02 February 2015 by the C/O. The risk assessment was subsequently approved by the master on 03 February 2015.

Three distinct hazards were identified as being applicable to working over the side. These were:

¹⁰ A youth charity offering maritime training opportunities (formerly called the “UK Sailing Academy”)

1. *Falling overboard whilst working over the ships side;*
2. *Improper use of harness, causing fall; and*
3. *Injury due to the movement of the ship.*

All three identified hazards were given a severity of “*Minor-moderate*” and a likelihood of “*Unlikely*”. As such, each hazard was allocated a Risk Factor of “*Low*”. Even with a “*Low*” risk factor, three control measures were identified. These were:

1. *Permit to work issued, appropriate safety harness worn, 2 lanyards and attached to a secure point onboard, responsible person to monitor task, appropriate training and guidance*
2. *Guidance and training in the use of harness and safety line, task to be overseen by an OOW, work to be carried out in accordance with the SOP’s and COSWP*
3. *Check weather forecast, task to be done in calm conditions*

9.2 Standard Operating Procedures

Section 28 of the yacht’s Standard Operating Procedures (SOP) covers working aloft and working over the side. In section 28.1 the SOP requires that:

“All crewmembers working outboard on M/Y Kibo, or in areas where the bulwark rail has been removed, **must wear inflatable lifejackets**, as well as the provided safety harness and arresting strop. All crewmembers working aloft – above 2m – shall wear the provided safety harness and arresting strop. The correct footwear must be worn.” (emphasis added)

This same section also requires that safety harnesses are to be secured to track ways or strong points at all times.

9.3 Technical Manual

In addition to SOPs, KIBO operates under a Technical Manual which provides guidance and instruction on Health and Safety and other matters relating to the operation of the yacht. Part 3, Section 3.6 of this manual addresses safe working practices when working aloft and over the side. From this manual:

“The following precautions are to be undertaken to ensure personal safety and the safety of others:

- *A Permit to Work is to be completed and kept on a clipboard at the worksite until the work is finished.*
- *Every crewmember working aloft or overside is to wear a safety harness fitted with a lifeline. The lifeline must be rigged independently in such a manner that it will be effective in the event of any failure in the means by which the crew member is suspended or supported at height and this may be accomplished by*

direct attachment to a suitable point on the vessel's structure or by a sliding attachment to a gantline stretched between two such points. In no circumstances is a lifeline to be attached to the means of suspension or support itself.

- *In addition to the above safety harness and lifeline, every crewmember working over the ship's side when there is a possibility of falling into the water must also wear a buoyance aid. Every vessel is to carry a minimum of two buoyancy aids for this purpose.*
-

Part 3 Section 6 of the Technical Manual gives guidance and instruction on the Permit to Work system to be followed and requires the master to ensure the PTW system is adhered to on board. Section 6.1 gives activities where a PTW is required and this list includes working over the ship's side.

Section 6.3 details procedures to be followed when the Responsible Officer changes during the period when a permit is in force.

"Anyone who takes over from the Responsible Officer as a routine or in an emergency shall assume full responsibility until the permit is cancelled or he hands over to another nominated person who is fully conversant with the situation. These persons must countersign the permit."

9.4 Permits to Work on board KIBO

Part 3, Section 6.1 of the Technical Manual requires a Permit to Work (PTW) to be completed whenever any of the following activities are carried out on board KIBO:

Hot-work

Working on Refrigeration Systems

Working overside

Maintenance or Repair of Live Electrical Equipment

Working aloft (unless undertaken vessel working aloft training)

Underwater operations

When working with materials suspected or known to contain asbestos.

When entering an enclosed space or a space likely to contain hazardous material or atmosphere.

In the period between June 2014 and the accident, a total of 62 PTWs were issued in respect to working aloft or working over the side. (46 working aloft and 16 working over the side). The person(s) conducting the work and the Responsible Officer issuing the permit are recorded on the permit forms.

Persons¹¹ performing the work requiring a PTW:

Position	Working Aloft	Working Overseide	Total
Chief Officer	1	0	1
Second Officer	11	2	13
Bosun	10	3	13
Lead Deckhand	21	9	30
Deckhand A	10	4	14
Deckhand B	2	0	2
Deckhand C	5	1	6
Deckhand D	1	1	2
Deckhand E	0	1	1
Deckhand F	0	1	1
Deckhand G	9	4	11
Deckhand H	1	3	4
Deckhand / Assistant Engineer	0	1 ¹²	1

Responsible Officers signing the PTW

Officer	Working Aloft	Working Overseide	Total
Master	1	0	1
Chief Officer	6	0	6
Second Officer	37	15	52
Third Officer	2	1 ¹²	3

On board KIBO a number of standard PTW forms were used by the deck department. These forms covered “Hot Work”, “Entry into Enclosed Spaces”, “Diving” and “General”. A “General” PTW form was used for working at height and when working over the side. On the “General” PTW form there was a section for recording the need for the following Personal Protective Equipment:

- Safety helmet;
- Safety shoes;
- Gloves;
- Goggles;
- Safety harness; and
- Buoyancy aids.

Each required item of PPE was to be “ticked” on the PTW form, and those not required were to be marked “N/A”.

¹¹ More than one “worker” may be included on each Permit to Work form.

¹² This was the permit covering the accident.

In the 16 permits for working over the side, the section to record the use of buoyancy aids was marked “N/A” on all permits. Neither the Standard Operating Procedures nor the Technical Manual require the use of a safety helmet when working over the side.

A copy of the PTW form raised to cover the work being undertaken when the accident occurred is included in the Appendix to this report.

9.5 Emergency Procedures and Drills

Man Overboard procedures are detailed in Section 3.2 of KIBO’s Emergency Response Manual and corresponding checklists are available on board. Like most emergency response procedures of this sort, the actions to be taken are most appropriate for when a person is lost overboard when the ship is underway.

Man overboard drills against the requirements of this procedure are scheduled every 3 months. The last man overboard drill conducted before the accident was on 08 April 2015, some 25 days prior to the accident.

10. Key personnel

10.1 “the Deckhand”

The Deckhand was a 22 year old British national who was serving on his first yacht. He joined the yacht while it was still under construction in Germany on 27 April 2014. Although referred to in this report as “the Deckhand”, he was employed in a dual capacity on board. His Seafarers Employment Agreement (SEA), which he signed on 26 May 2014, lists the capacity in which he is to serve on board as “Deckhand / Assistant Engineer”.

When the yacht delivered in June 2014, he formally “signed on” as “Deckhand / Assistant Engineer” on 06 June 2014. The Deckhand had been employed in the service of the yacht for just over one year (371 days) when the accident occurred. Since “signing on” (26 May 2014) he had spent 248 days on board the yacht and 101 days on leave. On the day of the accident, he was listed on the yacht’s crew list as “Assistant Engineer / Deckhand” and performing the duties of a deckhand at the time of the accident.

