

Marine Safety Investigation Unit





MARINE SAFETY INVESTIGATION REPORT

Safety investigation into a fatality of a crew member on board the Maltese registered container ship

SYDNEY TRADER

Off Port Limits Anchorage, Hong Kong on 02 September 2016

201609/002 MARINE SAFETY INVESTIGATION REPORT NO. 19/2017

FINAL

Investigations into marine casualties are conducted under the provisions of the Merchant Shipping (Accident and Incident Safety Investigation) Regulations, 2011 and therefore in accordance with Regulation XI-I/6 of the International Convention for the Safety of Life at Sea (SOLAS), and Directive 2009/18/EC of the European Parliament and of the Council of 23 April 2009, establishing the fundamental principles governing the investigation of accidents in the maritime transport sector and amending Council Directive 1999/35/EC and Directive 2002/59/EC of the European Parliament and of the Council.

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The objective of this safety investigation report is precautionary and seeks to avoid a repeat occurrence through an understanding of the events of 02 September 2016. Its sole purpose is confined to the promulgation of safety lessons and therefore may be misleading if used for other purposes.

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MARINE SAFETY INVESTIGATION UNIT Malta Transport Centre Marsa MRS 1917 Malta

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LIST OF REFERENCES AND SOURCES OF INFORMATION

Crew members MV Sydney Trader

Managers MV Sydney Trader

Merchant Shipping Directorate - Transport Malta

GLOSSARY OF TERMS AND ABBREVIATIONS

| AB | Able seafarer |
|--------|---------------------------------------|
| Co. | Company |
| DNV GL | Det Norske Veritas Germanischer Lloyd |
| GT | Gross tonnage |
| ISM | International Safety Management |
| kW | Kilowatts |
| LT | Local time |
| Ltd. | Limited |
| М | Metres |
| MSIU | Marine Safety Investigation Unit |
| MV | Motor vessel |
| No. | Number |
| OPL | Outside port limits |
| OS | Ordinary Seafarer |
| PPE | Personal protective equipment |
| RPM | Revolutions per Minute |
| SMS | Safety management system |
| TEU | Twenty-foot equivalent units |
| VHF | Very high frequency |

SUMMARY

The Maltese registered container vessel *Sydney Trader* had been anchored OPL at Hong Kong, China since 19 June 2016, awaiting orders for the next charter. At 0730, on 02 September 2016, the chief mate instructed the bosun to continue routine maintenance work in cargo hold no. 2. The chief mate also confirmed that all the Safety Management System (SMS) risk assessments and Permit to Work forms had been completed and signed before the bosun left the bridge at 0750.

At about 0805, five crew members entered cargo hold no. 2 via the manhole aft of Bay 18, Row 4, no. 2 M hatch, above the middle cross section. Soon after, at about 0810, the bosun reported to the chief mate that one of the ordinary seafarer (OS) had fallen down cargo hold no. 2. The bosun also informed the third mate (duty officer) on the bridge. The master was informed of the accident at about 0815.

The chief mate proceeded immediately to the cargo hold to provide first aid and medical assistance. When reaching the tank top, he noticed that the OS was unresponsive, with a serious head wound. He checked for a pulse on the OS' hand and neck but could not detect any.

The safety investigation found that the immediate cause of the fatal injury was a fall from a height of about 12 m into the cargo hold.

Two recommendations have been made to the Company to ensure that the risks posed by the safety wires on the cargo holds' platforms are mitigated.

FACTUAL INFORMATION 1

1.1 Vessel, Voyage and Marine Casualty Particulars

| Name | Sydney Trader |
|---------------------------------|--|
| Flag | Malta |
| Classification Society | DNV GL |
| IMO Number | 9297474 |
| Туре | Container Ship |
| Registered Owner | Belgravia Container Shipping Ltd. |
| Managers | Lomar Deutschland GmbH, Germany |
| Construction | Steel (Double bottom) |
| Length overall | 294.13 m |
| Registered Length | 190.26 m |
| Gross Tonnage | 54809 |
| Minimum Safe Manning | 15 |
| Authorised Cargo | Containers |
| Port of Departure | Hong Kong, China |
| Port of Arrival | Hong Kong OPL, China |
| Type of Voyage | Internal waters / Archipelago |
| Cargo Information | In ballast |
| Manning | 25 |
| Date and Time | 02 September 2016 at 08:10 (LT) |
| Type of Marine Casualty | Very Serious Marine Casualty |
| Place on Board | Cargo hold |
| Injuries/Fatalities | One fatal injury |
| Damage/Environmental Impact | None |
| Ship Operation | Normal Service – On anchor |
| Voyage Segment | Arrival |
| External & Internal Environment | Daylight, overcast but with a visibility of about five nautical miles. There was a Southwesterly moderate breeze, slight seas and a Southwesterly swell of about 0.5 m. The ambient temperature was 28 °C. Work was carried out under adequate artificial lighting. |
| | A.F. |

Persons on Board

25

1.2 Description of Vessel

Sydney Trader, a 54,809 gt fully cellular container ship was built in 2005 and was registered in Valletta. She was owned by Belgravia Container Shipping Ltd., managed by Lomar Deutschland GmbH of Germany (the Company) and was classed by DNV GL. The vessel was built by Hyundai Heavy Industries Co. Ltd., Republic of Korea.

Sydney Trader had a length overall of 294.51 m, a moulded breadth of 32.20 m and a moulded depth of 22.10 m. It had a summer draught of 13.65 m, corresponding to a summer deadweight of 67,222. The vessel had a TEU capacity of 5,047, spread over 13 rows.

