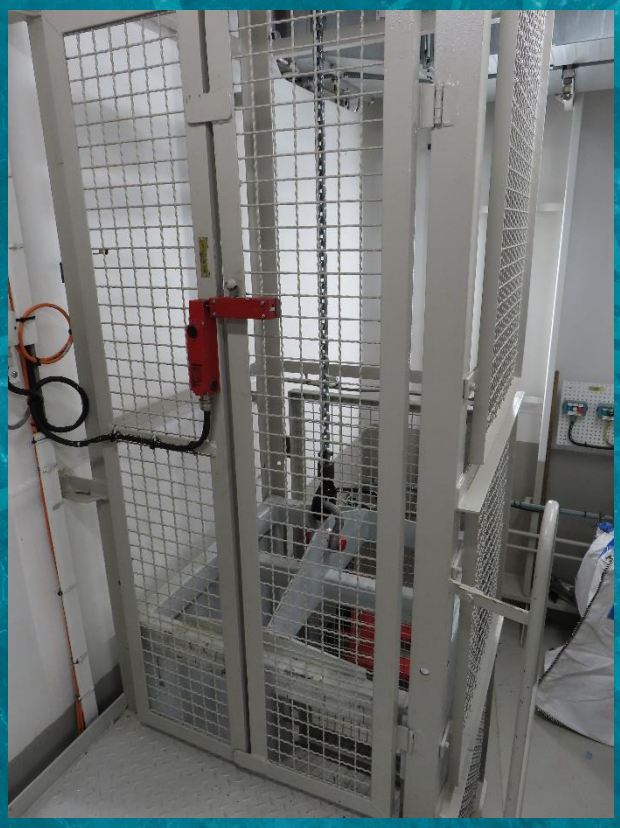
The Bahamas Maritime Authority

Marine Safety Investigation Report

into a lift fatality onboard Silver Nova on 22 February 2024



The Bahamas conducts marine safety or other investigations on ships flying the flag of the Commonwealth of the Bahamas in accordance with the obligations set forth in International Conventions to which The Bahamas is a Party. In accordance with the IMO Casualty Investigation Code, mandated by the International Convention for the Safety of Life at Sea (SOLAS) Regulation XI-1/6, investigations have the objective of preventing marine casualties and marine incidents in the future and do not seek to apportion blame or determine liability.

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Contents

1. Summary _____ 1
2. Factual Information _____ 2
3. Analysis _____ 9
4. Conclusions _____ 13
5. Lessons to be learned _____ 14
6. Actions taken _____ 15
7. Recommendations _____ 16
8. Glossary and Definitions _____ 17

1. Summary

What happened

On the morning of 22 February 2024, the Bahamas flagged passenger vessel Silver Nova was on passage off the coast of Brazil. Work was carrying on as normal below decks in the waste handling area where incinerator operators were preparing for the transfer of ash to a holding area onboard ready for disposal ashore at their next port.

During the transfer, a wiper who was asked to assist in the loading of the ash bag into a cage lift, was severely injured when the cage lift, he accessed to free the ash bag which had wedged itself, gave way, trapping and crushing his leg and lower body.

Despite immediate medical assistance on board and medical care ashore at a local hospital, the wiper later died following complications from his injuries.

Why it happened

The cage lift got wedged when an ash bag shifted during hoisting as a result of horizontal bars not being in place that were fitted to prevent cargo from spilling out from under the gate during loading.

The incinerator supervisor was unaware that the chain on the cage lift was slack when he isolated the power rendering it unsafe for access in any attempt to free the wedged ash bag.

The wiper entered the cage to free the ash bag unaware of the potential risks.

What can we learn

Crew that are asked to assist in unfamiliar operations, should refrain until suitably trained and qualified, including work involving lifting appliances.

Personnel working with lifting appliances should be experienced in all aspects of operations including emergency preparedness, especially equipment installed with safety features which should not be bypassed as they are fitted to ensure areas are made safe to prevent harm or severe injuries from occurring.