Although working in both deck and engine departments, he had expressed a desire to follow the “engineering route” through his career and held a 30 Hour Approved Engine Course¹³ and other yacht engineering courses. To assist in gaining the relevant sea time for more advanced engineering qualifications, the master had agreed to record him as “3rd Assistant Engineer” in his Discharge Book. The position

¹³ Issued by the UK Sailing Association and approved by the UK MCA.

of “3rd Assistant Engineer” was not listed on the Crew List for KIBO on day of the accident.

During his service on board KIBO, he was initially spending most working time with the deck department. This was because it was the yacht’s first “Summer Season” and the owner was often on board with guests, which in turn increases the workload on deck. After the end of the “Summer Season”, he began to spend more working time in the engineering department, but still worked as a deckhand when the workload of the deck department merited it.

10.2 Master

The Master was a 50 year old British national. He held a STCW II/2¹⁴ Certificate of Competency (CoC) as Master that was limited to “Yachts under 3000gt”. This CoC was issued by the United Kingdom in December 2001. The Master joined KIBO in October 2013 during the yacht’s construction and had sailed as Master ever since delivery.

The Master served in the UK Royal Navy from 1980 to 1991 leaving the service as a Seaman Officer. After working for a defence contractor as a navigator and deputy trials master, he joined a large yacht as Chief Officer in 1996. During 1998 he obtained a “UK Class 4 Certificate of Competency with Command Endorsement” which formed the basis for his current STCW II/2 qualification.

Between 1998 and joining KIBO in 2013, the Master had held command on a number of yachts as well as working on warship sea trials and in senior positions in yacht construction and refit.

10.3 Chief Officer

The Chief Officer was a 32 year old British national. She held a STCW II/2 Certificate of Competency (CoC) as Chief Mate without limitation as to tonnage or ship type. This CoC was issued by the United Kingdom in August 2012. The Chief Officer joined the yacht, prior to its delivery, in April 2014 and served as Chief Officer from delivery onwards.

The Chief Officer had served at sea for 14 years prior to the accident. Since starting a cadetship in 2001, she had worked on oil tankers, cruise ships and large yachts. She had worked on two other large yachts as Second Officer and Chief Officer prior to joining KIBO.

¹⁴ Mandatory minimum requirements for certification of masters and chief mates on ships of 500 gross tonnage or more

10.4 Third Officer

The Third Officer was a 25 year old South Africa national. The Third Officer joined the yacht, prior to its delivery, in April 2014 and served initially as bosun when the yacht entered service.

Between January and March 2015, the Third Officer took study leave from KIBO to attend college to study for a STCW II/1¹⁵ CoC as OOW Deck. On his return to KIBO he was promoted to Third Officer on 17 March 2015. At the time of the accident, the he was awaiting an opportunity to sit his oral exams to complete his OOW Deck studies¹⁶.

The Third Officer started his career in yachting as a day worker in October 2011 and obtained his first permanent position on a large yacht in January 2012. On this yacht he served initially as a deckhand before being promoted to bosun in October 2013.

KIBO was the second large yacht on which he had served.

10.5 Nurse

The nurse was a 23 year old New Zealand national who served on board KIBO as a stewardess. She trained as a nurse in New Zealand and was awarded a Bachelor of Nursing degree in 2011. After graduating she was issued with a Registered Nurse licence on 12 September 2011 and worked as a nurse in the Emergency Department of a New Zealand hospital. The nurse also held a post graduate diploma in Biological Sciences. She left the New Zealand hospital in June 2014 to travel in Europe and joined KIBO as a stewardess on 01 September 2014. KIBO was the first yacht the nurse had served on and she was working in yachting to save sufficient funds to enable her to study medicine with the aim of becoming a doctor.

Although primarily employed as a stewardess, the nurse was also responsible for the upkeep of the medical equipment on board and the evaluation and treatment of illnesses and injuries that did not require diagnosis or treatment ashore.

While serving on KIBO, the nurse had organised and delivered a first aid refresher course for the officers and crew. Topics covered in this refresher course included CPR, defibrillation, near drowning and shock.

¹⁵ Mandatory minimum requirements for certification of officers in charge of a navigational watch on ships of 500 gross tonnage or more

¹⁶ Post investigation note: The Third Officer now holds a STCW II/1 CoC as OOW Deck which is limited to "Commercially and privately operated yachts and Sail Training vessels less than 3000GT". This CoC was issued by the United Kingdom in September 2015

SECTION 2 – ANALYSIS

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. Direct cause of the accident

The direct cause of the fender hook leaving the bulwark is unlikely to be known with certainty. The event was not recorded by the CCTV system as the Deckhand was working outside of the motion detection zone of the camera covering the worksite. No member of the crew, apart from the Deckhand himself, directly witnessed the accident. The C/O recalls seeing the fender hook leaving the bulwark, but the Deckhand himself was unsighted. Due to the debilitating nature of the injuries sustained in the accident, the Deckhand was unable to recount his recollections of the accident.

When properly seated on the bulwark the fender hook provides a stable platform from which substantial weight can be suspended. The only time when the fender hook was not properly seated was when it is being moved to a new position on the bulwark. The fender hook was recovered after the accident and examined by the Spanish authorities. Photographs of the fender hook, post accident, (see figure 6, above) show it free from distortion or other damage.

Approximately seven minutes prior to the accident, the Deckhand was observed on CCTV repositioning the fender hook. He performed this repositioning alone and from outboard of the bulwark. He did not move to the inboard side of the bulwark and the relative safety of the main deck before removing the fender hook from the bulwark for repositioning.

The most likely direct cause of the accident was that the Deckhand lost his footing and fell while in the process of repositioning the fender hook.

As the sole means of support was the bosun's chair and safety harness attached to the fender hook, there was nothing to arrest the fall of the Deckhand or to stop the fender hook following him to the sea. No independent safety line was in use, despite being required by Part 3, Section 3.6 of the yacht's Technical Manual.

3. Sinking and subsequent near drowning

Crew members described the Deckhand as being less comfortable and confident in the water than most other members of the crew. Because of this, he was not

normally asked to prepare water sports equipment for guest use when he was working on deck. However, he could swim, and was seen swimming slowly towards the yacht immediately after the accident.

When he regained the surface of the water the Deckhand was described as looking “shocked”. Although apparently aware of his surroundings he was obviously disoriented by the fall and had most likely been struck on the head by the fender hook (see below).

His ability to swim back to the yacht would have been severely hampered by both his disorientation and the tool bucket which was still clipped to his safety harness. This bucket would have produced a great amount of drag making it much harder to swim. In addition to the increased drag caused by the tool bucket, the deckhand was still attached to the fender hook. The fender hook had a mass of 5.5kg and would have made it difficult to remain on the surface.

In such circumstances, and without the support of a lifejacket or other buoyancy aid, all but the strongest of swimmers would have difficulty remaining on the surface of the water for any length of time.

