Marine Safety Investigation Unit

Transport Malta

SAFETY INVESTIGATION REPORT

202207/018 REPORT NO.: 12/2023 July 2023

MT *SUNNY ISLES*

Fatal injuries to a crew member in the steering gear room, in position 21° 46' N 059° 58' E 18 July 2022

SUMMARY

On 18 July 2022, whilst *Sunny Isles* was *en route* from Al Jubail, Saudi Arabia, to Durban, South Africa, in a loaded condition, the second engineer was organizing and inspecting chain blocks in the engine-room, along with two other crew members.

While looking for additional material required for the task, the other crew members found the second engineer trapped and unresponsive between a collapsed stack of spare steel plates and a guard rail, in the steering gear room. The second engineer suffered serious injuries and was evacuated to a shore hospital, by helicopter. However, he was pronounced dead on arrival.

The safety investigation considered it likely that the stack of steel plates collapsed onto the second engineer, after a turnbuckle securing pin and its split pin slipped out, while he was either removing or inspecting a chain block in the plates' securing arrangements.

In view of the safety actions taken by the Company, no recommendations have been issued by the MSIU.

MV *Sunny Isles*

FACTUAL INFORMATION

Vessel

Sunny Isles was a 30,056 gt oil / chemical (type II) tanker, owned by Sunny Isles Shipping LLC and managed by International Tanker Management Ltd., UAE (the Company). The vessel was built by SPP Shipbuilding Company, Republic of Korea, in 2009. Nippon Kaiji Kyokai (ClassNK) acted as the classification society as well as the recognized organization, in terms of the International Safety Management Code, for the vessel.

Sunny Isles had a length overall of 183.00 m, a moulded breadth of 32.20 m, and a moulded depth of 19.10 m. The vessel had a summer deadweight of 50,697.10 metric tonnes (mt), which corresponded to a summer draft of 13.02 m.

Propulsive power was provided by a 6-cylinder, two-stroke, single-acting, slow speed, Doosan MAN B&W 6S50MC-C Mk7 marine diesel engine, which produced 9,480 kW of power at 127 rpm. This drove a fixed-pitch propeller, enabling *Sunny Isles* to reach a service speed of 14.9 knots.

At the time of the occurrence, *Sunny Isles* was loaded with 41,179 mt of petroleum products, and was on an even keel draught of 12.00 m.

Crew

The Minimum Safe Manning Certificate of *Sunny Isles* prescribed a crew of 14[1]. At the time of the occurrence, there were 21 crew members on board, comprising of Bulgarian, Russian, Georgian, Turkish and Filipino nationals.