When systems are being installed on ship’s, consideration must be given to ergonomics of design, adapting the workplace to the worker by designing tasks, workstations, tools, and equipment that are within the worker's physical capabilities and limitations

2. Factual Information

Silver Nova

Vessel Type	Passenger	**Flag**	Bahamas
Owner	Silver Nova Shipping Company LLC.	**Manager**	Silversea S.A.M
Classification Society	Lloyds Register	**Gross/Net Tonnage**	55,051/19,682
Built	June 2023	**Propulsion**	Diesel Electric Twin-screw

IMO No.	Callsign	Length overall	Breadth	Moulded Depth
9886213	C6GA5	243.6m	29.0m	9.30m

Last BMA Inspection	Last PSC Inspection
Amsterdam, Netherlands, 28 July 2023. No deficiencies	Trieste, Italy, 08 August 2023. No deficiencies

Rank/Role on board	Master	Chief Officer	Staff Engineer (Chief)	Wiper (Victim)	Incinerator Supervisor	Incinerator operator
Qualification	Master	Master	Chief Engineer	Engine Rating	Engine Rating	Engine Rating
Certification Authority	Italy	Italy	Italy	Philippines	Philippines	Philippines
Nationality	Italian	Italian	Italian	Filipino	Filipino	Filipino
Age	61	45	38	40	42	54
Time in rank	19 years	6 years	New start	1.5 years	1.5 years	5.5 years
Time on board	4 months	5 months	4 months	7 months	7 months	1 month

Environmental Conditions

Wind Direction	Wind Force	Wave Height	Swell Height	Precipitation / Sky	Visibility Range	Light Conditions
E	3	2-3 feet	N/A	Overcast	± 5 NM	Daylight

Voyage Details

Departure Port	Fortaleza, Brazil	Arrival Port	Macapa, Brazil
Time of departure	22 February 2024	Estimated time of arrival	24 February 2024
Voyage duration	2.5 days	Voyage distance	905 NM
Cargo	Passengers	POB	530 crew, 629 passengers
Stage of passage	On passage (deviated to Belém)	Traffic density	Light

Narrative

All times in this report are UTC – 3

On the morning of 22 February 2024, the Bahamian flagged passenger ship Silver Nova with 530 crew and 629 passengers onboard was on passage from Fortaleza, Brazil to Macapa, Brazil as part of the Amazon leg of its Grand Voyage South America itinerary.

Weather conditions for the voyage were favourable and the journey was operating as per her schedule. This was the vessel's maiden Grand Voyage South America cruise over a 71-day period having recently entered service in August 2023 in Italy.

Crew were carrying out work as normal on deck and below. This work involved planned maintenance, scheduled service intervals and daily routines, including the management of recyclable and non-recyclable waste onboard.

The responsibility of waste management onboard lies with an incinerator supervisor (IS) and an incinerator operator (IO). The IS and IO had undergone specific shipboard training in the use of all auxiliary equipment including the incinerator and lifting equipment and were duly signed off by the chief engineer as experienced and competent members of the engineering department.

Both the IS and IO were responsible for ensuring that waste accumulated onboard is collected and segregated first for recycling, and any dry waste such as card, paper, wood as well as dried food is shredded into 25mm size pieces before it is fed into an incinerator. Once the ash from the incinerator is cooled, the ash is then loaded into large one-ton bags and shipped ashore when the vessel is alongside. (Figure 1)

Figure 1. Incinerator ash discharge chute and bag

The cooled ash stored in bags require a fraction of the space onboard compared to conventional methods of compacted and baled waste on pallets or stored in cages. These ash bags are then transferred to an upper deck by means of a cage lift to a holding area for removal when unloading takes place when in port.

Following the conclusion of the morning toolbox meeting at 08:00 which was held in the engine control room (ECR), the IS and IO made their way up to deck 2 where the garbage handling area was situated (Figure 2). On arrival they commenced with separating waste for incinerating and other waste that would be recycled later,

where it would then be transferred to the provision handling area further aft of the garbage handling area ready for removal.