4. Nature of injuries sustained

The Deckhand sustained severe hypoxic brain injuries caused by the lack of oxygen and blood to the brain while he was underwater. A MRI scan carried out at the hospital in Majorca also revealed a small fracture of the right orbit¹⁷ of his skull. The most likely cause of this fracture is that he was hit on the head by the fender hook (to which he was attached by the supporting line) when he fell. Although a safety helmet would not have fully protected the face, had the Deckhand been wearing one when the accident occurred the effects of being struck in this area may have been reduced.

On admission to hospital in Palma, the Deckhand spent 11 days in the Intensive Care Unit, before being transferred to a hospital in the UK. On transfer to a UK hospital, he spent a further 34 days in the Intensive Care Unit. Although the Deckhand made progress in his rehabilitation following the accident, he continued to require 24 hour care. On 07 June 2017 the Deckhand died of bronchial pneumonia brought on by his immobility following the accident. A ruling of accidental death was recorded following an inquest at Birmingham Coroner’s Court.

¹⁷ The bony cavity in the skull containing the eyes.

5. Experience of the Deckhand working aloft and over the side of the yacht

Crew members interviewed as part of the investigation were certain that the Deckhand had worked aloft on many previous occasions. Generally, the tasks undertaken were reported to be washing down the upper exterior of the yacht. No one interviewed during the investigation was aware of the Deckhand having worked over the side of the yacht prior to the accident.

The records of PTWs held on board KIBO show 62 permits issued for working aloft or over the side between June 2014 and the day of the accident. None of these permits record the Deckhand as participating in work aloft or over the side prior to the permit issued on the day of the accident.

On the day of the accident, the CCTV recorded the Deckhand preparing for working over the side and donning his safety harness. From the CCTV recording it is clear that the Deckhand was fully familiar with wearing and adjusting the safety harness and it is extremely unlikely that he had not worn the harness in the past.

On the balance of probabilities, it is unlikely that the crew members interviewed were mistaken in their recollections and it is more likely that the Deckhand was not recorded on the permits as he was “assisting” rather than “leading” the work being undertaken. If this is the case, it represents a failure to keep proper records on PTWs.

6. Actions of the Chief Officer

This section addresses the actions of the C/O in relation to this incident. The wider topic of general safety management is discussed below.

When the 3/O left the yacht to take guests ashore in the tender, the duties of the “Responsible Officer” were assumed by the C/O. This hand over of responsibilities was not documented on the Permit to Work, as required by Part 3 Section 6.3 of the yacht’s Technical Manual.

From the time of assuming the duties of the “Responsible Officer” until the accident, the C/O made several checks on the Deckhand, but the Deckhand was not under the observation from a person on deck at all times. It was fortunate that the C/O was returning to the worksite when the accident occurred and the Deckhand’s fall from the worksite did not go unnoticed.

The C/O did not immediately appreciate the seriousness of the accident when it occurred. When she checked on the condition of the Deckhand after his fall, he had regained the surface of the water, had signalled that he was “OK” and was observed swimming slowly back to the yacht. On the evidence available to her at the time, the C/O concluded that the Deckhand, while in need of assistance, was not in immediate

and life threatening danger. If the C/O had appreciated the danger to the Deckhand it is likely that she would have summoned assistance via her radio, maintained visual contact with the deckhand and deployed the nearby lifebuoy. Had the C/O deployed a lifebuoy which was located in the vicinity of the worksite as soon as the Deckhand fell, it is likely that the Deckhand would have been able to remain on the surface of the water until recovered to the yacht.

Within 30 seconds of leaving to summon assistance for the Deckhand, the true nature of the emergency situation became apparent and the C/O initiated the full on board emergency response.

The C/O remained at the scene on the swim platform until the master arrived to take command. With the master in command at the scene, the C/O moved to the bridge of the yacht to coordinate the on shore emergency response to the emergency through MRCC Palma. By contacting MRCC Palma early in the incident response, the actions of the C/O ensured that there was the minimum of delay in transferring the medical care of the Deckhand to the shore side medical responders.

7. Actions of the Third Officer

This section addresses the actions of the 3/O in relation to this incident. The wider topic of general safety management is discussed below.

The 3/O was recorded as the “Responsible Officer” on the PTW issued to cover the work being undertaken when the accident occurred. Prior to the issue of this permit the 3/O had been recorded as the “Responsible Officer” on two previous permits relating to working aloft. The permit issued in respect of the work being undertaken when the accident occurred was the first permit where the 3/O was the Responsible Officer for working over the side of the yacht.

When the work commenced, the 3/O was in effective control of the worksite (as the Responsible Officer on the PTW). Part 3, Section 3.6 of the Technical Manual in force on board the yacht requires that:

- *Every crewmember working aloft or overside is to wear a safety harness fitted with a lifeline. The lifeline must be rigged independently in such a manner that it will be effective in the event of any failure in the means by which the crew member is suspended or supported at height and this may be accomplished by direct attachment to a suitable point on the vessel’s structure or by a sliding attachment to a gantline stretched between two such points. **In no circumstances is a lifeline to be attached to the means of suspension or support itself.** (Emphasis added)*

The 3/O did not ensure that the requirements of the Technical Manual were complied with prior to the work commencing. Only a single means of support was used, with no independently rigged lifeline.

When the 3/O left the yacht to take guests ashore in the tender, there was no formal documented hand over to another nominated person who was fully conversant with the situation, as required by Part 3 Section 6.3 of the Technical Manual. This resulted in a break in the “*observation from a person on deck*” recommended by Section 15.2.5 of COSWP. Given that this was the first time that the Deckhand had worked over the side of the ship, this observation from a person on deck should have been maintained throughout the work being undertaken.

When the serious nature of the accident was known, the 3/O’s actions in diving from the worksite in an attempt to recover the Deckhand were both selfless and commendable.

8. Actions of the nurse

When the nurse became aware of the accident her actions were swift, competent and professional. When she arrived on the swim platform she quickly and effectively took control of the medical response. The position of stewardess is a junior one in the hierarchy of a yacht’s on board management, however all on board were aware of her training and experience as a nurse. Her knowledge and experience were recognised by all involved in the emergency response and her instructions were obeyed quickly and without question.

The overall effectiveness of the medical response was supported by the nurse conducting an on board “first aid refresher” course which covered the proper use of AEDs and the treatment of near drowning victims.

The actions of the nurse greatly enhanced the Deckhand’s chances of survival.

9. General Safety Management on board

An extensive documented safety management system was in place on board KIBO. This documented SMS was fully compliant with the ISM Code (See 11.2, below). Although the documented SMS complied with the requirements of the ISM Code and covered the activities being carried out when the accident occurred, these activities were not being conducted in accordance with the SMS.

10. Verification of Safety Management activities on board

Safety management activities on board KIBO had been evaluated by both YCO S.A.M. and CISR prior to the accident occurring.