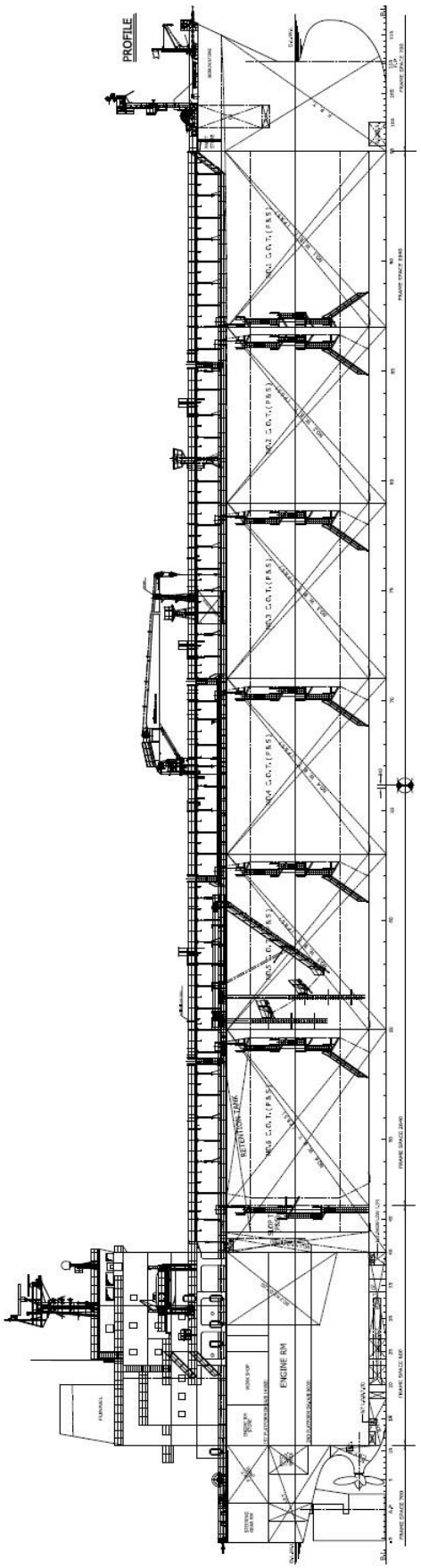

Figure 1: Extract of *Sunny Isles*' General Arrangement plan

[1] Provided that the unmanned machinery space (UMS) and the bridge control systems were operational, and at least two deck officers held Global Maritime Distress and Safety System (GMDSS) General Operator's Certificates.

The second engineer was a 41-year-old Russian national. He had 13 years of seafaring experience, around three of which were served in the rank of a second engineer with STCW[2] III/2 qualifications. His most recent certificate of competency was issued by the Russian Maritime Administration, in July 2021. This was his first employment term with the Company, and he had joined *Sunny Isles* on 27 May 2022, at the port of Fujairah, UAE.

The chief engineer was a 46-year-old Turkish national. He had about 23 years of seafaring experience, around 11 of which were served in the rank of a chief engineer with STCW III/2 qualifications. His most recent certificate of competency was issued by the Turkish Maritime Administration, in July 2021. This was his first employment term with the Company. He had joined *Sunny Isles* on 30 March 2022, at the port of Osaka, Japan.

The fitter was a 61-year-old Filipino national. He had about 15 years of seafaring experience, all of which were served in the rank of a fitter and around five of which were served with the Company. He held STCW III/5 qualifications for an able seafarer engine, and his certificate of proficiency was issued by the Philippines Maritime Administration (MARINA), in 2019. He had joined *Sunny Isles* on 27 May 2022, along with the second engineer.

The motorman (MM 1), who was assigned to assist the fitter, was a 56-year-old Filipino national. He had about 28 years of seafaring experience, served in this rank. He had been working with the Company for about 22 years. The motorman held STCW III/4 qualifications for a rating forming part of an engineering watch, and his certificate of proficiency was issued by MARINA, in 2014. He, too, had joined *Sunny Isles* on 27 May 2022.

Environment

The vessel's records indicated that, at the time of this occurrence, the sky was overcast, and the visibility was about seven nautical miles (nm). The wind was blowing from the Southeast, measuring Force 4 on the Beaufort Scale. The sea state was recorded as 'slight', with a one-metre-high Southeasterly swell. The fitter recalled that at the time of the occurrence, the rolling and pitching motions were as generally would be experienced at sea. The air and sea temperatures were recorded as 34 °C and 30 °C, respectively.

Narrative[3]

On 16 July 2022, *Sunny Isles* departed in a loaded condition from the port of Al Jubail, Saudi Arabia, bound for the port of Durban, South Africa. For the sea passage, the engine-room crew members were scheduled to be on daywork from 0700 to 1800, with the assigned duty engineer and rating taking routine UMS rounds between 1800 and 0700.

On the morning of 18 July, the second engineer held a daily work plan meeting with all engine-room crew members, in which the planned tasks for the day were assigned. The fitter was assigned the segregation and storage of all loose nuts and bolts according to their sizes, in the workshop. MM 1 was assigned routine rounds in the engine-room, followed by securing of a newly supplied electric motor. The fitter and MM 1 completed these tasks by noon.

At 1300, after lunch, the second engineer approached the fitter and MM 1, who were in the workshop, and assigned them an additional task, consisting of the fabrication and installation of hangers in the engine-

[2] IMO. (2020). *International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978* (Consolidated ed.). London: Author.

[3] Unless otherwise specified, all times in this safety investigation report are local (LT = UTC + 3).

room store (**Figure 2**), for various lifting equipment[4].

