Marine Safety Investigation Unit

Transport Malta

SAFETY INVESTIGATION REPORT

202010/015 REPORT NO.: 23/2021 October 2021

MT *MISS BENEDETTA*

Fatal injury to a crew member,
in position 16° 37.3' N 080° 01.0' W
12 October 2020

SUMMARY

On 12 October 2020, whilst *Miss Benedetta* was *en route* to the port of Pozos Colorados, Colombia, crew members were tasked with extracting a large steel plate from a stack of spare steel plates in the vicinity of the incinerator.

After the upper securing arrangements were removed, the lowermost ones were being loosened. During this time, the steel plates tipped over, and the securing arrangement buckled under their weight. Subsequently, the plates fell on an ordinary seafarer, entrapping him against the incinerator.

The safety investigation concluded that the gradual supporting of additional plates would have led to an increase in the weight, and which the crew members were unable to support.

Considering the safety actions taken by the Company, no recommendations have been issued by the MSIU.

Miss Benedetta

FACTUAL INFORMATION

Vessel

Miss Benedetta (Figure 1) was a 29,814 gt oil / chemical tanker, owned by Megaride Shipping S.R.L. and managed by Ships Surveys and Service S.R.L., Italy. She was built by STX Offshore & Shipbuilding Co. Ltd., Republic of Korea, in 2012. Registro Italiano Navale (RINA) acted as the classification society as well as the recognized organization, in terms of the International Safety Management Code, for the vessel.

The vessel had a length overall of 183.00 m, a moulded breadth of 32.20 m and a moulded depth of 19.10 m. She had a summer draught of 13.15 m, which corresponded to a summer deadweight of 50,895 tonnes. At the time of the occurrence, she was drawing an even keel draught of 11.20 m.

Propulsive power was provided by a six-cylinder, two-stroke, single-acting, slow speed, STX-MAN B&W 6S50MC-C7 marine diesel engine, which produced 9,480 kW at 127 rpm. This drove a fixed-pitch propeller, enabling *Miss Benedetta* to reach an estimated speed of 15 knots.

Miss Benedetta was engaged on short tramping voyages within the Gulf of Mexico, loading cargoes at ports in U.S.A. and unloading them either at ports around the East Coast of Central America or the North Coast of South America. The voyages generally ranged from two to five days.

Crew

Miss Benedetta's Minimum Safe Manning Certificate stipulated a crew of 14. At the time of the accident, the vessel was manned by 22 Indian crew members.

The fatally injured ordinary seafarer (OS 1) was 29 years old. He had around six years of seafaring experience, only one of which were served as an ordinary seafarer.