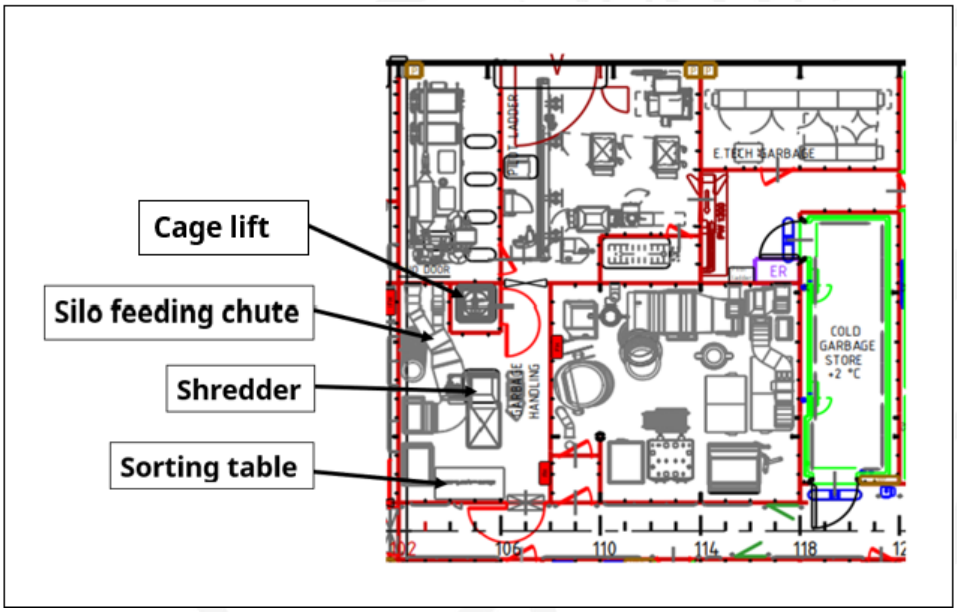

Figure 2. Deck 2 waste storage as depicted on extract from general arrangement drawing.

At around 10:20 following a coffee break and the completion of sorting and shredding waste for incineration, they proceeded down to deck 00 (zero-zero) to transfer the cooled ash from the previous day's incineration into ash bags. Enroute, they passed by a wiper who was on his way back to the engine room and asked him to assist them with lifting the ash bag into the cage lift.

Due to the nature and size of the one-ton ash bags in use, overfilling them would pose a problem for the IS and IO with lifting and moving them, so they routinely filled them approximately a third full in the region of 300 to 350 kilograms.

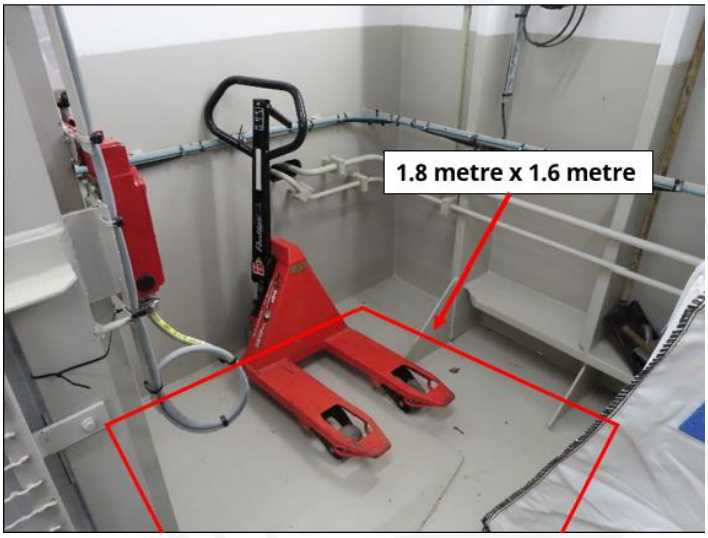

Figure 3. Available footprint to operate in along with a pallet truck.

The weight of the ash bag, coupled with a confined area in which to operate a manual pallet truck and the proximity of the discharge chute to the entrance to the cage lift, made transfer into the cage difficult for two crew, so a third person would often be called upon to assist (Figure 3). The cage lift was a custom-built unit to fit the allocated space and area in which it was to operate.