An internal audit of the SMS was conducted by YCO S.A.M in its capacity as the ISM “Company¹⁸” on 19 November 2014. In the executive summary of the audit report, the auditor concluded that “*There is strong evidence that the system is being well implemented.*” No non conformities were identified at this audit and one observation was raised relating to the inspection of food, water, and crew accommodation.

Two days after the completion of the internal audit, an external audit of the safety management activities was carried out by CISR on 21 November 2014. During this audit no non conformities were identified and a total of eight observations were raised.

The observations related to the following sections of the ISM Code:

Section	Title	Obs Raised
1	General	1
2	Safety and environmental protection policy	3
7	Development of plans for shipboard operations	1
9	Reports and analysis of non conformities, accidents and hazardous occurrences	1
10	Maintenance of ships and equipment	1
11	Documentation	1
	Total	8

None of the observations raised at this audit related directly to the work being undertaken at the time of the accident or to the Permit to Work system. The auditor concluded that “*While it is evident that vessel operates safely (attitude of Captain and all crew members to safe working practice in every routine job and also in drills is of a very high level), from SMS system implementation point of view there is room of improvement.*” (sic).

11. Compliance with rules and regulations

As a private pleasure yacht, KIBO was not subject to the mandatory statutory requirements that would apply to a yacht engaged in commercial activities. As such there was no statutory obligation to comply with a number of national and international requirements that would apply to a “commercial yacht”. However, the

¹⁸ SOLAS IX/1 defines “company” as “*the owner of the ship or any other organization or person such as the manager, or the bareboat charterer, who has assumed the responsibility for operation of the ship from the owner of the ship and who on assuming such responsibility has agreed to take over all the duties and responsibilities imposed by the International Safety Management Code*”.

owner had elected to comply with a number of these requirements on a voluntary basis. These requirements included:

The Large Commercial Yacht Code (LYC);

The International Safety Management Code (ISM Code);

The International Ship and Port Facility Security Code (ISPS Code);

The Maritime Labour Convention, 2006 (MLC); and

The International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1995 (STCW).

As complying with these codes and standards was on a voluntary basis, there was no legal obligation for compliance or legal sanction available for noncompliance, beyond the withdrawal of any appropriate voluntary certificate that had been issued.

11.1 Large Commercial Yacht Code¹⁹

During the design and construction of the yacht, compliance with the requirements of the Large Commercial Yacht Code were verified and, on the yacht's delivery, the construction of the yacht was certified as complying with Large Commercial Yacht Code by CISR.

Sections of the Large Commercial Yacht Code with direct relevance to this accident include:

Section 22 Protection of personnel:

Section 22.3.1 requires that provision be made to enable persons to work safely when working aloft or overside is required. On board KIBO, this was controlled through the Technical Manual (Part 3, Section 3.6), Standard Operating Procedures (SOP 28) and Risk Assessments. However, these controls were not being fully followed at the time of the accident.

Section 23, Medical Stores:

Section 23 requires that yachts should carry medical stores as required by the Administration. For a Cayman Islands ship, the minimum medical stores requirements are detailed in Shipping Notice 06/2014. Medical stores carried on board KIBO were supplied by a specialised aviation and maritime provider of medical support services, MedAire. The medical stores supplied to the yacht by MedAire were in excess of those required by Shipping Notice 06/2014.

¹⁹ Post Investigation Note: The *Large Commercial Yacht Code* has been updated and combined with the existing *Passenger Yacht Code*. The new combined and updated code is published as the *REG Yacht Code* (See Section 3)

Section 26, Manning and Personnel Certification:

Section 26.2.1 of the Large Commercial Yacht Code states:

An Administration should ensure that all vessels are safely and sufficiently manned in relation to the nature of their operation with the responsibilities placed on companies owning or operating seagoing vessels, to ensure that their vessels are manned with personnel of appropriate grades who have been properly trained and certificated.

The numbers of certificated officers and certificated and non-certificated ratings, must be sufficient to ensure safe and efficient operation of the vessel at all times.

The guidelines place a duty on the owner or operator to provide the master of a vessel with the necessary resources to comply with the manning requirements.

KIBO had been issued with a Minimum Safe Manning Document by CISR on 14 April 2014. For voyages over 150 nautical miles from a safe haven, this document specified the following deck officers to be carried:

- 1 – Master – STCW Regulation II/2;
- 1 – Chief Mate – STCW Regulation II/2
- 1 – Officer of the Watch – STCW Regulation II/1

At the time of the accident, KIBO was manned in excess of all the minimum requirements specified in the Minimum Safe Manning Document.

Section 30, Safety Management:

Section 30.1 of the Large Commercial Yacht Code requires yachts of 500 GT and over and their associated managers to comply with IMO's International Safety Management Code (ISM Code).

11.2 The ISM Code

The International Safety Management Code (ISM Code) is applied by Chapter IX of the SOLAS Convention. The objectives of the Code are to ensure safety at sea, prevention of human injury or loss of life, and avoidance of damage to the environment, and in particular, to the marine environment, and to property (ISM 1.2.1).

A documented SMS was in place on board KIBO that met the requirements of Section 1.4 of the ISM Code (Functional requirements for a safety management system).

Risk Assessments and SMS Procedures

The purpose of any on board risk assessment is to be a careful examination of what could cause harm, so that decisions can be made as to whether enough precautions have been taken or whether more should be done to prevent harm. Their aim is to minimize accidents on board ships.

The risk assessment conducted on 02 February 2015 relating to overside working identified a number of control measures to be taken when this type of work was to be undertaken. These were:

1. *Permit to work issued, appropriate safety harness worn, 2 lanyards and attached to a secure point on board, responsible person to monitor task, appropriate training and guidance*
2. *Guidance and training in the use of harness and safety line, task to be overseen by an OOW, work to be carried out in accordance with the SOP's and COSWP*
3. *Check weather forecast, task to be done in calm conditions*

These control measures were incorporated into both Section 28.1 of the yacht's Standard Operating Procedures (SOP) and Part 3 Section 3.6 of the Technical Manual (TM).

At the time of the accident the requirements of both the SOP and the TM were not being fully implemented as follows:

A lifejacket was not worn by the Deckhand as was required by the SOP;

Only a single means of support was provided for the Deckhand, with no second "safety line" being provided; and

The single supporting line was attached to a moveable fender hook on the yacht's bulwark and not directly attached to a suitable fixed point of the yacht's structure.

As a result of not fully following the SOP and TM, there was no means to arrest the fall of the Deckhand when the fender hook became detached from the bulwark. Once in the water and weighed down by the weight of the fender hook, the Deckhand did not have the support and buoyancy that would have been provided by a lifejacket.

Not fully following the SOP and TM contributed to the seriousness of the both the accident itself and the injuries sustained by the Deckhand.

Permit to Work System

As part of the SMS a Permit to Work system was employed on board KIBO. The Technical Manual describes the system in the following terms:

The permit-to-work system simply sets out the precautions to be taken prior to commencement of any potentially hazardous work activity.