Propulsive power was provided by a 8-cylinder Sulzer 8RTA96C, two stroke, single acting, slow speed direct drive diesel engine, producing 45,760 kW at 102 rpm. This drove a single fixed pitch propeller, to reach a service speed of 25.0 knots.

1.3 Crew

At the time of the accident there were 25 persons on board.

The master was a Romanian national and the chief engineer a Russian national. The chief mate, second engineer, third engineer and the electrician were all Ukrainian nationals. The second and third officers and the rest of the crew members were all Myanmar nationals. There were also four Polish technicians on board.

1.3.1 Crew experiences

The master was 56 years old, with 33 years sea service. He was the holder of a master's Certificate of Competency issued by the Romanian Authorities, for 21 years. He had served as master since then and worked for the Company for about 14 years. The master did not keep a navigational watch.

The chief mate was 31 years with 10 years sea service. He held a chief mate's Certificate of Competency issued by the Ukrainian Authorities, for five years and had sailed as chief mate for two years, one year with the Company. The chief mate was designated the 4 to 8 watch.

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The third mate was 36 years with 14 years sea service. He had held his second mate's Certificate of Competency for four years, issued by the Myanmar Authorities and had sailed as third mate for two and a half years, 16 months with the Company. He was designated the 8 to 12 watch.

The bosun was 47 years of age with 24 years sea service. He did not hold any certificates of competency. He had worked for the Company for the past 16 years, serving 12 years as bosun. He was not a watch keeper and was designated a day worker.

1.3.2 The fatally injured crew member experience

The fatally injured crew member was a Myanmar national, aged 30 years, with just under six years of sea service. He had sailed for one year as a cadet, three years as an OS and one year as an AB. He did not hold any certificates of competency. He had sailed for 12 months with the Company and had been on board *Sydney Trader* for just over six months. He was designated a day worker.

The fatally injured crew member had completed a medical fitness examination on 01 August 2015 in Myanmar. The crew member was declared medically fit for deck service and look out duties without restriction. The medical certificate was valid until 31 July 2017.

The AB had joined the vessel on 25 February 2016 at Manzanillo, Panama. Upon signing on the vessel, the AB had completed the Company's Safety Familiarisation Checklist, which included training in the use of Personal Protective Equipment (PPE), entry in to enclosed spaces, Accident Prevention and the Permit to Work System.

1.3.3 AB's hours of work

Hours of work records were maintained on board in accordance with the Maltese Merchant Shipping (Hours of Work) Regulations, 2002.

On 01 September 2016, the AB had started work at 0800, finishing at 1700 and had one period of 16 hours rest before starting work at 0800 on 02 September. During the previous month (August), the AB had been assigned day work duties and had an average of 14 hours rest in every 24 hour period.

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1.4 The Cargo Hold

An inspection of the cargo hold was carried out during the course of the safety investigation. The access manhole to cargo hold no. 2 (Figure 1) was positioned aft in way of Bay 19, Row 04, hatch port no. 2 M, above the port middle cross section.



Figure 1: Access to cargo hold no. 2

The access was possible via two vertical ladders, each approximately 2.5 m in length, to platform no. 2 on the middle cross section (Figure 2).



Figure 2: Vertical ladder to second platform from platform no. 1, showing the position of the safety wires

The port middle cross section consisted of seven platforms (Figure 3). Platforms nos. 3 to 7 were accessible via a stairway. Access to the cargo hold tank top from platform no. 7 was via a vertical ladder, approximately 2.5 m long.



Figure 3: Position of the platforms inside the cargo hold

During the on board visit, it was noticed that cargo hold no. 2 was adequately lit with fluorescent lights, fitted on the deck heads on each platform above the stairways and vertical ladders. Each ladder and stairway was in good condition and had been well maintained and illuminated.

The crew were assigned areas to chip and paint at the aft end of the lower middle cross section platforms (Figure 4). While working on the platforms, it was neither possible to view platform no. 2 nor the vertical ladder on the platform.



Figure 4: Areas where the crew members were working when the accident happened

Two steel safety wire guards (lower & upper) were fitted on either side of each of the platforms to prevent personnel falling into the cargo hold (Figure 5). A yellow plastic sleeve was fitted around the entire length of the safety wires.



Figure 5: Position of the vertical ladder on platform no. 2 and the safety wires on either side

Soon after the accident, several members of the crew noticed that the upper guard safety wire was broken (Figure 6), close to the end frame from where it had been secured. The safety wire was positioned on the inboard side of platform no. 2, (Bay 19, row 03, tier 14), above the area where the casualty's body was found on the tank top.



Figure 6: Both ends of the parted safety wire

The photographs provided by the vessel showed that the safety wire strands were corroded (Figure 7). However, a close inspection of the safety wire revealed that it would not have been possible to observe the condition of the safety wire, given that it was sheathed within the yellow plastic sleeve, although there were rust marks on the surface of the sleeve, indicating that this area of the safety wire had been corroding.

The MSIU did not have information on whether the safety wires had been ever load tested or visually inspected on regular basis, perhaps as part of the vessel's planned maintenance system. It was understood, however, that the safety wires had been in place since 2005, when the vessel had been delivered.



Figure 7: Corroded safety wire inside the yellow sleeve

1.4 Environment

The wind was Southwesterly, force 4, slight seas and a Southwesterly swell of about 0.5 m. The ambient temperature was 28 °C. Work was carried out under adequate artificial lighting, which was reported to be good and adequate.

1.5 Narrative

On 02 September 2016 at 0730, the bosun reported to the bridge to be assigned the work to be carried out for that day by the deck crew. As it was raining, the chief mate instructed the Bosun to continue chipping and painting inside cargo hold no. 2, which was yet unfinished from the previous day. At 0750, a safety management system (SMS) risk assessment and the necessary job hazard forms were completed and signed by the master, chief mate and the bosun (**Annex A**). The bosun then proceeded to the crew's changing room, where he discussed the day's work with his colleagues and delegated the tasks. All crew were wearing their PPE as per Company's SMS. This included a hard hat, overalls, gloves and glasses¹.