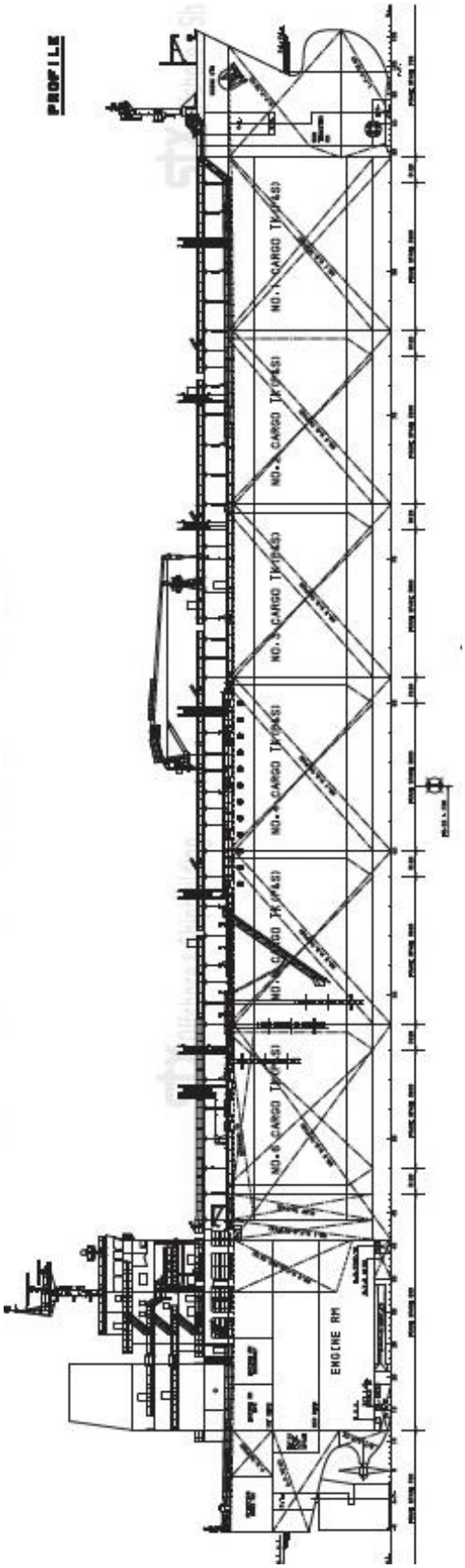

Figure 1: Extract of General Arrangement Plan of *Miss Benedetta*

He held STCW[1] II/4 qualifications, and his certificate of proficiency was issued by the Indian authorities in 2017. He had joined the vessel on 05 October 2020, from the port of Corpus Christi, U.S.A. For the month of October 2020, he was not assigned any watchkeeping duties at sea.

The second engineer was 45 years old. He had around 21 years of seafaring experience, eight of which were served in the rank of a second engineer. He held STCW III/2 qualifications for a second engineer officer, and his most recent certificate of competency was issued by the Indian authorities in 2019. He had joined the vessel on 05 October 2020, in the port of Corpus Christi, U.S.A. He was not assigned any watches at sea.

The pumpman, who also served as the bosun, was 59 years old. He had around 38 years of seafaring experience, all of which were served as a pumpman. He held the basic seafaring qualifications required by STCW V/1-1 and VI/1 and was not assigned to any watches at sea. He had joined the vessel on 10 March 2020.

The fitter was 37 years old. He had around 13 years of seafaring experience, all of which were served as a fitter. He too held the basic seafaring qualifications required by STCW V/1-1 and VI/1 and was not assigned any watches at sea. He had joined the vessel on 05 October 2020, in the port of Corpus Christi, U.S.A.

One of the two able seafarers – deck (AB 1) who witnessed the accident was 54 years old. He had around 26 years of seafaring experience, all of which were served in the rank of an AB. He held STCW II/5 qualifications for an AB, and his most recent certificate of proficiency was issued by the Indian authorities in 2016. He had joined the vessel on 03 February 2020, in the port of Pascagoula, U.S.A. For the month of October 2020, he was assigned the 0400 to 0800 and 1600 to 2000 watches at sea.

The other AB (AB 2) was 45 years old. He had around 20 years of seafaring experience, 19 of which were served in the rank of an AB. He held STCW II/5 qualifications for an AB, and his most recent certificate of proficiency was issued by the Indian authorities in 2016. He too had joined the vessel on 03 February 2020, in the port of Pascagoula, U.S.A. For the month of October 2020, he was assigned the 0800 to 1200 and 2000 to 2400 watches at sea.

The OS who witnessed the accident (OS 2) was 28 years old. He had around two years of seafaring experience as a trainee OS and this was his first employment term in the rank of an OS. He held the basic seafaring qualifications required by STCW V/1-1 and VI/1. He had joined the vessel on 05 October 2020, in the port of Corpus Christi, U.S.A. For the month of October 2020, he was not assigned any watchkeeping duties at sea.

The trainee OS (TOS) was 19 years old, and this was his first employment term at sea. He held the basic seafaring qualifications required by STCW V/1-1 and VI/1. He too had joined the vessel on 05 October 2020, in the port of Corpus Christi, U.S.A. For the month of October 2020, he was not assigned any watchkeeping duties at sea.

Environment

Around the time of the accident, the weather was clear with a visibility of about seven nautical miles (nm). The wind was blowing from the Northeast, at Force 4 on the Beaufort scale. Slight seas and a 0.8 m-high Easterly swell were observed. The air and sea temperatures were both recorded as 30 °C. The vessel was neither rolling nor pitching.