At 10:24 the IS called the cage lift down from deck 2 to deck 00 by engaging the switch on the main control box situated on deck 0.

Although access and working space was limited, the IS and IO accompanied by the wiper managed to manoeuvre the bag resting on the pallet truck into the cage lift. The ash bag was proving difficult due to its weight and its position, so the IS and the IO made their way back up to deck 0. The IS opened the access gate with an over-ride key he had taken from the ECR and with the use of some bale hooks, they both climbed on to the top frame of the cage and leaning through, gathered up the handles on the ash bag in the cage below to try and move it centrally (Figure 4).

Figure 4. CCTV extract showing IS and IO accessing the open top of the cage lift to grab the ash bag.

Whilst they were both lifting and taking the strain, the wiper pushed the ash bag from below to try and centre it into the cage lift, before removing the pallet truck in order for the cage door to close.

Shortly before 10:29 and following several attempts, the cage lift door was finally closed by the wiper on deck 00. The IS made his way down to lock the rear access gate before proceeding up to deck 0 where he closed and locked the front access gate. He then made his way over to the lift controls situated diagonally opposite the lift.

On reaching the control panel the IS began hoisting the cage up to deck 2, while the IO set about connecting an empty ash bag to the discharge chute, and the wiper repositioned the manual pallet truck out of the way and clear of the cage entrance.

As the lift cage made its way up and through the deckhead on deck 0 the IS noticed that the cage was not rising further at which point he noticed that the ash bag had moved and wedged itself between deck levels 0 and 1. As this occurred the IO and wiper were making their way up from the lower deck.

Several attempts were made by the IS to try and dislodge the lift by lowering and then lifting the cage, but it proved unsuccessful, at which point the IO and wiper left deck 0 at 10:32 and made their way up to deck 1 to investigate further.

The IS called up through the lift space stating that he would try again to dislodge the bag by hoisting and lowering it. The IS called up to deck 1 again for feedback but the IO stated that it was not moving, at which point the IS ceased operating the lift, isolated the controls and activated the emergency stop before making his way up to deck 1.

Upon realising that the bag was the issue, the IS asked the IO to go and retrieve a steel pole from the store on deck 2 so it could be used to push the bag from the sides of the cage in an attempt to lever or push it free.

The wiper at this point had made his way to the rear of the cage on deck 1 to see if he could open the cage door and manhandle the bag from inside to free it.

The IO retuned with a pole and along with the IS tried to hook a tie handle in an attempt to move the bag. The wiper summoned the IS to open the rear access gate so that the ash bag could be accessed (Figure 5). The IS opened the gate following a discussion with the wiper and returned to the IO at the front. The wiper then entered the cage lift to free the bag.

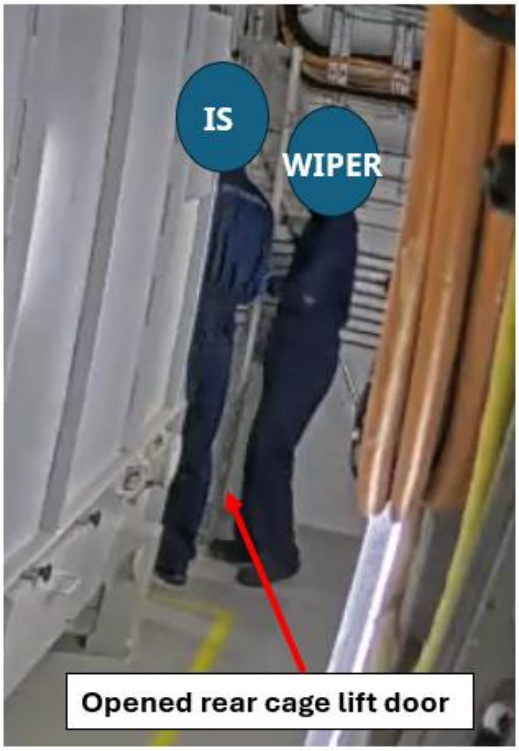

Figure 5. IS and wiper opening the rear cage lift door.