Section 16.2.2 of COSWP observes that a permit to work does not in itself make the job safe, but contributes to measures for safe working. COSWP makes further recommendations regarding PTW systems which include:

Before signing the permit, the authorising officer should ensure that all measures specified as necessary have in fact been taken (COSWP 16.2.3(d));

The person responsible for carrying out the specified work should countersign the permit to indicate his understanding of the safety precautions to be observed. (COSWP 16.2.3(f)); and

The authorising officer retains responsibility for the work until he has either cancelled the permit or formally transferred it to another authorised person who should be made fully conversant with the situation. Anyone who takes over, either as a matter of routine or in an emergency, from the authorising officer, should sign the permit to indicate transfer of full responsibility (COSWP 16.2.3 (e)).

The PTW in use at the time of the accident did not follow the above guidance given in COSWP. The work to be undertaken was discussed between the Deckhand, the 3/O and the C/O. However, the Deckhand did not countersign the permit, nor was there a dedicated place on the PTW form for him to do so. The permit was signed by a responsible officer despite the SMS requirements for working over the side of the yacht not being complied with prior to the work commencing.

When the responsible officer left the yacht to take guests ashore, while the work was still in progress, responsibility for the work was not formally transferred to another responsible officer.

As all previous permits for overside work had the requirement for "Buoyancy aids" on the permit form marked as "N/A", it is reasonable to conclude that the issue of permits for overside work had become less than rigorous, with each being duplicated from the previous one issued.

The implementation of the SMS was ineffective in ensuring that the Permit to Work system was properly followed on board.

Emergency Response Procedures

The Contingency Plans contained in Section 6 of the SMS and Section 3.2 of the Emergency Response Manual consider two "man overboard" scenarios. The first is when the person is seen going overboard and the second is when a person is later discovered missing. Both of these scenarios are considered to occur when the yacht

is underway at sea. These plans are of limited value when applied to a person falling into the sea when the ship is at anchor or alongside.

11.3 The Maritime Labour Convention

The Maritime Labour Convention, 2006, (MLC) is a convention of the International Labour Organisation which establishes minimum working and living standards for seafarers. The Convention applies to ships “ordinarily engaged in commercial activities” and does not apply to private pleasure yachts (or “pleasure yachts not engaged in trade”) such as KIBO.

Regulation 4.2 of MLC (Health and safety protection and accident prevention) is intended to ensure that seafarers’ work environment on board ships promotes occupational safety and health. This regulation is given effect in Cayman Islands law by the Merchant Shipping (Maritime Labour Convention)(Health and Safety) Regulations, 2014. Like the Convention itself, these regulations do not apply to private pleasure yachts.

Regulation 4(4) of these regulations requires the shipowner and master of a Cayman Islands ship to take into account the guidance contained in Code of Safe Working Practices for Merchant Seafarers (COSWP) when complying with the regulations.

Section 15.2 of COSWP gives guidance on safe systems of work for working aloft and outboard. In section 15.2.5, COSWP gives the following guidance:

15.2.5 Personnel working aloft should wear safety harness with lifeline or other arresting device at all times (see section 4.10). A safety net should be rigged where necessary and appropriate. Additionally, where work is done overside, buoyancy garments should be worn and a lifebuoy with sufficient line attached should be kept ready for immediate use. Personnel should be under observation from a person on deck.

At the time of the accident, the Deckhand was wearing a safety harness with single suspension line, however it was not attached to a “strong point” on the ship’s structure. A lifebuoy was located in the vicinity of the worksite, but was not deployed immediately after the Deckhand fell from the worksite.

No “buoyancy garment”, lifejacket or other buoyancy aid was worn and observation by a person on deck was not continuous. Whereas this guidance contained in COSWP was incorporated into the risk assessment for working over the side and in the operating procedures of the yacht, the guidance was not fully implemented on the day of the accident.

12. Fatigue

Fatigue has been shown to be a contributing factor in many accidents. As KIBO was voluntarily complying with the Maritime Labour Convention at the time of the accident, maximum hours of work and minimum hours of rest are specified in regulation 2.3 of that Convention.

A work and rest schedule had been specifically produced by the master for this visit by the owner and guests. This schedule ensured that all members of the deck crew received sufficient rest for the duration of the visit, while having adequate persons on duty to meet the expected needs of the guests.

Ensuring that all deck crew maintained their minimum hours of rest for the duration of the owner's visit was aided by utilising the "Assistant Engineer / Deckhand" in his role as a deckhand.

Records of work and rest hours were examined and there is no evidence to suggest that fatigue was a contributing factor in this accident.

13. Other considerations

13.1 Yacht design, aesthetics and access arrangements

Aesthetic design is considered extremely important in yachting. Whereas the rub rails fitted to the hull of KIBO were functional and designed to protect the hull, the stainless steel strips attached to the rub rails were mainly cosmetic.

Cleaning of the above water portion of a yacht's hull is usually undertaken from water level, with the persons undertaking the cleaning being supported in either a small boat or in a "punt", as shown below.



Typical yacht hull washing
(image c/o www.liveyachting.com)

This arrangement was not suitable for polishing the stainless steel parts of the rub rails fitted to KIBO because the polishing required close proximity with the work surface and detailed application of metal polish.

During the design of the yacht, arrangements were made to provide safe access to the exterior of the yacht for cleaning and maintenance²⁰. Whereas there were sufficient pad eyes provided for maintenance of the forward half of the rub rail (including the location of the accident), the provision of pad eyes in the aft portion of the yacht did not provide adequate single “strong points” to secure a solo safety line to prevent falling into the water when cleaning the rub rails.

The length of a safety line attached to one of the available “strong points” would not have prevented a person falling into the water when working at the aft most portions of the rub rails. However, in the case of such a fall from the worksite into the water, that person would have maintained a physical attachment to the yacht.

It would have been possible to secure a safety line by a sliding attachment to a “gantline” fixed between two such strong points when working for the entire length of the rub rails, as required by Part 3, Section 3.6 of the Technical Manual.

Had the Deckhand been attached by a safety line to either a single strong point or to a “gantline” between strong points when the accident occurred it would have greatly aided in his location and recovery.

13.2 On board emergency response

The elapsed time between the Deckhand falling from the worksite to him being recovered from a water depth of 18m and brought back on board the yacht was 13 minutes and 24 seconds. Key event timings from the CCTV recordings are given below:

Event	Time	Elapsed Time				
Deckhand falls from worksite	10:57:31	45s	1m 50s	11m 59s	29s	13m 24s
C/O leaves worksite for help	10:57:47					
Rescue swimmer enters water	10:58:16					
3/O enters water	10:59:21					
Rescue diver enters water	11:09:30				1m 24s	
Deckhand recovered on board	11:10:54					

Initially, the incident was treated as a “working incident” whereby a crew member was in need of assistance, rather than a life threatening emergency. The Deckhand had regained the surface of the water and appeared aware of his surroundings and was seen swimming slowly back to the yacht. The bucket and the 5.5kg fender hook attached to his safety harness would not have been apparent to an observer on the

²⁰ See Drawing Number 6497/0750 – 08 – 10 “Maintenance Plan”, included in the Appendix to this report.

yacht. Had the lifebuoy in the vicinity of the worksite been deployed as soon as the Deckhand fell, it is likely that the Deckhand would have been able to remain on the surface of the water until recovered to the yacht.