[1] IMO. (2010). *The Manila amendments to the annex to the International convention on standards of training, certification and watchkeeping for seafarers (STCW), 1978*. London: Author.

Narrative[2]

On 07 October 2020, *Miss Benedetta* departed from the port of Corpus Christi, U.S.A., carrying a cargo of gasoline RON 92, bound for Pozos Colorados, Colombia. Due to a hurricane warning within the Gulf of Mexico, the vessel had to divert her route to avoid the region of heavy weather. This resulted in an increase in the estimated voyage duration, from 5.5 days to 7.5 days.

At around 0800 of 12 October, whilst the vessel was navigating through the Caribbean Sea, the daily toolbox meeting was held between the master, chief officer, chief engineer and second engineer. During the meeting, several tasks were planned for the day, one of which was to replace a heavily corroded steel floor plate (Figure 2) in the port side midship deck store, which was noticed by the chief officer during the voyage. The second engineer was designated as the person in charge of this task. While the toolbox meeting was being conducted, all other crew members were engaged in various other tasks on board.

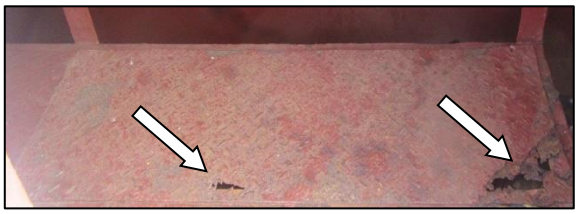

Figure 2: Corroded floor plate of the port side midship store

Following the toolbox meeting, the chief officer, second engineer and fitter proceeded to the port side midship deck store to have a look at the corroded plate. The plate measured 1240 mm by 410 mm and was about 6 mm thick. They then proceeded to the engine-room to check whether a plate of similar dimensions was readily available. As none were found, it was decided to pull out a larger plate of similar thickness from a stack of about 13 spare steel plates (Figure 3), located near the incinerator in the engine-room, and cut it to the required dimensions.

Figure 3: Location of the secured stack of spare steel plates in the engine-room

Almost all steel plates in the stack measured 2450 mm by 1230 mm, with different thicknesses. The weight of the steel plates in the stack ranged from 80 kg to 250 kg. The required steel plate, which weighed around 160 kg, was in the near middle of the stack (Figure 4), secured by three horizontal angle bars (Figure 5).

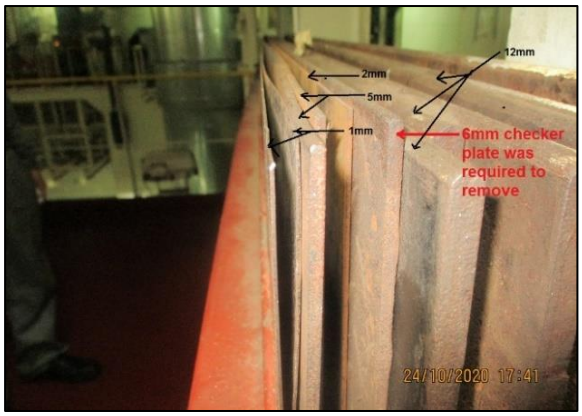

Figure 4: Position of the required steel plate (red arrow) amidst the stack

Figure 5: Securing arrangement of the stack

[2] Unless specified otherwise, all times mentioned in this safety investigation report are in local time (LT = UTC - 5).

A risk assessment (RA) for the handling of the required steel plate was prepared by the chief officer and second engineer, in the form prescribed by the vessel's safety management system (SMS) manual, which was then approved by the chief engineer. The officers did not fix a particular time at which this task was to commence and, after preparing the RA, the chief officer and second engineer proceeded to carry out other planned tasks.

At around 0930, the chief officer met the pumpman, told him that the corroded plate in the midship store had to be replaced and advised him that additional crew members would be required to pull out a spare steel plate from the stack in the engine-room. During the coffee break, the pumpman and the fitter agreed to perform this task after the break.