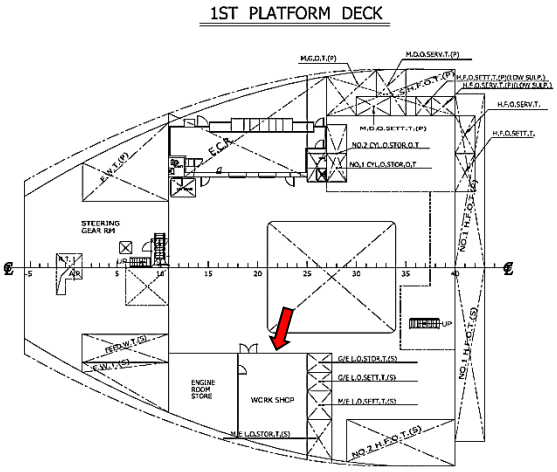

Figure 2: Location of the workshop and engine-room store

The three of them went into the engine-room store, identified the location where the hangers had to be installed, and discussed the design and materials required for the task. The fitter and MM 1 then commenced the task.

The fitter and MM 1 recalled that the second engineer intermittently visited the store to check on the progress of the task. Occasionally, he also brought in various lifting equipment, such as eye bolts, shackles, and chain blocks. They last saw the second engineer leave the store at around 1330.

After fabricating and installing one hanger, the fitter and MM 1 required some more material for the next hanger. Finding no steel pipes in the store, the two of them went into the steering gear room where the spare steel pipes, angle bars and steel plates were stored. It was about 1415. The crew members explained that the steel pipes and angle bars were stored on the port side of the steering gear room, while the steel plates were stored on the starboard side, against the chemical storage area.

The fitter and MM 1 did not find the appropriate pipes for the task, and as they were leaving the steering gear room, MM 1 noticed a stack of spare steel plates resting against the guard rails at the starboard side of the steering gear. As he moved closer, he saw the second engineer trapped between the stack of plates and the guard rails (**Figures 3** and **4**)[5].

Figure 3: Simulated photograph of the location at which the second engineer was found (red circle)

[4] The Company informed the safety investigation that the originally fitted hangers for chain blocks, in the steering gear room had been damaged. The second engineer intended to fabricate and install new ones in the store, and thus have all lifting equipment close to the workshop.

[5] The long, steel pipe seen in the photographs was used for the purpose of the simulation only and was not amongst the stack of plates that fell on the second engineer.

Figure 4: Simulation of how the second engineer was found (red circle); the second engineer's safety helmet can be seen near the manhole, to the left (white arrow)

He immediately called the fitter, and both tried to lift the plates off the second engineer. However, the plates were too heavy, and their attempts were unsuccessful. It was also observed that the second engineer had suffered facial injuries and was unresponsive.

MM 1 hurried to the engine-room and informed the other engine-room crew members about the situation. The third and fourth engineers rushed to the steering gear room with MM 1, while the other motorman phoned the bridge. This was at 1422. The second officer, who was keeping the navigational watch at that time, acknowledged the call and immediately relayed the message to the master, who was in his cabin.

The master went up to the bridge and sent the second officer down to the steering room to check on the second engineer's condition[6]. After checking the second engineer's condition, the second officer called the bridge and advised the master that the second engineer's condition was very serious. The master then sent the third officer, who was also on the bridge, down to the engine-room, and called the chief officer up to the bridge.

At around 1445, after the chief officer arrived, the master went down to the steering gear room. By this time, the crew members had moved the steel plates off the second engineer and were attempting to resuscitate him. However, the master noticed that the second engineer did not show any signs of life.

At 1457, on the master's instructions, the crew members shifted the second engineer to the engine control room (ECR), where they continued with their resuscitation attempts, using also an automated external defibrillator.

In the meantime, the master returned to the bridge and notified the Company about the situation. The Company reported the occurrence to the Royal Airforce of Oman and requested for assistance. At around 1645, the Company contacted the vessel and advised the master to proceed West, towards the coast of Oman, where the Royal Airforce of Oman would carry out the medical evacuation of the second engineer.

At 1805, the second engineer was evacuated by a Royal Airforce of Oman helicopter and transferred to a hospital. The vessel resumed its voyage to Durban at 1828. The second engineer was pronounced dead on arrival at the hospital.

Hospital reports

No hospital reports were available, which would have indicated the nature and extent of injuries suffered. The hospital documents confirmed that the second engineer had succumbed to his injuries before his arrival at the hospital.

The master and the Company advised the safety investigation that at the request of the family, no autopsy had been carried out.

[6] The second officer was also the vessel's designated medical officer.