At about 0805, all six crew members made their way towards cargo hold no. 2 to descend *via* the manhole aft of Bay 19, Row 04, hatch port no. 2 M, above the port middle cross section, the two short vertical ladders sections and down to the second platform. Five of the crew members then descended into the cargo hold and made

¹ A photo of the injured crew member, which was provided to the MSIU indicated that he was neither wearing gloves, glass nor a safety harness.

their way to the tank top. As the crew members had been working in cargo hold no. 2 on the previous day, all the chipping and painting equipment had already been on site and therefore, it was not necessary to lower or carry any additional tools inside the cargo hold.

The bosun stated that he did not enter the cargo hold but remained on the hatch cover Bay 18 to place some plywood sheets over the manhole to cargo hold no. 2. It was confirmed by all the crew members inside the cargo hold that the fatally injured crew member was the last person to enter the cargo hold. The bosun (on the main deck) did not see him entering the cargo hold manhole.

The crew members had been assigned painting or chipping jobs on the aft areas of the lower platforms nos. 6 and 7 of the middle cross section. From that area, it was neither possible for the crew members to see the second platform nor the vertical ladder leading to it. Moreover, they recalled that they had their backs to the stairways and the tank top area were the fatally injured crew member eventually landed.

The crew members had just reached their designated work areas and had either started or were preparing to start chipping and / or painting on the middle cross section platforms, when they heard a loud noise². Upon hearing the noise, the crew members inside the cargo hold stopped their work and turned towards the direction of the noise. At this point, they observed their colleague lying on the tank top, approximately in way of Bay 18, row 02. It was immediately evident to them that he had fallen down into the cargo hold and ran towards him to assist him.

One of the crew members remained with the injured crew member, checking for vital signs while the other four crew members proceeded on deck to inform the bosun and get the stretcher from the hospital. In the meantime, the bosun stated that he was standing on the hatch cover at Bay 18, when he also heard a loud noise which sounded as if something had hit the cargo hold tank top. Consequently, he made his way down to platform no. 2 to investigate the cause. On reaching platform no. 2, the bosun saw the injured crew member on the deck. On seeing the bosun, the other crew members informed him that the OS had fallen down to the tank top deck. The bosun then

² One crew member described the sound as being similar to an empty paint drum being dropped on the tank top.

informed the chief mate and the third officer on the bridge, using his VHF radio³. Soon after, at about 0815, the third mate informed the master of the accident.

The chief mate changed into his working gear and proceeded to the cargo hold to provide first aid and assistance to the injured crew member. Upon reaching the tank top, the chief mate immediately realised that the situation was very serious. The injured crew member was unresponsive and had a severe injury to his head. He checked for a pulse on his neck and wrist but did not detect any. Soon after, the second mate arrived inside the cargo hold and was also unable to detect a pulse. The master was updated with the information at about 0820 and informed that the injured crew member had passed away. At this point, the master requested that the crew member was not to be shifted, given that shore authorities would be called to visit the ship.

The master then informed the vessel's operators, Port Health, Immigration Department, the ship's agent, the insurers, Police and Port Authorities of the accident. He also recorded in the Official Log book that the OS had fallen from a height of approximately 12 m from the access ladder of cargo hold no. 2 to the tank top and that no vital signs were detected due to the severity of the injuries, which he had sustained.

Eventually, *Sydney Trader* shifted from its position and anchored within Southeast Lamma Anchorage, where local authorities boarded to conduct their investigations and eventually landed the fatally injured crew member onto a launch. During the course of the safety investigation, it was noticed that the report compiled by the attending police officer indicated that the OS had been wearing a safety helmet, but he had not locked the safety buckle under his chin and consequently, the helmet had become detached during the fall. However, one of the ABs informed the MSIU that the crew members normally had the chinstrap fitted in place under the chin when wearing their safety helmets. The other AB who attended the injured OS indicated that he could not recall the details because he was more concerned about his colleague rather than his safety helmet.

³ The MSIU has conflicting evidence because the chief mate stated that he was informed of the accident when he was in the messroom at about 0810, whereas the third mate stated that he recalled being notified of the accident over the phone, also at about 0810. Whichever the most accurate version of events, the MSIU does not believe that this had a bearing on the accident's outcome.

1.5.1 Cause of death

The autopsy report submitted to the MSIU revealed that the cause of death was a heavy blunt impact to the head, causing skull fracture and fatal brain injury. It was also established that the impact to the head was consistent with a fall from a height. Other serious wounds were identified to other areas of the head, facial region and upper limbs.

The toxicological examination confirmed that no alcohol, common drugs and poisons were present in the system, at the time of death.

2 ANALYSIS

2.1 Purpose

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

2.2 Immediate Cause of the Accident

During the course of the safety investigation, it was confirmed that none of the crew members witnessed the OS' actual fall (and landing) to the cargo hold tank top. However, they all recalled that when they entered the cargo hold, the upper port side safety wire on platform no. 2 was intact. After the accident, each crew member stated that they had noticed that the safety wire had parted. The bosun, however, stated that he did not notice that this safety wire was broken when he proceeded to platform no. 2 immediately after the accident. He also stated that later on, it was the chief mate who showed him the broken safety wire.

It appeared that the OS may have leaned on the safety wire, possibly putting his full weight on it to look down to the cargo hold tank top, causing the safety wire to fail. It was also deemed possibly that he tripped or lost his footing after descending the ladder and grabbed the safety wire to steady himself, causing the safety wire to fail. He then lost his balance and fell down into the cargo hold.