At around 1030, the pumpman instructed OS 2 to inform AB 1, AB 2, OS 1 and TOS to proceed to the engine-room to assist in pulling out the steel plate. AB 1, OS 1, OS 2, and TOS then made their way to the engine-room, while AB 2 remained on deck to complete another task. The pumpman went to the port side midship deck store to confirm the dimensions of the corroded plate. All of them were wearing coveralls, with hard hats, safety shoes, and leather working gloves.

AB 1 and the three OS were met by the fitter in the engine-room, who led them to the location of the stack. His plan was to have them support the stack, while he would loosen the securing nuts with a spanner and remove all three angle bars, following which, they would pull out the required plate. The pump man arrived while the fitter was loosening the securing nuts of the uppermost angle bar. The crew members positioned themselves as shown in Figure 6.

After the upper two angle bars were removed and the fitter commenced loosening the last nut of the lowermost angle bar, the crew members noticed that the stack was getting heavier to support.

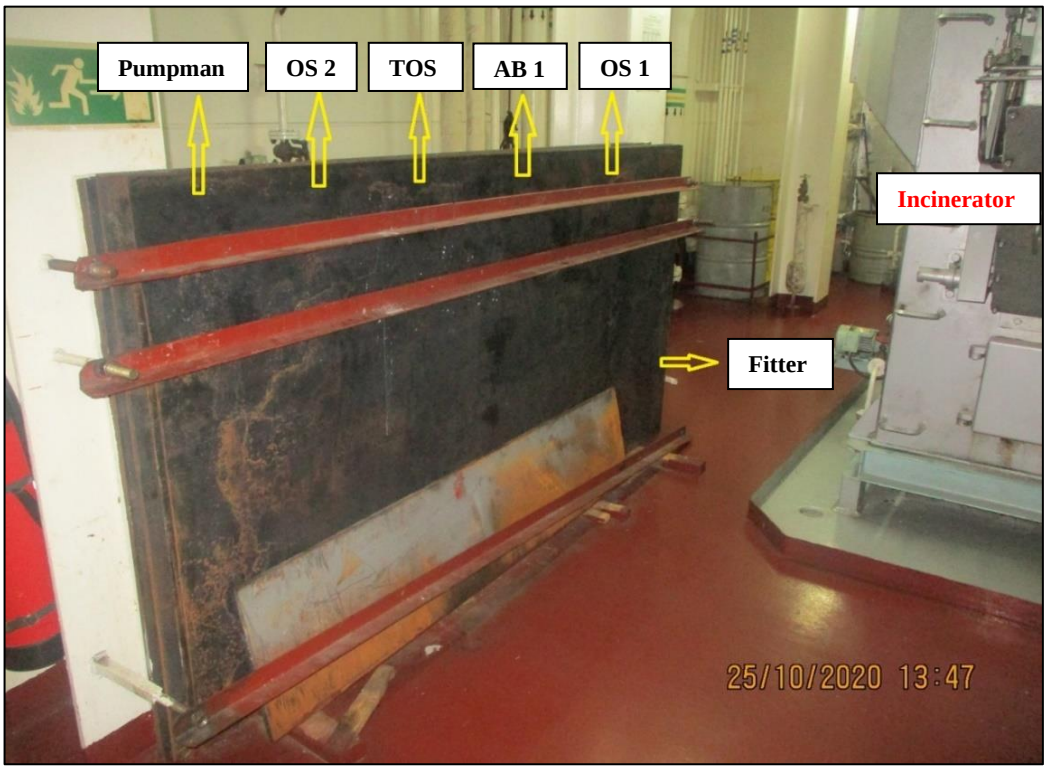

Figure 6: Position of the crew members while the securing arrangement was being removed

The fitter was still loosening the nut of the securing arrangement when the crew members became overwhelmed by the weight and, unable to support the stack any further, most of the steel plates tipped over. During this time, the securing arrangement buckled under the weight of the steel plates (circled in red, in Figure 7). While the other crew members managed to move clear of the falling plates, OS 1 did not manage to and was trapped between about eight steel plates and the incinerator (Figure 8).