At 10:35 the wiper who was stood with one leg inside the cage on the edge of the pallet, and his other on deck was manhandling the ash bag when suddenly it dislodged, and the cage plummeted more than 2 metres towards deck 0. The wiper's upper leg, pelvis and lower abdomen ended up crushed and trapped between the deckhead on deck 0 and a support bar on the upper section of the cage lift.

The IS turned back and saw what had happened and immediately left the scene to call for help. Within a minute the second engineer accompanied by a fitter and another engineer attended the scene to examine the extent of the casualty. The second engineer raced back to the ECR and notified the chief engineer and bridge, where the ship's emergency code alpha alarm was sounded alerting the ship's surgeon and medical team. The second engineer then returned and set about securing the cage.

Along with a full complement of medical staff, the ship's surgeon who was now in attendance instructed the engineers to secure the lift so that a safe extraction could be carried out. With the use of a strop and chain block the second engineer managed to isolate the cage and prevent movement allowing for a safe extraction of the severely injured wiper.

Almost half an hour after securing the cage lift, rigging a harness and hoist for extraction, the wiper was safely recovered from the cage lift and positioned on the deck a couple of metres away so that the medical team could attend to him.

Following emergency medical care onboard by the ship's surgeon and his team to stabilise the wiper's condition, the wiper was transferred later the same day by air to a hospital's emergency care unit in Belém, Brazil.

After five weeks in intensive care the wiper died following complications from his injuries.

Previous similar casualties

The Bahamas Maritime Authority has recorded six instances of crushing related fatalities in the last fourteen. years. There have been several cases where seafarers have been killed either directly or resulting from lifting, moving and watertight doors operations going wrong:

Platinum Explorer (2016) BMA
A Bahamas flagged drill vessel was in a demobilised condition at anchorage outside Labuan, Malaysia. During planned maintenance, a trainee driller whilst left to check the functions of the fingers on the Riser feeding machine derrick got trapped when a component on the derrick moved. The trainee driller died from the injuries sustained to his chest.
BMA-Investigation-Report-Crew-fatality-onboard-the-Platinum-Explorer.pdf (bahamasmaritime.com)

Cimbris (2020) MAIB
An Isle of Man flagged general cargo vessel was alongside at the Antwerp Bulk terminal, Belgium discharging cargo. During cargo operations hatch covers were being removed using the ship's gantry cranes and stowing them on top of each other in preparation for discharge. During operations stevedores were busy working in the holds, when a supervising stevedore was fatally crushed when he went to oversee work being carried out, unaware he was positioned directly below the hatch cover being lowered.
MAIB Report 12/2021 - Cimbris - Very Serious Marine Casualty (publishing.service.gov.uk)

Solent Star (2018) BMA
A Bahamas flagged refrigerated cargo vessel was alongside in Nagoya, Japan discharging cargo. During operations, the number 1 crane short-circuited rendering it inoperative, requiring it to be temporarily decommissioned and repositioned from its operational position, to allow number 2 crane access to continue discharge of cargo. The work involved number 2 crane hoisting number 1 crane whilst it was being unsecured. Whilst work was underway to move number 1 crane the jib support plate securing number 1 crane was cut free, the crane swung towards number 2 crane where a fitter was standing. The fitter died instantly when crushed between the two cranes.
BMA-Investigation-Report-Crew-Fatality-onboard-the-Solent-Star.pdf (bahamasmaritime.com)

3. Analysis

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

A crew member suffered fatal injuries following when the cage lift, he entered to free a wedged ash bag dropped more than two metres trapping his upper thigh, pelvis and lower abdomen between the cage lift and deck.

Cause of injury

The wiper's injury resulted from entering and unsafe space to free a wedged ash bag, unaware of the associated risks in the cage lift's slack hoist chain, or what the likely outcome would be when freeing the ash bag.

Design

The cage lift manufactured by Yale with a safe working load (SWL) of 700 kg was a purpose-built design during the new build phase of the vessel and comprised several safety features, including emergency shut-offs, limit switches, safety switches and horizontal bars (Figure 6). The lift also comprised additional safety features whereby the lift would not operate if the cage doors were not properly closed or if limit switches were incorrectly set or out of position during operations.