Although no crew member saw the OS fall, taking into consideration the extent of the injuries sustained by the OS and the broken safety wire on platform no. 2, the MSIU believes that the cause of death was the fall from platform no. 2, down to the cargo hold tank top.

2.3 Failure of the Safety Wire

The safety wires fitted on either side of the platform were intended to serve as a physical barrier system, preventing anyone in close proximity of the edge from falling into the cargo hold. The evidence which the MSIU has gathered does suggest that this type of barrier system had been installed from the time the ship had been built.

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From a theoretical perspective, these barriers may be considered as physical fittings, keeping the vulnerable component of a socio-technical system (the crew members in this case) away from the hazard. Given that these barrier systems had been fitted for years, the MSIU was unable to gain access to any documentation, which would have explained what sort of hazard analysis had been carried out back then before the safety wires had been fitted. Neither was there any information as to how or why this choice of physical barrier system had been made.

Experience gained by the MSIU in the safety investigation of barrier system failure suggests that such documentation is rarely available. It would seem that there is a tendency to accept fittings similar to this, without an actual objective analysis as to why this physical barrier system, rather than another, had been selected. Even more, no safety certification existed.

The above raises yet another issue. Hazard analysis is a fundamental aspect of any safety management system – with Section 9 of the International Safety Management (ISM) Code specifically referring to analysis to ensure that risks are identified and addressed. However, it did not appear that the potential failure of the safety wire had been identified – otherwise it would have been addressed.

However, one has to be realistic and acknowledge that:

- it is almost impossible for any risk management framework or methodology to identify all possible risks on board a complex structure like a ship; and
- there was no history of similar previous accidents on board any of the Company's vessels and hence, corporate memory was such that these safety wires had never failed.

The MSIU, therefore, is not of the opinion that the failure of the safety wire can be attributed to a systemic failure of the vessel's safety management system.

Accidents within socio-technical systems happen in the presence of, *inter alia*, preventive barriers. It was not excluded that the failure of the safety wire was due to a combination of:

 a weakened safety wire due to severe corrosion of the strands, possible due to the daily exposure to and penetration of natural elements; and 2. the actual fall of the OS from an unknown height on the safety wire (or full body weight leaning against the safety wire).

The MSIU was unable to determine whether the safety wire would have been able to withstand the force generated by a falling person, had it been in a new condition. Nonetheless, it is plausible to hypothesis that the corroded safety wire strands would have reduced the overall tensile strength of the safety wire.

The fact that the safety wire was sheathed and considering its location inside the cargo hold, this made it susceptible not to be inspected and replaced. Although there were traces of rust across the outside circumference of the safety wire sheath, it would have been virtually impossible for the crew members to determine the extent of the (internal) corrosion damage within the safety wire strands.

It was ironic that the very same sheathing which was fitted to protect the safety wire had actually served to conceal a lethal problem, which led to the ultimate failure of the safety wire.

2.4 Fatigue

Taking into consideration the records of hours of sleep and rest and the fact that none of the crew members made any reference to irregular behaviour patterns by the OS, which would suggest that fatigue was an influential factor in his actions, the safety investigation believes that fatigue was not a contributing factor to this accident.

THE FOLLOWING CONCLUSIONS, SAFETY ACTIONS AND RECOMMENDATIONS SHALL IN NO CASE CREATE A PRESUMPTION OF BLAME OR LIABILITY. NEITHER ARE THEY BINDING NOR LISTED IN ANY ORDER OF PRIORITY.

3 CONCLUSIONS

Findings and safety factors are not listed in any order of priority.

3.1 Immediate Safety Factor

.1 The immediate cause of the fall from platform no. 2 was not witnessed by any of the crew members inside the cargo hold. It was evident, however, that the fall was not arrested by the safety wire, which parted under the weight of the fatally injured crew member.

3.2 Latent Conditions and other Safety Factors

- .1 It was not excluded that the OS may have either leaned on the safety wire, possibly putting his full weight on it to look down to the cargo hold tank top, or lost his footing after descending the ladder, grabbing the safety wire to steady himself causing it to fail.
- .2 The potential failure of the safety wire had not been identified as part of the vessel's safety management system.
- .3 The failure of the safety wire was due to a combination of a weakened safety wire due to severe corrosion of the strands, possible due to the daily exposure to and penetration of natural elements.
- .4 The corroded safety wire strands would have reduced the overall tensile strength of the safety wire.
- .5 The fact that the safety wire was sheathed and considering its location inside the cargo hold, made it susceptible not to be inspected and replaced.
- .6 It would have been virtually impossible for the crew members to determine the extent of the (internal) corrosion damage within the safety wire strands.
- .7 The very same sheathing which was fitted to protect the safety wire had actually served to conceal a lethal problem, which led to the ultimate failure of the safety wire.

3.3 Other Findings

- .1 It would seem that the safety wire was accepted because it was fitted during the ship building, without an actual objective analysis as to why this physical barrier system, rather than another, had been selected.
- .2 The failure of the safety wire cannot be attributed to a systemic failure of the vessel's safety management system.
- .3 Fatigue was not a contributing factor to this accident.

4 **RECOMMENDATIONS**

In view of the conclusions reached and taking into consideration the safety actions taken during the course of the safety investigation,

Lomar Deutschland GmbH is recommended to:

- 19/2017_R1 replace all safety wires, considering that these safety barrier systems
 are an intrinsic part of the on board safety;
- 19/2017_R2 apply a definite life-cycle to the safety wires and address this in the vessel's safety management system and the related planned maintenance regime to ensure that all safety wires inside the cargo holds are replaced at regular intervals.