The stack of spare steel plates

The stack consisted of 36 spare steel plates measuring 2,438 mm in length, 1,220 mm high and 1.5 mm thick, four plates measuring 1,981 mm in length, 1,016 mm high and 3 mm thick, and four plates measuring 1,981 mm in length, 1,016 mm high and 5 mm thick. Data available to the safety investigation indicated that the larger plates (2,438 mm length and 1,220 mm height) were placed against the metal mesh of the chemical storage area, and the eight smaller plates were placed in front of them.

The Company informed the safety investigation that the total weight of the stack was estimated to be 1.75 mt. The plates had been supplied to the vessel in 2020, for the purpose of fabricating storage boxes. However, none had ever been used.

The crew members stated that the securing arrangement for the stack of steel plates had been in place since 2021, and that the arrangement had neither been checked nor adjusted by any of them, during their time on board.

The arrangement (**Figures 5** and **6**) consisted of two wire slings, secured to the vessel's fittings, and connected by a turnbuckle across the face of the plates. A chain block was also connected to the wire slings, across the face of the steel plates.

Figure 5: Simulated photograph of the securing arrangement

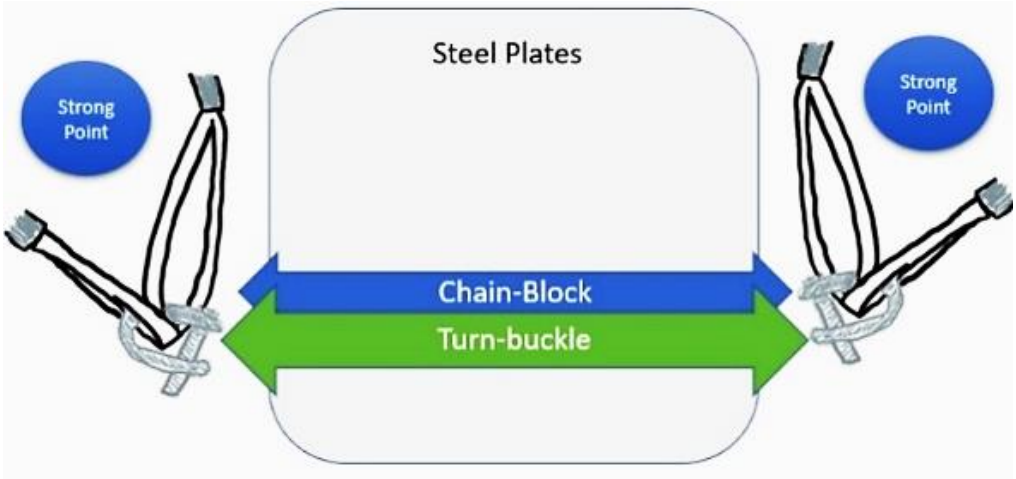

Figure 6: Sketch of the securing arrangement

Source: The Company

The Company advised that the chain block was meant to serve as an additional securing means for the plates. The crew members further stated that after the occurrence, the stack of steel plates was secured with the same arrangement.

The chain blocks

Chain blocks are designed to hoist weights vertically (or at an angle, as specified by the manufacturer). Several manufacturers warn against the use of a chain block to lift loads at unspecified angles. Nonetheless, chain blocks with a rotating hand chain guide enable the user to pull a load even horizontally. Manufacturers do not recommend leaving loads suspended on a chain block, as it may result in personal injury in the event of failure of the brake mechanism.

The chain block which acted as an additional securing means of the stack of steel plates had a safe working load (SWL) of 0.5 tons. Its certificate of test / thorough visual examination was dated 14 October 2011. This chain block did not have a rotating hand chain guide.

Status of the securing arrangement after the accident

The crew members stated that, after the removal of all steel plates from the accident site, they found the turnbuckle and the hook at the running end of the chain block, released. They further found the pin at the released end of the turnbuckle not in place (**Figures 7** and **8**). The split pin[7] (red arrow in **Figure 8**), which was designed to prevent the turnbuckle pin from slipping out, was found in the vicinity, intact but not in its place. No damages were observed on any part of the securing arrangement.