Figure 7: Securing arrangement which gave way

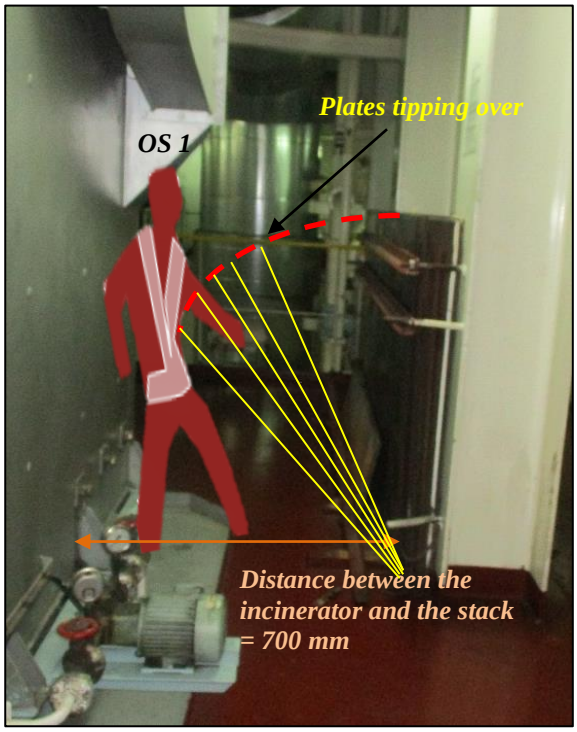

Figure 8: Simulation of the accident

Seeing OS 1 trapped, the rest of the crew members immediately tried to lift the steel plates off him. In the meantime, AB 2 arrived at the scene and, realising what had happened, rushed to the engine-room workshop, and returned with a crowbar to assist in the lifting of the steel plates. Due to the weight of the plates, the crew members were only able to lift one plate at a time and place it in the original stacking position.

When almost all the plates had been lifted, the stack of plates once again tipped over, hitting OS 1 again. Soon after, the second engineer, motorman, and wiper, who were working elsewhere, were alerted by the commotion, and arrived at the scene. While the motorman and the wiper assisted the rest of the crew members to lift the steel plates, the second engineer alerted the chief engineer and the electrical officer who were in the engine control room (ECR).

The electrical officer contacted the chief officer, who was checking the vessel's gas detectors in the cargo control room at that time, and informed him of the accident, following which, the chief officer rushed to the location. Thereafter, at around 1050, the bridge was notified about the accident and the master rushed down to the engine-room.

Meanwhile, the crew members once again lifted the steel plates off OS 1, one plate at a time. Since additional manpower was available this time, they managed to lift off all the plates and secure them. OS 1 was then pulled into a clear area, while AB 2 fetched a stretcher from the vessel's hospital. At around 1055, OS 1 was carried on the stretcher to the ECR, where he was examined for injuries and first aid was administered.

Observed injuries

In the ECR, the chief officer observed injuries on OS 1's chest, abdomen, lower back, both arms (including two fingers of his right hand with broken fingernails) and to his right leg. OS 1 also complained of

discomfort in his throat and pain in his legs, abdomen and back. He was unable to walk.

Post-accident events

The chief officer administered pain killers to OS 1, cleaned his wounds and dressed them in the ECR. At around 1150, OS 1 was transferred to the vessel's hospital, where medical treatment was continued.

The master, then, contacted the *Centro Internazionale Radio Medico* (CIRM), which provided him with advice on medical treatment. The advice was followed, and OS 1 was kept in the vessel's hospital under observation.

On 13 October, at around 0001, the crew members noticed that OS 1's condition was deteriorating. The master updated CIRM via e-mail. At around 0224, CIRM responded and advised the master to arrange for an urgent medical evacuation and on additional medical treatment to be administered until evacuation. At the time, the vessel was about 220 nm from the nearest port (Kingston, Jamaica) and about 260 nm from her destination (Pozos Colorados, Colombia). In the meantime, it was reported that OS 1 had lost consciousness.

The master conveyed CIRM's advice to the Company, via satellite phone. The Company advised the master that it will make the necessary arrangements for an air evacuation of OS 1 and would revert soon with details.

At around 0320, the chief officer noticed that OS 1 had no pulse. The master was immediately informed. Attempts to revive OS 1 were unsuccessful.