Once the severity of the situation was realised (i.e. when it was apparent that the Deckhand was no longer on the surface of the water), the yacht crew quickly moved to a full emergency response. From this point onwards, the on board response was swift and professional. Additional swimmers entered the water to search for the Deckhand from the surface and a full underwater rescue was commenced and executed.

SECTION 3 – CONCLUSIONS, ACTIONS TAKEN AND RECOMMENDATIONS

1. Conclusions

As with most accidents, it is not possible to cite a single event or action as the “cause”. Rather a sequence of events and circumstances ultimately led to the accident occurring and the severity of its consequences.

- A) The most likely cause of the Deckhand falling from the worksite was that he lost his footing while repositioning the fender hook on the yacht’s bulwark.
- B) Had the lifebuoy in the vicinity of the worksite been deployed as soon as the Deckhand fell, it is likely that the Deckhand would have been able to remain on the surface of the water until he could be recovered to the yacht.
- C) The method of work being employed at the time of the accident was not in accordance with:
 - 1) Section 3.6 of the yacht’s Technical Manual in that no separate lifeline was in use in addition to the *means by which the crew member is suspended or supported at height*;
 - 2) Section 28.1 of the yacht’s Standard Operating Procedures in that no inflatable lifejacket was being worn at the time of the accident; or
 - 3) The guidance given in Section 15.2 of the Code of Safe Working Practices for Merchant Seafarers for working aloft and outboard.

As a result of not fully following the SOP and TM there was no means to arrest the fall of the Deckhand when the fender hook became detached from the bulwark. Once in the water and weighed down by the weight of the fender hook, the Deckhand did not have the support and buoyancy that would have been provided by a lifejacket or buoyancy aid.

- D) The failures to follow Section 3.6 of the Technical Manual and Section 28.1 of the Standard Operating Procedures are likely to have contributed to the seriousness of the injuries sustained in the accident.
- E) There was evidence of a systematic failure in the Permit to Work system as none of the 16 permits raised in relation to working over the side of the yacht required the wearing of a lifejacket or other buoyancy aid.
- F) When the 3/O left the worksite and vessel at 1021h there was no formal or documented hand over of “Responsible Officer” duties as required by Part 3 Section 6 of the Technical Manual.

- G) The level of supervision over the deckhand, given the nature of the work being undertaken, was below that recommended in COSWP and required by the on board risk assessment. It was fortunate that the C/O witnessed the fender hook leaving the bulwark, or the accident may have gone undetected.
- H) The lack of space allocated on the PTW form for “workers” to sign is likely to have led to a lack of awareness about the requirement for the form to be signed by those carrying out the work.
- I) The actions of the nurse during the on board medical response greatly enhanced the Deckhand’s chances of survival.

2. Actions Taken

Following this accident, Y. CO S.A.M have taken the following actions:

Conducted an Internal Investigation. This investigation covered the events before, during and following the accident, and the impacts on persons affected by the accident. The results of this investigation have led to changes in operational controls and procedures across the Y.CO fleet of managed yachts.

Conducted specific training on board KIBO. Specialists in safe working practices when working at height conducted ship specific training on board KIBO during June 2015. These specialists also conducted an assessment of KIBO’s existing procedures and equipment provision for over side working.

Revised the operating procedures on board KIBO. Revised operating procedures for over side working and working aloft have been implemented on board KIBO. Amongst other new measures, these revised procedures more specifically reflect the guidance contained in COSWP for this type of work.

Issued Fleet Circulars. Following the accident, Y.CO produced a number of Fleet Circulars to highlight the risks involved in working aloft / over side and appropriate working methods.

Operational Procedures Review. Following the accident, Y.CO conducted concentrated inspections on their managed yachts. This review compared procedural requirements to actual working practices employed on board, resulting in a number of corrective actions being implemented.

The following action was taken by the Working Group²¹ tasked with the periodic review and updating of the Large Commercial Yacht Code:

Revised safety requirements for working aloft and for over side work.

As part of the review and updating process, changes were made to the safety requirements for working aloft and for over side working. These new requirements are contained in the REG Yacht Code which has replaced the existing Large Commercial Yacht Code and Passenger Yacht Code.

New requirements include the provision of over side Working Systems on yachts to provide a safe means of external access to all parts of a yacht where crew are expected to be working.

The new (*REG Yacht Code*) and existing (*Large Commercial Yacht Code*) requirements for over side working are included in the Appendix to this report.

3. Recommendations

In view of the above actions taken, no further recommendations are made in this report.

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

4. References

The following publicly available documents are referenced in this report and may be downloaded from the hyperlinks provided:

[LY3 The Large Commercial Yacht Code](#)²²: In force at the time of the accident.

[The REG Yacht Code](#)²³: Amended and consolidated Large Yacht Code.

[Code of safe working practices for merchant seafarers](#)²⁴: (2018 Version).

²¹ This Working Group was composed of yacht specialists from the Maritime Administrations of the Red Ensign Group (REG) and representatives from the yachting industry. Y. CO S.A.M actively participated in this Working Group.

²²https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/444652/LY3_-_Final_Version.pdf

²³ <https://www.redensigngroup.org/publications/>

²⁴ <https://www.gov.uk/government/publications/code-of-safe-working-practices-for-merchant-seafarers-coswp-2018>

APPENDIX – PHOTOGRAPHS AND OTHER DOCUMENTS

Y.CO

OPS 5A-Y PERMIT TO WORK: GENERAL

For "Hot Work" use "Permit to Work – Hot Work" form.
 For "Entering Enclosed Spaces" use "Permit to Work – Entry into Enclosed Spaces" form.