Figure 7: Photograph of the turnbuckle with the securing pin out of place at one end (red circle)

Figure 8: Close-up photograph of the turnbuckle with the securing pin (red arrow: split pin in place)

Planned tasks

The vessel's safety management system included a daily work plan sheet for daily tasks planned for the deck and engine-room departments. These were required to be posted in the ECR, bridge, and on the noticeboards in the accommodation common spaces. A note at the bottom of the daily work plan sheet read:

Any work required to be completed, not on this Work Plan, must be brought to the attention of the Master or Chief Engineer [*sic*.].

[7] Also known as a cotter pin.

The daily work plan record for 18 July 2022 listed the following tasks for the engine-room:

- adjustment of the air conditioner compressor belts;
- for diesel generator no. 1: checking the crankshaft deflection, fuel pump timing, and the replacement of the pyrometer and sensor for the exhaust of cylinder no. 3;
- cleaning of the fresh water ultra-violet sterilizer filter;
- organizing and inspecting the chain blocks at the workshop; and
- commencement of repairs of the lifeboat's hull.

Except for the repair of the lifeboat's hull, all the above-listed tasks were recorded as assigned to the fitter and both motormen. The work plan indicated that whilst all these tasks required a toolbox talk to be conducted, organizing and inspecting the chain blocks was the only task that neither required a work permit, nor a risk assessment to be completed.

The chief engineer stated that he was not advised on the second engineer's plan to install new hangers for the lifting gear, although he was aware that the second engineer had planned an inspection of the chain blocks.

Inspection of the chain blocks

The vessel's records indicated that the engine-room had 10 chain blocks, all of which were last visually inspected by the previous second engineer on 30 April 2022. Information detailing the inspection was not available.

The visual inspection of the chain blocks was scheduled as a quarterly task in the vessel's planned maintenance system.

Records of hours of work / rest

The second engineer's work / rest hours records for the month of July 2022, indicated that his hours were compliant with the STCW requirements. His records of hours of work / rest indicated that he had commenced work at 0700, on 18 July 2022.

Drug / alcohol tests

After the accident, on-board alcohol tests were conducted on the rest of the crew members. All the tests returned negative results.

Similar occurrences reported to the MSIU

The MSIU has published one safety investigation report[8] on a similar fatal accident, which occurred on board a Maltese-registered vessel on 12 October 2020. Six crew members were assigned the removal of a steel plate from a stack of 13 spare steel plates in the engine-room. While removing the securing arrangements of the stack, about eight steel plates (each weighing between 80 kg to 250 kg) tipped over and trapped one of the crew members against the incinerator. Similar to this occurrence, the crew member had suffered fatal injuries.

During the safety investigation into the fatal accident on board *Sunny Isles*, the MSIU was notified of two additional, similar (but non-fatal) accidents on board Maltese-registered vessels. One occurred on 12 December 2022 and the other on 13 April 2023. In both cases, a stack of steel plates tipped over and fell on crew members, resulting in serious injuries. In both cases, the MSIU noted that the crew members were in the process of securing the stack of steel plates, when they tipped over.

[8] MSIU safety investigation report no. 23/2021.

ANALYSIS

Aim

The purpose of a marine safety investigation is to determine the circumstances and safety factors of the accident as a basis for making recommendations, and to prevent further marine casualties or incidents from occurring in the future.

Cause of fatal injuries

In the absence of medical and autopsy reports, the safety investigation believes that the second engineer suffered fatal injuries, shortly after the stack of spare steel plates tipped over and fell onto him.

Probable cause of the tipping over of the steel plates

The data available to the safety investigation suggested that the securing arrangement for the stack of steel plates had been released. Since there were no witnesses to this occurrence, the safety investigation was unable to determine whether this was done intentionally and therefore, four hypothetical scenarios were considered in which the second engineer may have:

a) intentionally released the turnbuckle securing pin and slackened the chain block;

b) intentionally released the turnbuckle securing pin to access the chain block, following which, the chain block hook may have slipped;

c) intentionally slackened the chain block, during which, the split pin followed by the turnbuckle securing pin may have accidentally fallen out; or

d) accidentally released the chain block hook and the split pin, which resulted in the release of the turnbuckle securing pin.

It must be stated that the stack of steel plates was secured by wire slings and a turnbuckle, with the chain block meant to act as an additional means of securing. Bearing in mind the task that the second engineer was carrying out, the safety investigation considered it likely that his intentions were to release the chain block for inspection. Considering that the wire slings and turnbuckle were in place, he may have believed that the release of the chain block would not pose any hazard.