The master updated the Company, who contacted CIRM for further advice. However, based on the information conveyed, CIRM confirmed the passing away of OS 1. Thereafter, the Company relayed CIRM's response to the master. The vessel proceeded to her destination. The vessel arrived and anchored off Pozos Colorados in the morning of 14 October. The body was transferred to a local morgue.

Cause of death

The autopsy concluded that the cause of death was blunt trauma to the abdomen, resulting in a hypovolemic shock.

The stack of spare steel plates

The spare steel plates were placed on board by the ship building yard, during the construction phase. No certificates had been provided.

The storage location had been chosen following an agreement between the shipyard construction manager and the chief engineer on board the vessel at that time. The stack's securing arrangements were fabricated and fitted by the shipyard, with the assistance of the crew members.

No information was available on the last time that a large steel plate had been extracted from the stack. All crew members stated that this was the first time that such a task was being performed during their employment term.

Risk assessment

The vessel's SMS Manual contained comprehensive procedures and instructions for RAs. It required, amongst others, that RAs were prepared by relevant and responsible shipboard staff, which included the master, chief officer, chief and second engineers, the crew members with the most experience in the task being assessed, and those to be involved in the execution of the task.

The SMS Manual also required for at least one person from each department (deck and engine-room) to have received formal training in risk assessment and incident investigation. The chief officer and chief

engineer were trained and certified in this regard.

The RA was prepared by the chief officer and second engineer and verified by the chief engineer. No other crew member was present during the preparation of the RA.

Three hazards were identified in the RA, namely, personal injuries, lifting equipment failure and handling heavy objects. As the risks associated with each of these hazards were considered as medium, control measures were identified by the chief officer and second engineer to lower the risks.

For the hazard of personal injuries, the identified control measures were briefing of all personnel, regarding the scope of the job and the dangers involved, advising all personnel on proper lifting methods, the wearing of proper safety gear and the application of good seamanship.

For the hazard of lifting equipment failure, the identified control measures included training and briefing the crew before work, supervision of the job by senior officers, ensuring that the surroundings of the job site were clear of obstructions, proper communication and that the speed of task was to be slow throughout the process.

For the hazard of handling heavy objects, the identified control measure was for additional manpower to be sought.

The RA indicated that, following these control measures, the risks associated with each of the hazards was low.

Tasks planned on the day of the accident

On the day of the accident, the deck ratings had been assigned derusting and painting of various areas and fittings on deck. These tasks had commenced at around 0800, while the senior officers were convened for the toolbox meeting. The plan was for the deck ratings to resume their respective tasks once the required steel plate would have been extracted.

On completion of the RA, the second engineer proceeded to incinerate collected garbage, which was one of the tasks he had assigned to himself during the toolbox meeting.

After briefing the pumpman on the extraction of the required steel plate, the chief officer proceeded to check the vessel's gas detectors, which would be required during cargo unloading operations.

Records of hours of work / rest

The work / rest hour records of all crew members involved in the steel plate accident, indicated that their rest periods complied with the relevant requirements of the STCW Code and MLC, 2006[3].

Drugs / alcohol tests

Following the accident, a breath analyser test was carried out on all crew members involved. The test returned negative results for all the tested crew members.

However, the safety investigation was unable to have access to the toxicology tests' results.

[3] ILO. (2006). *Maritime Labour Convention*. Genève: Author.

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 to OS 1

OS 1 suffered fatal injuries after the stack of steel plates, each weighing between 80 kg to 250 kg, tipped over on him and trapped him against the incinerator.

Urgency of the task

Information collected from the vessel indicated that there was concern that the corroded plate would give way should crew members walk over it and therefore, the intention was to replace it.

Further to the above, the safety investigation believes that a heavily corroded floor plate could be viewed as a deficiency / shortcoming in the vessel, her crew and/or the Company by local port authorities (terminal safety inspectors, port State control officers, *etc*.) as well as other players in the shipping industry (charterers, oil major vetting inspectors, *etc*.).

It is commonly known within the shipping industry that deficiencies / shortcomings identified by any of the aforementioned parties and accidents occurring on board a vessel could adversely affect the future commercial prospects of that vessel[4].