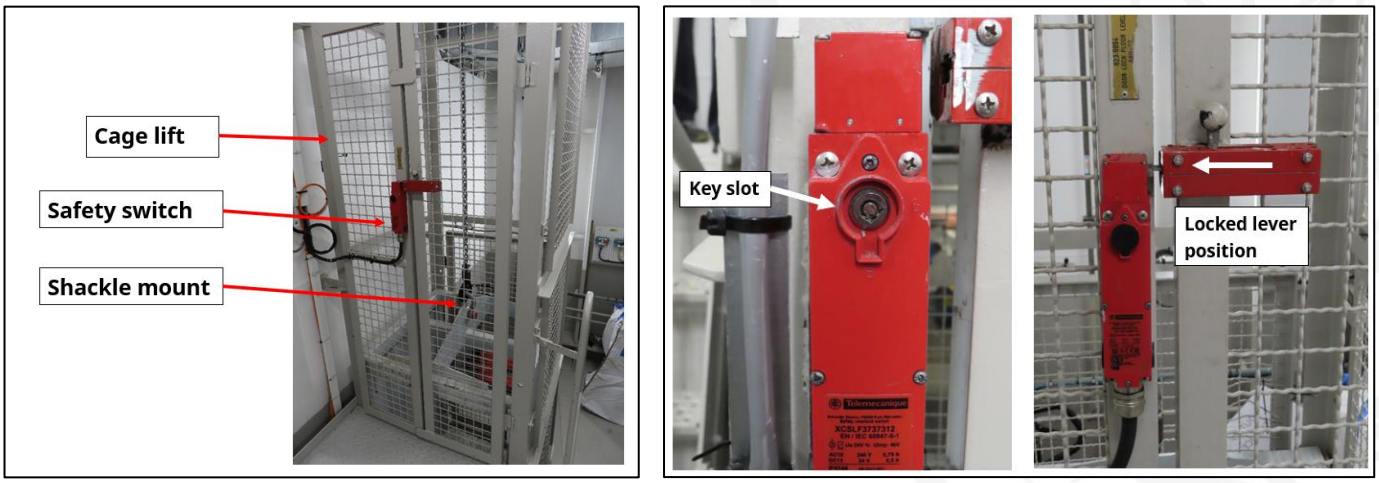

Figure 6. YALE cage lift located on deck 00.

The two horizontal bars fitted are to be lowered in sequence, with the inner one being lowered first at the rear of the cage before loading commences followed by the second one on completion of loading prior to closing the gate. These bars act as a barrier to prevent any load carried from snagging or spilling out from the bottom of the cage during hoisting operations (Figure 7).

The lack of oversight in lowering the inner horizontal bars when loading commenced, was most likely due to distraction resulting from the task at hand of loading the ash bag into the cage lift. Additionally, the cage did not clearly inform users of their purpose or indicate the importance in lowering them when loading commenced or on completion prior to closing the cage door.

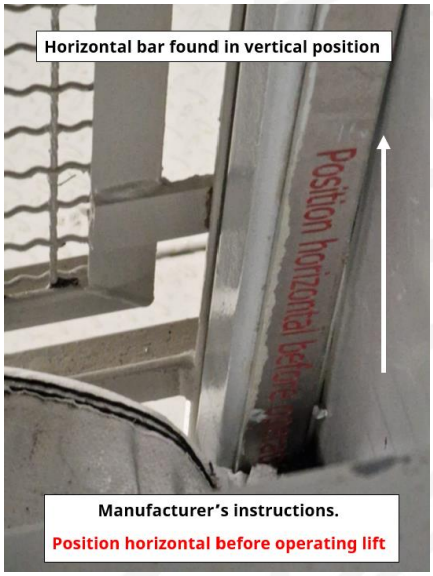

Figure 7. Horizontal bar found in vertical position.