Yacht KIBO	Date 03-05-2015	Risk assessment ref
Location of work	Main DECK OUTBOARD	Description of work REPAIRING RUB RAIL
Duration from/to (1 working day)	10:00 – 13:00	
Names & ranks of crew employed	[REDACTED] D/H	

Safety checklist
 To be completed by the responsible officer before the work activity begins

Duty officers (deck and engine) notified	✓
Appropriate warning notices displayed	N/A
Electric power isolated where appropriate	✓
Hydraulic power isolated where appropriate	✓
Alarm systems operative where fitted	✓
Required tools and equipment adequate and available	✓
Required safety equipment adequate and available	✓
Communications link established and tested	N/A
Access to and from work location adequate	✓
Protective clothing and equipment if required	
Safety helmet	N/A
Safety shoes	✓
Gloves	N/A
Goggles	N/A
Safety harness	✓
Buoyancy aids	N/A

Other _____

Special precautions to be taken: _____

Approval granted

Responsible officer name & rank **[REDACTED]** **3/0.**

TO BE COMPLETED AND KEPT AT THE WORK SITE UNTIL COMPLETION, THEN FILED

ISSUE 3: REV D
 ISSUED 01* APRIL 2014
 SAFETY MANAGEMENT SYSTEM

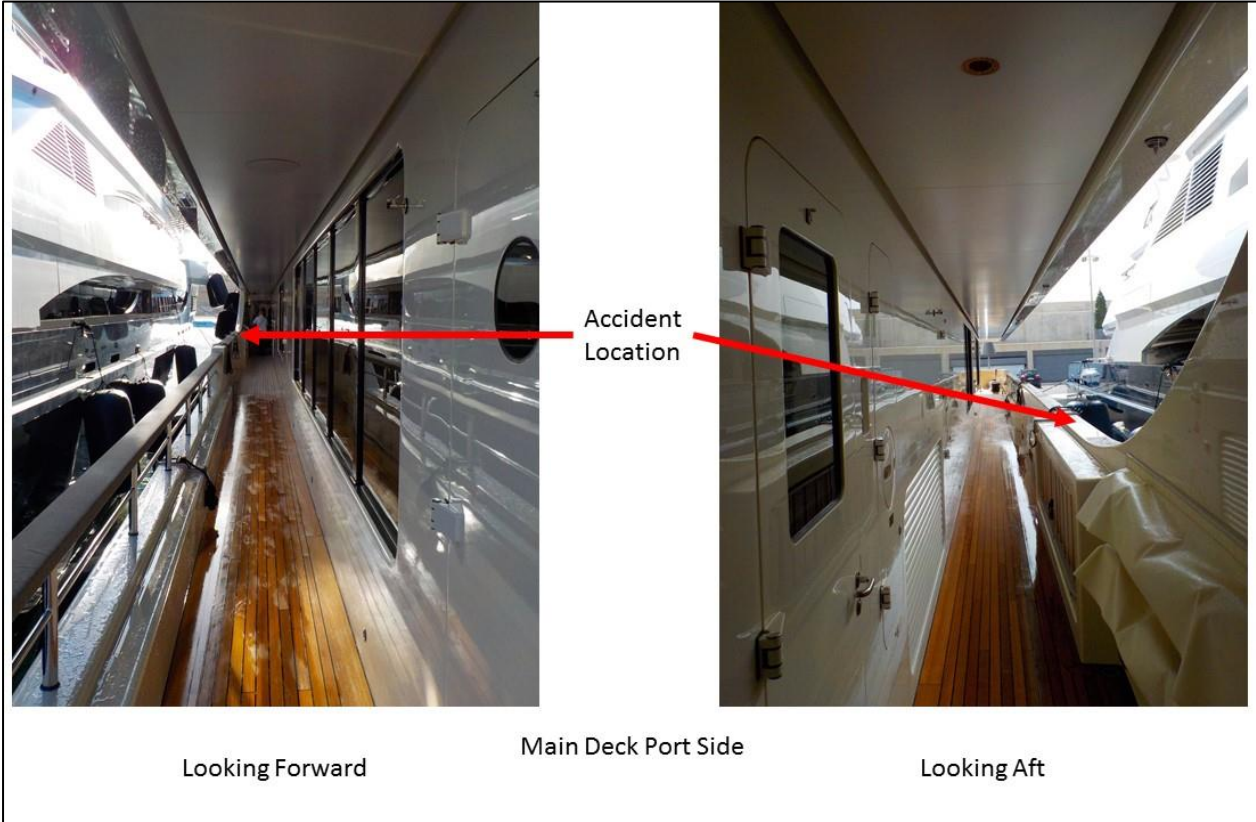
PAGE 2 OF 2
 KIBO

APPROVED BY MANAGING PARTNER
 ISSUED BY Y.CO SAFETY MANAGEMENT

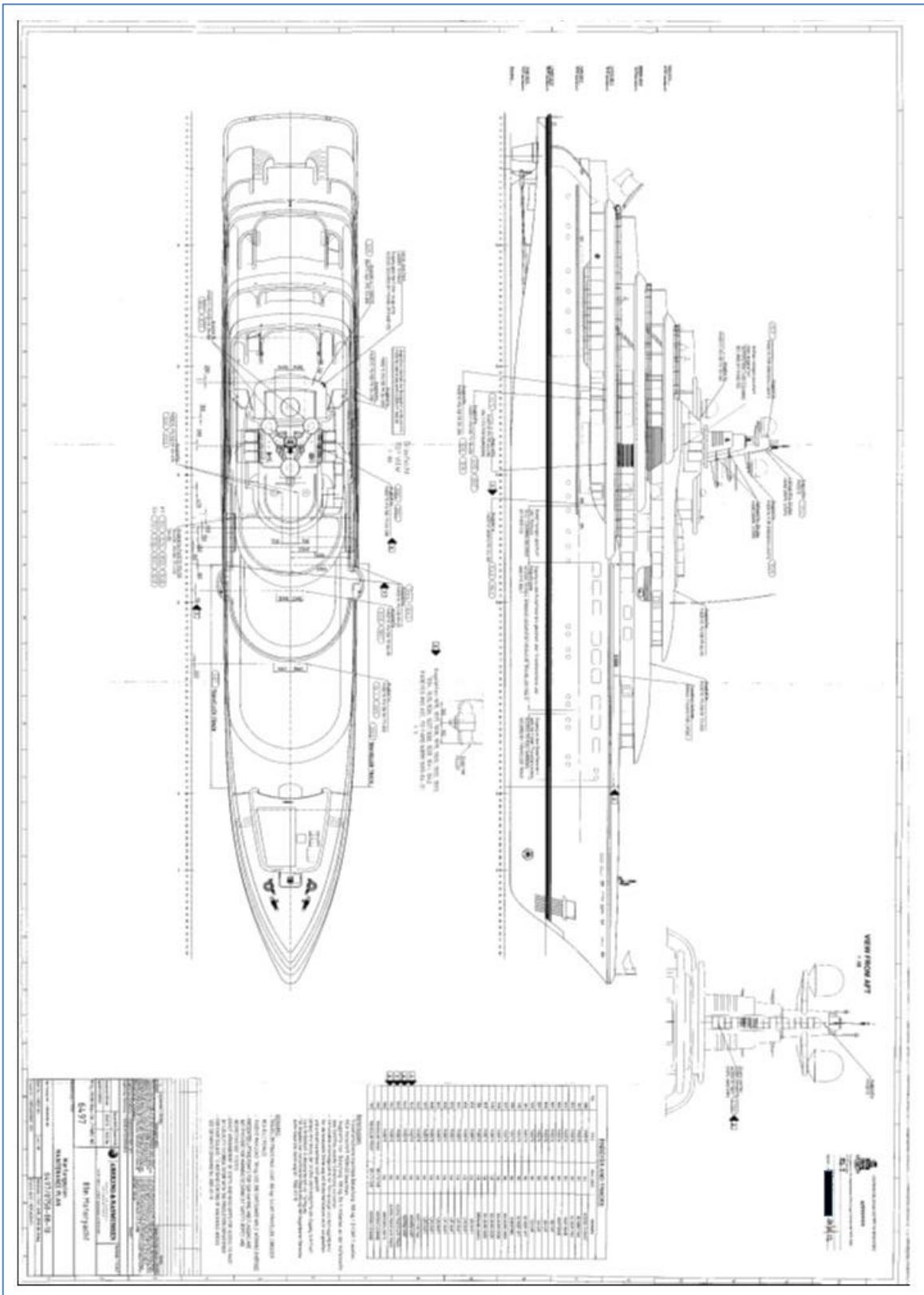
Permit to Work in force at the time of the accident.