ANNEXES

Annex A Cargo Hold Entry Permit, Job Hazard Analysis and Risk Assessment

| | | FOR | M CBO008: 0 | ARGO | HOLD E | NTRY PERM | III | | | |
|---------|-------------------------|--------------------------|------------------|-------------|---------------|-------------------|-----------------|-----------------|------------|------|
| /ES | SEL NAME | SYDNEY TRADER | l | | v | OYAGE NO. | N/A | PERMIT NO. | 12 | |
| his p | permit relates to entry | into a cargo hold ar | id should be co | ompleted | by the Mas | ster or respons | ible Officer a | nd by the perso | n entering |) th |
| pace | e or authorized team l | eader. | | | | | | | | |
| ENE | ERAL | | | | | | | | | |
| Care | no Hold ID No: | | | | | 2 | | - | | |
| Rea | son of entry: | | | | Derusting | and painting | cargo hold# | 2 | | |
| This | permit is valid from: | 08100 | hrs Date: | 02 | 1001 | 16 | (Se | e Note 1) | | |
| | to: | TIDO | hrs Date: | 0 | 10001 | V | | | | |
| | | 14100 | The Dotter | 01 | .03. | 19 | | | | |
| CEC | TION 1 Bra Enter | Propagation | | | | | | | | |
| JEL /To | he checked by the M | aster or Resonsible | Officer | | | | | | Yes | |
| | Is there presence of | caroo that might car | use oxygen de | nletion of | produce d | ancerous / tox | ic tumes (See | Note 2)? | | |
| | Has an anteement h | where the nort ter | ninal and the k | laster be | en made li | n writing, if yes | selin port)? | | П | |
| | Have all caroo oper | ations been suspend | AHA Spel | cho | NDS | CANFO | ORINA | IOUS | দি | |
| | Pre-entry atmosphe | te tests (enter readir | nos as acolicad | le) | | 0 | | | TZ | |
| | - oxygen | 20.9 % | ol | | | | By: | CU OPF | | |
| | - hydrocarbon | ~ % | EL (≤1%) | | | | | | | |
| | - toric cases | -nom (Snecify gas | | 1 | | | Time | 08105 | | |
| | Have arrangements | been made for sub | sequent atmost | ohere ch | cks? | | | | M | |
| | Has been ensured t | hat no suspended lo | ads exist over | nead? | | | | | M | |
| | Are arcess and illur | nination adequate? | | | | | | | N | |
| | Is rescue and resus | citation equipment a | vailable for imr | nediate u | se by the e | entrance to the | hold? | | Ē | |
| | Has the responsible | nerson been design | ated to be in a | onstant | ttendance | at the entrance | e to the hold? | | ĩŬ | |
| | Enter Name and Ra | nk BEN | 3-AB | 3- | OS | | | | | |
| | Has the Officer of th | e Watch (bridge, en | gine room) bes | advise | d of the pla | nned entry? | | _ | N. | |
| | Has a system of con | mmunication betwee | n all parties be | en tester | and emer | gency signals | agreed? | | Ē/ | |
| | Are emercency and | evacuation procedu | res established | d and und | derstood by | all personnel | involved? | | | |
| | Is all equipment use | d in good working a | ondition and in: | spected r | prior to entr | v? | · · · | | | |
| | Are personnel prope | arly clothed and equi | ipped? | | | | | | Ø | |
| | Is there a system fo | r recording who is in | the hold? | | | | | | Ø | |
| | Have all above been | n discussed during a | formal work pl | lan meet | ng with al | personnel part | icipating to th | e entry being | . 1 | |
| | present? | | | | | | | | | |
| l | | | | | | | | | | |
| SEC | CTION 2 - Pre-Entry | Checks | | | | | | | 12201 | |
| (To | be checked by the p | erson entering the he | old or authorize | od team I | eader) | 1251 32422 | A 5 22 | | Yes | |
| ٠ | I have received pe | mission from the Ma | aster and instru | ictions fro | om the Res | ponsible Office | er to enter the | cargo | | |
| | hold | | •••••• | | | | | | M | |
| • | Section 1 of this pe | mit has been succ | essfully comple | ted by th | e Respons | ible Officer and | approvad by | the Master | 4 | |
| ٠ | I have agreed and | understand the com | munication pro | cedures. | | | | | M | |
| • | I have agreed upor | n a reporting interval | of | minutes. | | | | | ¥, | |
| • | Emergency and ev | acuation procedures | have been ag | reed and | are under | stood | | | | |
| ٠ | I am aware that th | e cargo hold must | be vacated in | mediate | ly in the e | vent of any n | otified adver | se conditions | - 1 | |
| | such as atmosph | ere tests showing a | a change from | agreed | sare criter | ia, notificatio | n or any dan | ger overnead, | M | |
| | or sate access or | mumination being | Jeopardized e | IC | | | | | Ų | |
| | TION 2 Prosthing | annaratus and at | or coulomont | | | | | | | |
| IT. | be checked jointly h | w the Master and D | anonaible Off | cer and t | ne nerson s | who is to enter | the hold or th | e team leader) | Yos | |
| | The quark at hold | entrance is familiar | with the breathi | nd sonar | atus lo ha | used in an em | ACCENCY (REC) | e teen loodelj | | |
| | situation | | | Achpai | USF | | ingeney leade | ~ | | |
| | The breathing app | aratus has been test | ed as follows: | | | t. | | | - | |
| _ | | and canacity of ai | | | | | | | | - 3 |
| • | | S GILL CONVENTION OF ALL | SUDDIV | | | | | | | |
| • | - low r | ressure audible ala | m | | | | | | | |