Although the IS and IO had undertaken task specific training on the operating of the cage lift, the wiper who was asked to assist, had not been, and was unaware of the potential risks in entering the cage lift to free the ash bag.

The operation of the lift was controlled by a main control box on deck 0 with smaller control boxes situated on deck 1 and 2. The main control panel featured two switches allowing for the operator to operate it in either auto or manual mode and the other switch to select either an up or down function.

In auto mode, lifting can be operated by anyone pressing the call hoist button on any deck level. The manual mode requires the switch to be manually set and controlled from each box on each deck level by first ensuring the ready button is activated before calling the hoist. Each control is fitted with an emergency stop button and the cage lift can be stopped on any deck level regardless of whether it is set to manual or auto.

Figure 8. Main control box switch and smaller control box switch

On the day the casualty, the controls were set to manual (Figure 8). Although the IS had followed training and safety protocols in deactivating the cage lift by isolating the power supply, no visible checks were carried out by either himself or the IO to verify the tension of the chain or whether the horizontal bar was lowered in place prior to hoisting.

The lifting mechanism of the cage lift comprised a gantry and winch motor which was installed in the uppermost part of the lift space. The winch motor comprising a winch drum containing a length of chain was connected to the top of the lift cage by means of a shackle, for hoisting and lowering to a maximum height of 10 metres.

Although fitted with several safety features, no considerations were factored into the design to provide a suitable means of reducing the potential for a slack chain from forming, or a means to alert operatives.

Ergonomics

Due to the design layout of where the cage lift was installed, and an ash bag weighing in excess of 300 kilograms, the IS and IO routinely requested the assistance of others to help load it into the lift.

Furthermore, the configuration and layout of the cage lift required the IS to routinely open the side access gate using the over-ride key in order to scale the top frame of the cage lift. This means of access and the additional task of reaching down through the top of the cage to grab the ash bag handles was not covered in any pre-planning meeting or addressed as part of the ship's manual handling risk assessment.

An opportunity was missed by the architects and engineers onboard during the build phase to examine the working area assigned to incinerator operations, and the means of transferring and removing of cooled ash safely. The consideration for smaller bags to store the cooled ash in, and weighing less, removes the need for a third person to assist in transferring the bag into the cage.

The cage lift when installed was positioned adjacent to the ash hopper chute allowing for proximity, however, did not factor in a suitable footprint or safe area for personnel working in and around the cage lift when transferring loaded ash bags by means of a manual pallet truck.

The need for a manual pallet truck in an already confined space removed any available safe area to manoeuvre the loaded ash bag and made handling and transferring the bag into the cage difficult, requiring the assistance of a third person to assist in manhandling the bag into the lift.

On the day of the casualty, the IS asked the wiper to assist them in the transferring and loading of the ash bag into the lift. By requesting assistance from untrained passers-by who are not familiar with the process and routine, introduced additional risks into the operation.

Considering the level of skills and experience in incinerator operations, an opportunity was missed by the IS and the IO to raise their concerns during toolbox meetings relating to the ergonomics and layout of the area in which to operate, further compounded by the need for a manual pallet truck and the regular requests for assistance from unskilled operatives in ash transfer.

Although the wiper was trained in incinerator operations on another vessel within the fleet, his actions were most likely complacent due to a loss of situational awareness in not considering the dangers of entering the cage, informed by his past experience of working on similar systems.

Management of controls

The company operated a set of controls covered both in their safety management system (SMS) and on-board standard operating procedures (SOP)

Each set of activities and tasks being performed were governed by a SOP outlining specific training requirements and a set of checks to ensure that the task being undertaken followed the prescribed criteria in accordance with its SMS and the manufacturers guidelines.

Considering the weight of the ash bags being transferred, no consideration had been given to reducing the capacity of the bags or to install a gantry and hoist during installation, for ease of transferring ash bags into the cage lift, thereby removing the need for a third person and reducing the likelihood of injuries occurring to those already working in a confined area.

Although the SOP and instructions were defined, a lack of oversight by the engineering department in ensuring that suitably sized ash bags were in use was most likely a factor in why the IS regularly requested assistance to transfer ash.