It is also possible that the second engineer may have viewed the use of the chain block in the securing arrangement as redundant and therefore, he intended to remove it altogether and store it on the newly installed hangers in the engine-room store.

As the turnbuckle and chain block were securing the stack of spare steel plates, the safety investigation considered it highly unlikely that the second engineer would have intentionally released both arrangements (*i.e.*, scenario ‘a’). Rather, it is more likely that he may have intentionally released only one of them.

In the case of scenario ‘b’, the intentional release of the turnbuckle may have been carried out to gain access to the chain block for a visual or physical inspection. This would have been a highly likely scenario, if the chain block, or any part of it was tightly wedged between the turnbuckle and the steel plates. For an unknown reason, the hook(s) of the chain block may have slipped out during this inspection once the turnbuckle was released.

If any part of the chain block was not wedged between the turnbuckle and the steel plates, and the chain block was easily accessible, it is likely that the second engineer may have intentionally released the chain block to inspect and / or transfer it to the store, during which the split pin and the turnbuckle pin slipped out (scenario ‘c’).

It could not be excluded that the second engineer may have attempted to inspect the

chain block without releasing it, and that the release of its hook may have been accidental. If this was the case, it is possible that the split pin and turnbuckle securing pin may have slipped out while he was inspecting the chain block (scenario 'd').

For scenarios 'c' and 'd', it is also likely that the split pin may have slipped out much earlier before the occurrence and may have gone unnoticed.

Slipping of the split pin and the turnbuckle securing pin

A split pin is used to prevent a bolt or securing pin from slipping out of its place. The pin is inserted into a pre-drilled hole in the bolt / securing pin and the ends of the pin are then twisted outwards to prevent the split pin itself from falling out (**Figure 9**).

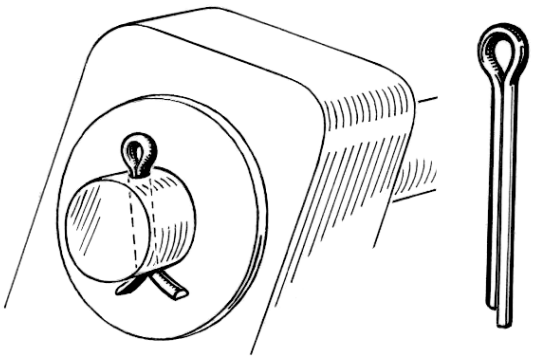

Figure 9: Split pin (or cotter pin)

Source: *Line drawing of a cotter pin/split pin*, Pearson Scott Foresman

To remove the split pin, its (twisted) ends would have to be pressed and brought together again to allow it to be pulled out of the hole. If the ends of the split pin are not twisted outwards after inserting it in place, it may slip out in the event of any disturbance or vibration. The slipping out of a split pin would be even easier if its size is smaller than the one designed for the particular drilled hole.

The crew members stated that they had found the split pin lying in the vicinity[9], and its ends were found pressed together, thus suggesting that the split pin may have either been removed by the second engineer or slipped out at some point.

Risk assessment

As stated earlier in this safety investigation report, the daily work plan sheet (prepared by the second engineer for the engine-room tasks) neither required a work permit, nor a risk assessment for the organization and inspection of chain blocks at the workshop.

While noting that a formal risk assessment was not carried out and recorded, the safety investigation was unable to determine whether the second engineer had carried out an on-site dynamic risk assessment or not.

If the second engineer had carried out an on-site dynamic risk assessment, it is highly likely that he may not have been able to identify all associated hazards, thus reducing the effectiveness of his risk assessment. This would be the case, particularly when considering that none of the crew members who were on board at the time of the occurrence, were involved in the rigging up of these securing arrangements.

The other possibility would be that the second engineer did not perceive any hazards associated with the task, and based on which, no risk assessment was carried out.

The chain block as a securing means

While the safety investigation noted that the chain block was not used as designed when it was positioned as an additional means to secure the stack of steel plates, it was also noted that the chain block had no damages.

[9] The safety investigation also bore in mind the possibility that the split pin found in the vicinity after the accident, may have not been the one initially for the securing pin of the turnbuckle.

The safety investigation therefore concluded that although the use of the chain block as a securing arrangement was hazardous, it was not a contributory factor to this accident.