Considering that the vessel was an oil / chemical tanker, the crew members would not have been able to execute tasks such as this one while in port. In addition to possible restrictions by port authorities, the short duration of the vessel's stay in port and the importance of the crew's focus on cargo operations for that duration would not have allowed for such tasks to be executed in port.

In this regard, rectifying such issues at the earliest available opportunity while the vessel was at sea, is not only a common practice but it would generally be the only option available to the crew.

Then, crew members would also have other tasks on their hand, which also could only be carried out at sea. With multiple tasks competing for the (limited) time, *a prima facia*, the task of extracting the steel plates would not have appeared more complex than any other task to be carried on board and therefore extensive briefing would not have been considered critical.

Risk assessment

The safety investigation believes that there were no manifested cues for the senior officers to suggest that this would have been a complex task, to the extent that it would have required a thorough briefing. This, however, could have significantly influenced the approach taken to get the job done.

The existing control measures to mitigate the risks associated with two of the three identified hazards of the RA included briefing of the crew members engaged in the execution of the task. However, as mentioned earlier in this safety investigation report, no other crew member, except for the chief officer, chief engineer and second engineer were involved in the RA process.

Although the hazard of lifting equipment failure had been identified in the RA, the crew members involved in the task were not aware of any lifting equipment which had to be used for the task.

The fitter, who had joined the vessel just one week before the accident, was not aware of

[4] RightShip. (n.d.). RightShip's safety score. Retrieved from https://www.rightship.com/resources/knowledge-base/?section=1353

the availability of lifting gear, which could be used for this task. Moreover, since it was the first time that the crew members were assigned this task during their employment term on board, it was not excluded that none of them was aware of how to execute the task. Without a warning sign in the area to caution crew members not to release the securing arrangements, the crew members initiated the execution of the task based on their understanding of the situation, unaware of the availability of the lifting clamps.

In addition to the above, an existing control measure to mitigate the risks associated with the failure of the lifting equipment was that the task had to be conducted under the supervision of senior officers. However, none of the officers were present while the task was being executed.

Around the time of the occurrence, the chief officer was in the cargo control room. Although the second engineer was engaged in the incineration of garbage and the accident occurred near the incinerator, around the time of the occurrence he and the wiper were at the garbage collection area on deck.

The senior officers were not aware that the task had commenced. The chief officer stated that he had requested the pumpman to inform him when they were ready to commence the task. However, the pumpman could not recollect this request. In the absence of an agreed time, the exchange of communication on when the task was about to commence was critical to ensure the presence of a senior officer on site.

Lifting clamps for the transfer of heavy steel plates were available on board (Figure 9). The lifting clamps would allow for extraction of a required plate, without the removal of the securing arrangements (Figure 10).

Figure 9: A lifting clamp on board *Miss Benedetta*

Figure 10: Extraction of a steel plate using the lifting clamps

Adopted method to extract the steel plate

The gradual supporting of additional plates would have led to an increase in the weight, which the crew members had to support. Whilst there may have been no indications to the crew members that the situation would run out of control, it was highly probable that as much as the increase in weight was both anticipated and felt, there was no reason to suspend the work, given that this approach appeared to be the only plausible way to extract the required steel plate. This was indicative of a 'plan continuation', whereby the original plan is stuck to and continued with, even though the situation would have evolved and perhaps calls for a different plan[5].

Fatigue and drug / alcohol consumption

The crew members' work / rest hours met the relevant requirements, and they tested negative for the presence of alcohol. However, the safety investigation could not verify the quality of the crew members' rest. Drug tests were not conducted on board after the accident.

Nonetheless, in the absence of any evidence which could have indicated that the actions or behaviour of the crew members were symptomatic of fatigue and / or drug abuse, neither fatigue nor drug / alcohol consumption were considered contributory to this accident.

Vessel's motions

The vessel was neither rolling nor pitching at the time of the accident. Therefore, the vessel's motion were not considered a contributory factor to this accident.