| LOMAR DEUTSCHLAND GmbH FORM CBO0 | Integrated Management System Manual 7 <u>18: CARGO HOLD ENTRY PERMIT</u> |
|--|--|
| fece mask-under positive pressure a The means of communication have been tested a The guard at hold entrance has been provided wild during an emergency rescue situation | and not leaking |
| Signed upon completion of Sections 1, Master Piele Vasile | 2 and 3 by: Date 02,09/[& Time_02100 |
| Responsible Officer for supervising entry Ch. Mate Person entering the cargo hold BN or authorized team leaderBN | Date 02, 02, 16 Time 07, 155 Date 02, 02, 16 Time 08, 100 |
| Terminal Representative | Date/ Time |
| AB 3 OS1 OS2 OS3 PIS SEE REN SECTION 5 - Completion of entrance into cargo hold • Cargo hold has been safely evacuated • Cargo hold secured against entry | anex.!. d (To be completed by the Responsible Officer supervising entry) Date Time Date Time |
| The Officers of the Watch (Bridge, ECR) have been Ren RRK: MR Signed upon completion of Sections 4 and 5 by: | n duly informed Date Time happen incident. |
| Responsible Officer supervising entry | Date 02 104 16 Time 08150 |
| Terminal Representative | Date/ Time |
| THIS PERMIT IS RENDERED INV THI | ALID SHOULD ANY OF THE CONDITIONS NOTED IN E CHECK LIST CHANGE |
| Notes: 1. The permit should contain a clear indication as to 2. If "YES" the cargo hold should be treated as an er | its maximum period of validity, which in any event should not exceed 8 hours. closed space and in addition an "Enclosed Space Entry Permit" should be issue |
| 20 1. 1. X. | |
| Invite No.00 Detry 05.00.0010 | |

| LOMAR DEUTSCHLAND GmbH | | Integrated Management System Manual 1 | 4 |
|------------------------|-----------------------------------|---------------------------------------|---|
| | FORM JHA 001: JOB HAZARD ANALYSIS | | |

VESSEL

SYDNEY TRADER

DATE 02.09.2016

NUMBER NA TITLE Chipping, wire brushing and painting crossway and tank top in the cargo hold #2

INITIATOR CAN BE: a) the Master or any other Officer or crewmember (through the Master) and b) the Head of any Company's Department or any member of the Department (through the Department Head). A copy of this form should be filled by the Initiator (Master/ Department Head) and the DPA.

| Secti | on 1 | |
|-------------|-------------------------------------|-----------------------------------|
| Do ar | ny of the following hazards apply (| tick) : Preventative Measures |
| \boxtimes | Electrocution | Isolation, correct PPE |
| \boxtimes | Slipping/Trips | Clean working area, safety shoes. |
| \boxtimes | Falling | Access ladder to cargo hold |
| | Exposure to hazardous materials | |
| \boxtimes | Mechanical Injury/Burns | PPE |
| \bowtie | Inadequate Ventilation | Used cargo hold ventilation |
| \boxtimes | Eye Injuries | Safety goggles |
| | Manual Handling | |
| \boxtimes | Operating Machinery | In good working condition |
| \boxtimes | Noise | Ear muffs |
| | Pressurized Media | |

| Section 2 | In addition to the | above, the following must be considered: |
|---------------|----------------------|--|
| P.P.E. Matr | rix | Must be compled with Ch. 7.9 |
| C.O.S.W.P. | . (M.C.A) Reference | Ch. 23 |
| Instruction (| or training needs | Yes |
| Communica | ations | VHF communication with OOW |
| Supervision | 1 | Yes, C/O |
| Contingenc | y (What happens if?) | |
| Other perso | onnel | Assisting Bosun, 3-AB & 3-OS |
| IMSM Refe | rence | |

| Section 3 | | | | | | |
|--|----------------------------------|-------------------------------|--|-------|-------|----------|
| Taking into account the controls alro hazards idenlified present a signific | eady in place ant risk? If ye | (i.e. permits s, please co | s, IMSM procedures, etc.) do any of th priment. | 10 | Yes 🗌 | No 🛛 |
| Comments: | | | | | | |
| Risk Assessment required: | Yes 🗌 | No 🖂 | If yes, please attach form RA | 001. | | |
| MASTER /DEPART. HEAD Name | | | | Signa | ture | |
| | | | | | | |
| Issue No.02 / Date: 05.02.2012 | | | Revision No.00 / Date: 05.02.2012 | 1.1 | | Page 1 d |