Overview of KIBO showing accident location

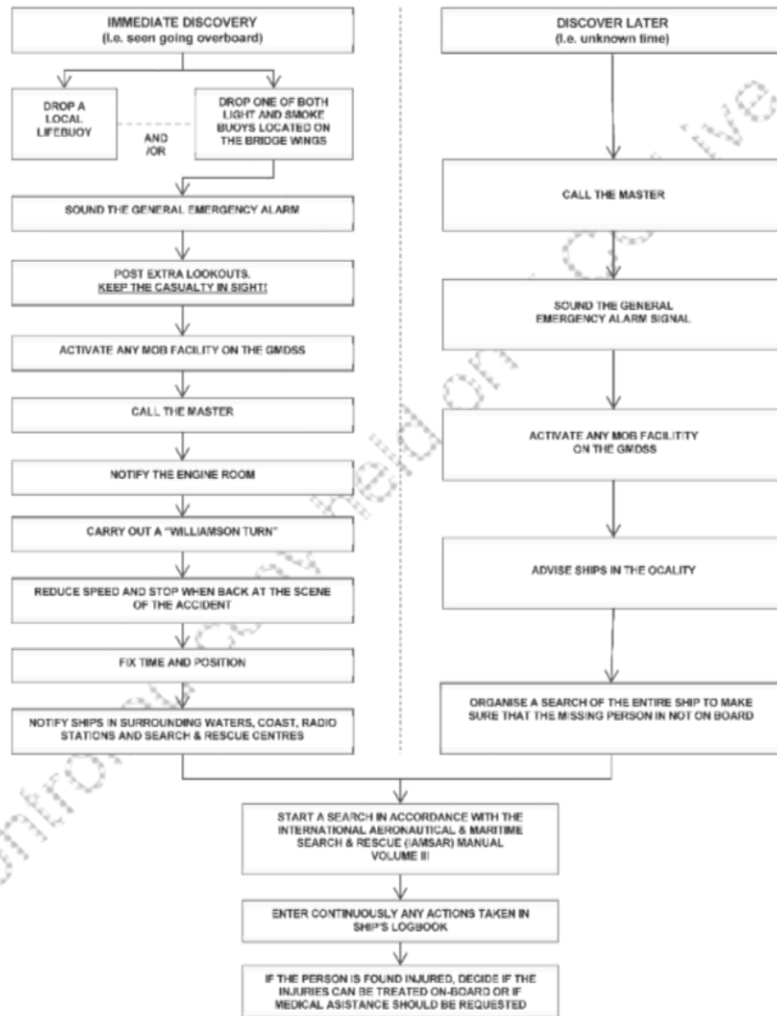


Main Deck Port Side



KIBO Maintenance Plan

3.2 Missing person, inc. man overboard



Requirements for Working Aloft and Over Side Working contained in the Large Commercial Yacht Code and the REG Yacht Code.

Large Commercial Yacht Code (LY3) (in force at the time of the accident):

22.3 Safe Work Aloft, Overside, and on the Bowsprit of Sailing Vessels

22.3.1 When access to the rig, bowsprit, or overside working is required, provision should be made to enable people to work safely, in accordance with national standards, see National Annex.

22.3.2 The arrangements provided should be based on established safe working practices for the type of vessel. The arrangements may include but not be limited to:

- .1 safety nets below the bowsprit;*
- .2 safety grab rails or jackstays (metal or wire) fixed along the bowsprit to act as handholds and strong points for safety harnesses;*
- .3 mandatory use of safety harnesses aloft, overside, (refer to national annex) and for work on the bowsprit;*
- .4 sufficient footropes and horses in wire (or rope) permanently rigged to enable seamen to stand on them whilst working out on the yards or on the bowsprit;*
- .5 safety jackstays (metal or wire) fixed along the top of the yards, to provide handholds and act as strong points for safety harnesses;*
- .6 means of safely climbing aloft, such as:
 - (i) fixed metal steps or ladders attached to the mast; or*
 - (ii) traditional ratlines (rope) or, rattling bars (wood/steel), fixed across the shrouds to form a permanent ladder.**

The REG Yacht Code (Replacement Code for LY3):

Annex O – Protection of Personnel

O1 - Safe Work Aloft, Over-side, and on the Bowsprit of Sailing Vessels

(1) When access to the rig, bowsprit, or over-side working is required, provision shall be made to enable people to work safely, in accordance with recognised national or international standards.

(2) The arrangements provided for accessing rigging shall be based on established safe working practices for the type of vessel. The arrangements may include but not be limited to:

(a) safety nets below the bowsprit;

(b) safety grab rails or jackstays (metal or wire) fixed along the bowsprit to act as handholds and strong points for safety harnesses;

(c) mandatory use of safety harnesses aloft, over-side, and for work on the bowsprit;

(d) sufficient footropes and horses in wire (or rope) permanently rigged to enable seafarers to stand on them whilst working out on the yards or on the bowsprit;

(e) safety jackstays (metal or wire) fixed along the top of the yards, to provide handholds and act as strong points for safety harnesses;

(f) means of safely climbing aloft, such as:

(i) fixed metal steps or ladders attached to the mast; or

(ii) traditional ratlines (rope) or, rattling bars (wood/steel), fixed across the shrouds to form a permanent ladder.

(3) Safe means of external access to all parts of the vessel shall be made available where crew are expected to work through Over-side Working Systems in accordance with Annex B.

(4) Equipment manufacturers of Over-side Working Systems and ship builder instructions and guidance on their installation, use, maintenance, inspection and testing shall be followed at all times.

(5) The mast and other spaces requiring access via ladders shall include continuous fall protection measures to protect personnel when ascending or descending ladders.

(6) New vessels shall have "External Access Plans" showing locations and loads for all elements of the Over-side Working Systems in accordance with Annex B approved by a Recognised Organisation