CONCLUSIONS

1. OS 1 suffered fatal injuries after a stack of steel plates tipped over and fell on him, trapping him against the incinerator.
2. The task of extracting the steel plates would not have appeared more complex than any other task to be carried on board and therefore extensive briefing would not have been considered critical.
3. The crew members handling the steel plates were not aware of the lifting equipment which could have been used for the task, without removing the securing arrangements.
4. The gradual supporting of additional plates would have led to an increase in the weight, which the crew members had to support;
5. A 'plan continuation', was observed, whereby the original plan is stuck to and continued with, even though the situation would have evolved and perhaps calls for a different plan;
6. None of the senior crew members was present on site to supervise the extraction of the steel plate;
7. The safety investigation believes that there were no cues to the senior officers to suggest that this would have been a complex task, to the extent that it would have required a thorough briefing.

[5] Dekker, S. (2014). *The field guide to understanding 'human error'* (3rd ed.). Surrey: Ashgate Publishing Limited.

SAFETY ACTIONS TAKEN DURING THE COURSE OF THE SAFETY INVESTIGATION[6]

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

1. A circular was sent out to notify its fleet of the accident, which included a request for all vessels to fabricate more effective storage and securing arrangements for spare steel plates (Figures 11 and 12) and instructions on the handling of steel plates;

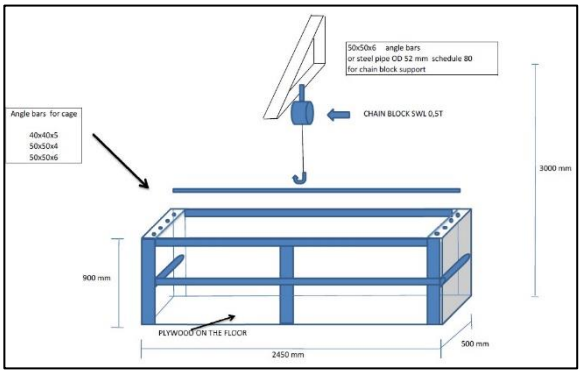

Figure 11: Sketch of the Company-recommended storage and securing arrangements for spare steel plates

Figure 12: Renewed securing arrangement for the spare steel plate stack on *Miss Benedetta*

2. A safety meeting was conducted by the master and chief engineer, following a request from the Company. Crew members were instructed not to take work initiatives unless authorised by a responsible officer;
3. The Company's procedures and the prescribed form for recording daily toolbox talks were revised, and a notice was promulgated across the fleet, advising that a responsible person / team leader was to conduct an on-site toolbox talk with all members of the work team, prior to commencing any task;
4. Introduced procedures on the handling of heavy metal plates in the SMS manual and revised the relevant risk assessment.

RECOMMENDATIONS

Based on the safety actions taken by the Company, no recommendations have been issued by the MSIU.

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

SHIP PARTICULARS

Vessel Name:	*Miss Benedetta*
Flag:	Malta
Classification Society:	Registro Italiano Navale
IMO Number:	9541306
Type:	Oil / Chemical Tanker
Registered Owner:	Megaride Shipping S.R.L.
Managers:	Ships Surveys and Service S.R.L.
Construction:	Steel – Double Hull
Length Overall:	183.0 m
Registered Length:	175.37 m
Gross Tonnage:	29,814
Minimum Safe Manning:	14
Authorised Cargo:	Liquid cargoes in bulk

VOYAGE PARTICULARS

Port of Departure:	Corpus Christi, U.S.A.
Port of Arrival:	Pozos Colorados, Colombia
Type of Voyage:	International
Cargo Information:	38,222 mt of Gasoline RON 92
Manning:	22

MARINE OCCURRENCE INFORMATION

Date and Time:	12 October 2020 – 1045 LT
Classification of Occurrence:	Very Serious Marine Casualty
Location of Occurrence:	16° 37.3’ N 080° 01.0’ W
Place on Board:	Engine-room
Injuries / Fatalities:	One fatality
Damage / Environmental Impact:	Minor damage / None
Ship Operation:	In passage
Voyage Segment:	Transit
External & Internal Environment:	Clear sky, with a visibility of 7 nm; Northeasterly wind, Force 4 on the Beaufort scale; slight seas with 0.8 m high Easterly swell. Air and sea temperatures were recorded at 30 °C.
Persons on board:	22