| | a second s | RISK | MAN | AGEMEN | T 34 | | | 100 | | | | Risk As | sessment | Conditio | US | |
|------|---|------------------------------|---------|---------------------------------------|------------------------------------|----------------------|----------------------------|-------------------|----------------------------|------------------------|-----------------------------|----------------------------|---------------|------------|------------------|---------|
| ber | ation / Work activity | being h | MAINT | ENACE CARG | O HOLD#2 | /CHIPPI | NG AND | 3 | | Work Aut | horization | Wor | k has been | authorize | p | ⊠ Y 🗆 |
| Sc | 3360. | ., p | Rour | tine XIN | on-routine | | | | | No Fatigu | e | Stat | f is adequa | tely reste | P | N N |
| 18 | arated by: Vessel 🕅 | SYDNEY TRADER | | | | | | | | Use of pr | oper PPE | Stat | ff is using p | roper PPI | | |
| q | : number (tobe assigne | d by the Office): | | | | | | | | Experien | ced staff | Sta | ff has task | experience | | N N |
| 1 18 | POPOLICION OFF | Necon. | | | LONGEDI | ENCE CAT | FGORY | and the second | | | | | RISK MA | TRIX | | A DOUGH |
| | FREQUENCI CALL | Monofon than | | - | CUINER | | | | Vaior | | | | | FREQUEN | CY | |
| | request - recently w | once per voyage | 4 | Human losses / fatalities | Major pollution Full scale resp | n / ponse | Excessive/ h damage >S1 | gh cost 100000 | national & retencional | | - | 1 11 | 2 | 3 | 4 M (4 | 2 |
| - | Probable - Possibility of | Once per year | | | Indonte of | ution (| Moderato co | otor | mpod | BONI | | 1 00 | MUN MIN | MIG | HIR | H |
| | isolated incidents | | e | Serious injury to personnel | Significant res commitment | sources | (100000 - | | Considera blo impact | SEQUI | 3 6 | L(3) | (9)W | (6)H | H(1) | H |
| - | Occasional-Possibility of | Once per 5 | | Number of minutes / | 1 inte pollution | | Little cost or | ſ | 1 | сои | 4 | M(4) | H(8) | H(12) | H(16 | H (0 |
| _ | | 1 | 2 | Medical treatment for personnel | Limited respo short duration | uss of | (\$10000 - \$ 100000) | | impad | High=In | blerable Risk | Medium= | Tolerable Ris | N=M=Ne | gligble Rsk | |
| | Remote. Not Ikely to poort | Once per 10 vears | | Fex minor | Minimum polit. | ution / | Minimum co. | 41 | Zero | | | | | | | |
| | Very unlitely. Practically impossible | Once per 30 years or more | - | injuries | needed | | < \$1000 | | pedui | | | | | | | |
| - 1 | | | | | | 2 | isk Asses | sment | | STOCK STOCK | | 100000 | 1.000 | | | |
| | | Ris | k Ident | ification | | | | | | | Risk Analy | sis | | H. | Initial evalu | ation |
| 0 | | Hazard | F | -North Control | | Poter | ntial s event | | | Existing co | ntrol measu | res | Total I | Ľ | 2 | |
| | Tools from store | | | | 0.2 | erious i ersonnel | njury to | Always and sat | s wear prop fety shoes | er PPE as | boiler suits, | , goggles, | gloves | 3 2 | S | |
| | Chipping | | | | 0 2 | erious i ersonnel | njury to | Always and set | s wear prop fety shoes. | er PPE as Dust mask | boiler suits, to be worn | , goggles, i if dust ap | gloves | 3 | Σ | |
| 8 | F: Frequency, C: Conse | quence, R: Risk | | | | | | | | | | | | | | Π |
| 1 | | | | | | | | | | | | | | | | Г |
| | | | | | | | | | | | • | | | | • | |