Access to the cage lift when locked requires an over-ride key, and although the cage lift was opened on the day of the incident, no proper control over the over-ride keys was present, as the chief engineer was unaware that the keys had been removed from the ECR.

4. Conclusions

- The wiper sustained serious injuries when the lift he entered fell trapping and crushing his lower body.
- The wiper entered the gate of the cage lift in order to free the ash bag which had wedged itself during hoisting.
- Prior to loading and closing the cage lift the lowering the horizontal bars was missed resulting in the bag shifting during hoisting.
- Although the power to the cage lift had been isolated, neither the IS, IO nor the wiper were aware of how slack the chain had become.
- The manufacturer's instructions on the importance in lowering the horizontal bars as part of lift operations was not clearly marked on the cage lift.
- A breakdown in communication between the IS, IO and wiper resulted in their failure to ensure all safety features and securing arrangements of the cage were maintained in accordance with manufacturers guidelines.
- The design, installation and proximity of the cage lift to the ash chute meant that the crew relied on adapting their job and workplace in order to fulfil a task. rather than consideration being given to designing tasks, workstations, tools, and equipment that are within the worker's physical capabilities and limitations.

5. Lessons to be learned

- Crew that are asked to assist in unfamiliar operations, should refrain until suitably trained and qualified, including work involving lifting appliances.

- Personnel working with lifting appliances should be experienced in all aspects of operations including emergency preparedness, especially equipment installed with safety features which should not be bypassed as they are fitted to ensure areas are made safe to prevent harm or severe injuries from occurring.

- When systems are being installed on ship's, consideration must be given to ergonomics of design, adapting the workplace to the worker by designing tasks, workstations, tools, and equipment that are within the worker's physical capabilities and limitations.

6. Actions taken

Silversea S.A.M has:

- Instructed that designated operators should be re-trained in the use of the system, highlighting the importance of stopping work in case of any issue/malfunction outside of the normal operation of the lift.
- Informed all persons not designated to resolve troubleshooting to immediately call the technical person in charge.
- Improved the visibility of the manufacturer instructions posted in place, with label and self-explanatory images from the operating manual.
- Ensured that lift keys should be maintained in the security keys inventory and kept secured in the ECR, available only upon Chief Engineer authorisation.
- Instructed all personnel that the performing of tasks on a voluntary basis is not permitted without the authorisation and approval of the Head of Department or Supervisors.

7. Recommendation

The investigation found that the design of the workplace required the crew to adapt their practices in an unsafe manner in order to complete the task. Shipboard assessment of risks associated with manual handling did not reflect the realities of work and supervisors did not have a clear understanding of how the work was completed. Therefore, it is recommended that:

- **Silversea S.A.M** revise its manual handling and associated risk assessments to reflect work as done and adapt workplace design and/or practices to effectively mitigate risk.

8. Glossary and Definitions

Deckhead	A deckhead is the underside of a deck in a ship. It bears the same relationship to a compartment on the deck below as does the ceiling to the room of a house.
ECR	Engine Control room
Incinerator	An incinerator is a furnace for burning waste
Limit switch	A limit switch is a safety device that is provided to allow the setting of the hoist travel within a prescribed travel range to prevent them from traveling beyond their designated floors.
Minimum Safe Manning	Minimum Safe Manning is a function of the number of qualified and experienced seafarers necessary for the safety and security of the ship, crew, passengers, cargo and property and for the protection of the marine environment.
SMS	A Safety Management System is an organised system of operational procedures and mandatory safety rules which safeguard the vessel and the maritime environment. It ensures that ship owners and crew comply with international safety regulations and those established by relevant government authorities.
SOP	A Standard Operating Procedure is a set of step-by-step instructions compiled by an organisation to help workers carry out routine operations.
SWL	Safe Working Load is commonly referred to as the maximum lifting capacity of mechanical handling and lifting equipment.
Toolbox	A toolbox talk will generally cover a topic that is immediately relevant to the workers in attendance. It could be a hazard specific to the jobsite, a safety procedure that may come up over the course of the workday, or a recent incident or near miss.