Nonetheless, the safety investigation attempted to analyse why the crew members may have considered using the chain block. This analysis considered the differences in the lengths of the spare steel plates in the stack. Most of the steel plates in the stack were about 0.5 m longer than the eight smaller ones, with the larger plates being placed against the chemical storage area and the smaller ones in front of them.

It is likely that as the wire slings were pulled around the larger plates, there may have been some amount of slack in way of the smaller plates, if the securing arrangement consisted of only the turnbuckle and the wire slings. This may have led the crew members to consider the use of a chain block, whereby the slings could be held tight for further tightening of the turnbuckle. Additionally, once tightened, the chain of the hoist would tend to lay firmly against the stack of plates, thus appearing to serve as an additional means of securing.

CONCLUSIONS

1. The second engineer was found trapped between a stack of spare steel plates and guard rails in the steering gear room, with fatal injuries.
2. The crew members found that the securing arrangement's turnbuckle securing pin and its split pin were not in place.
3. The turnbuckle securing pin and its split pin may have either been removed or slipped out at one point, resulting in the collapse of the stack of spare steel plates.
4. It is likely that the second engineer was either inspecting or removing the chain block, which was meant to serve as an additional means of securing the stack of spare teel plates, when the stack collapsed onto him.
5. No damages were observed to any of the gear in the securing arrangement.
6. No formal risk assessment was carried out and recorded.
7. It is highly likely that a dynamic risk assessment by the second engineer would not have enabled him to identify all associated hazards, thus reducing the effectiveness of his risk assessment.

SAFETY ACTIONS TAKEN DURING THE COURSE OF THE SAFETY INVESTIGATION[10]

Following the accident, the Company took the following safety actions:

1. Company's representatives attended the vessel, and conducted various training sessions and safety briefings with the crew members;
2. a safety bulletin with details of the accident, was circulated across the Company's fleet;
3. new storage racks were fabricated for the spare steel plates, pipes, and other heavy material on board *Sunny Isles*, followed by all other vessels in the Company's fleet;
4. the status of the storage / racking and safe handling of heavy material on board all vessels in the Company's fleet, was reviewed / verified by superintendents in the fourth quarter of 2022;
5. unnecessary heavy material, was landed ashore at convenient ports, from all vessels in the Company's fleet;

[10] **Safety actions shall not create a presumption of blame and / or liability.**

6. the Company added various computer-based training programmes to their competency management system, for shipboard and shore staff;
7. the Company's safety management system was revised, and a new control of work process (emphasizing toolbox talks, risk assessments, use of permits and checklists, reporting procedures, *etc*.) was introduced as part of the permit to work system; and
8. risk assessments were prepared and / or revised for the preparation of storage racks and for the safe handling of heavy material on board all vessels in the fleet.

RECOMMENDATIONS

Taking into consideration the Actions taken by the Company, no recommendations have been made.

SHIP PARTICULARS

Vessel Name:	*Sunny Isles*
Flag:	Malta
Classification Society:	Nippon Kaiji Kyokai
IMO Number:	9396775
Type:	Oil / chemical tanker
Registered Owner:	Sunny Isles Shipping LLC
Managers:	International Tanker Management Ltd., UAE
Construction:	Steel – double bottom
Length Overall:	183.0 m
Registered Length:	175.54 m
Gross Tonnage:	30,056
Minimum Safe Manning:	14
Authorised Cargo:	Liquids in bulk

VOYAGE PARTICULARS

Port of Departure:	Al Jubail, Saudi Arabia
Port of Arrival:	Durban, South Africa
Type of Voyage:	International
Cargo Information:	Petroleum products – 41,179 mt
Manning:	21

MARINE OCCURRENCE INFORMATION

Date and Time:	18 July 2022, at 1415 LT
Classification of Occurrence:	Very Serious Marine Casualty
Location of Occurrence:	21° 46’ N 059° 58’ E
Place on Board	Steering gear room
Injuries / Fatalities:	One fatality
Damage / Environmental Impact:	No damages
Ship Operation:	In passage
Voyage Segment:	Transit
External & Internal Environment:	Overcast sky, visibility of 7 nm, Southeasterly moderate breeze, slight sea with a one-metre-high Southeasterly swell. Air and sea temperatures: 34 °C and 30 °C, respectively.
Persons on board:	21