| All TERURTIVE WAYS TO CONDUCT THE WOTK. All TERURTIVE WAYS TO CONDUCT THE WORK. Conditional Risk Control Messures)? THE Framework to Explore the above Additional Risk Control Messures)? THE Framework to Explore the above Additional Risk Control Messures)? THE Framework to Explore the above Additional Risk Control Messures)? THE Framework to Explore the above Additional Risk Control Messures)? THE Framework to Explore the above Additional Risk Control Me | | LOMAR DEUTSCHLAND GmbH EQ | RM RA 001: RISK ANA | LYSIS – RISK ASSESSMENT | Integrated Management System | Manual 14 | | |
|---|--------------------|--|---------------------------|--|------------------------------|------------|---------|---------|
| Risk Treatment Risk Treatment Hazard Ion Action Risk Control Measures 1 Initing flages and feel. Flying netid or paints, immalision of dust 2 Initing flages and feel. Flying netid or paints, immalision of dust 2 Initing flages and feel. Flying netid or paints, immalision of dust 2 Initing flages and feel. Flying netid or paints, immalision of dust 2 Deary amentments to INS required (elated to be above Additional Risk Control Measures)? 2 Deary amentments to INS required (elated to be above Additional Risk Control Measures)? 2 Deary amentments to INS required (elated to be above Additional Risk Control Measures)? 2 Contingency plans (to failitate sele management and recovery of the sluation in case of any uplanet occurrences) 2 Contingency Plans 3 Deary in the work 4 Initing flager and feel. Flying meted 5 Initing flager and feel. Flying meted 4 Initing flager and | ALTERNAT | TIVE WAYS TO CONDUCT THE WORK | | | | | | |
| Ideated tool Ideational field. Control Measures Responsible Action Timeline F C R 1 1 1 1 1 2 1 20 Priver field of the Single and field finance if and field of a data field. Finance if and field of a data field data field of a data field data field of a data field of | | | Risk Treatment | | | | Residua | al risk |
| 1 Siles and treft: Froeseners, Fried Col Print/during fingers and feet. Fring metal or paints, inhalation of dust 1 1 1 1 1 Free Free mers, C. Correspondent, R. Rai, Rein F. Free mers, C. Correspondent, R. Rai, Monthalia Encoded During faither rise work 1 <td< td=""><td>Hazard No.</td><td>Additional Risk Control Measures</td><td>8</td><td>Responsible</td><td>Action Timeline</td><td>F</td><td>F C</td><td>R</td></td<> | Hazard No. | Additional Risk Control Measures | 8 | Responsible | Action Timeline | F | F C | R |
| 2 Hitting lingers and feet. Flying metal or paints. Imitation of dust C/O During/after the work 1 1 1 Non F Freuency. C. Consequence. R. Flait De any menofinments to INS required (related to the above Additional Risk Control Measures)? De any menofinments to INS required (related to the above Additional Risk Control Measures)? 1 1 1 1 1 Ves Describe: Control Measures)? 1 1 1 1 1 1 Net Exercitie: Control Measures)? 1 1 1 1 1 1 1 Net Exercitie: Control Measures)? 1 1 1 1 1 1 1 Net Contingency plans (to facilitate safe management and recovery of the stuation in case of any uplanned occurrences) 1 1 1 1 1 Risk Management Team Item Rank / Title Signature 0:0.09.2016 0:0.09.2016 Remarks: Management Team Item Item 0:0.09.2016 1 1 1 1 1 1 | | Slips and trips. Tools damaged | | C/0 | Prior/ during the work | - | 2 | - |
| More F Freuendy, C. Control Measures/? Do any amendmants to IKS required (related to the above Additional Risk Control Measures/? Vet Descrite: No Stay amendmants to IKS required (related to the above Additional Risk Control Measures)? Vet Descrite: Control Measures)? No Contingency Plans Contingency Plans Descrite: Risk Management Team Rank / Title Risk Management Team Bate Read Stank / Title Risk Assessment reviewed/approved by: On:09 2016 Renarks: Date Risk Assessment reviewed/approved by: Mass Renarks: Revision No.01/ Dee: 602.012 | 2 | Hitting fingers and feet. Flying metal or paints. Inhalation | of dust | C/O | During/after the work | - | - | _ |
| De any amendments to INS required (related to the above Additional Risk Control Messures)? De any amendments to INS required (related to the above Additional Risk Control Messures)? Vec Descrite: No No Contingency plans (to facilitate sele management and ecovery of the situation in case of any unplaned cocurrences) Energency case Contingency Plans Risk Management Team Rank / Title Name 01.09 2016 Remarks: 01.09 2016 Remarks: 01.09 2016 Remarks: 01.09 2016 Remarks: 01.09 2016 | Note F: Frequency, | , C: Consequerce, R: Risk | | | | | - | |
| No No No No Contingency plans (to facilitate safe management and recovery of the situation in case of any urplaned occurrences) Contingency plans Contingency plans Contingency plans Contingency plans Contingency plans Contingency plans Encogency case Contingency plans Encogency case Contingency plans Encogency case Contingency plans Nisk Management Team Name Remarks: Remarks: Remarks: Remarks: | Do any amendmer | nts to IMS required (related to the above Additional Risk | Control Measures)? | A DESCRIPTION OF A DESC | | | | |
| No. (N) No. (N) Contingency plans (to facilitate sefe management and recovery of the stuation in case of any unplanned occurrences) Contingency plans (to facilitate sefe management and recovery of the stuation in case of any unplanned occurrences) Energency case Contingency Plans Risk Management Team Rank / Title Neme Rank / Title Neme 0.1.09 2016 Risk Management Team 0.1.09 2016 Remarks: 0.1.09 2016 Risk Assessment reviewed/approved by: 0.1.09 2016 Remarks: MASTER Remarks: 0.1.09 2016 | Yes Describe | | | | | | | |
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| Energency case Contingency Plans Risk Management Team Rank / Title Signature Name C/O Date Name Rank / Title Signature Risk Asaessment reviewed/approved by: Rank / Title Signature Review Route (Rank Rank Rank Rank Rank Rank Rank Rank | Contingency pla | ins (to facilitate safe management and recovery of the si | tuation in case of any un | planned occurrences) | | | | |
| Risk Management Team Rank / Title Signature Date Name C/O 0.09 2016 Remarks: 0.09 2016 Remarks: 0.09 2016 Name 0.09 2016 Remarks: 0.09 2016 Name 0.09 2016 Remarks: 0.00 2016 Name 0.00 2016 | Emcrgency case | Contingency Plans | | | | | | |
| Name Rank / Title Signature Date 01.092016 Remarks: C/O 001.092016 01.092016 01.092016 Risk Assessment reviewed/approved by: Assessment reviewed/approved by: 01.092016 01.092016 Name MASTER Signature Date 01.092016 01.092016 Remarks: Mane MASTER Signature Date 01.092016 01.092016 Issue No.201 MASTER Signature Signature Date 01.092016 01.092016 | Risk Managemer | nt Team | | | | | | |
| C/O C/O 01.09.2016 Remarks: BOSUN 01.09 2016 Risk Assessment reviewed/approved by: Assessment reviewed/approved by: 01.09 2016 Name MASTER Date 01.09 2016 Remarks: Rank / Title Signature 01.09 2016 Remarks: MASTER Date 01.09 2016 Remarks: Assessment reviewed/approved by: Assessment reviewed/approved by: Assessment reviewed/approved by: | Name | | Rank / Title | Signature | | | | |
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| Name Rank / Title Signature Date Name MASTER 01.09.2016 Remarks: Issue No.027 / Date: 15.02.2012 Page 2 of 2 | Rick Assassmen | t raviousd/sourced bur | | * | | | | |
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| | | Issue No/02 / Date: 05.02 2012 | Revis | sion No.00 / Date: 05 02 2012 | 4 | oge 2 of 2 | | |

| | | RISH | K MAP | VAGEMEN | T 35 | | | | | | Risk Assess | ment Co | ndition | | |
|-------|---|------------------------------------|---------|---|---|-----------------------------|------------------|------------------------|----------------------------------|---------------|------------------------------|----------|-------------------|----------------------------|-------|
| Dp SS | eration / Work activity essed: | / being | SCRAP | TENACE CAR | SO HOLD#2/ | CHIPPING AND | | | Work Autho | Drization | Work has | been at | thorized | X | |
| | | | Rou | itine 🛛 🗚 | Ion-routine | | | _ | No Fatigue | | Staff is ac | lequatel | rested | | |
| 0 | nerated by: Vessel [X | SYDNEY TRADE | æ | | | | | | Use of prop | ter PPE | Staff is us | ing prop | er PPE | NX | |
| õ | le number (15 be assigne | d by the Offce): | | | | | | | Experience | d staff | Staff has | task exp | erience | | |
| 0.98 | FREQUENCY CATE | GORY | | | CONSEQUE | NCE CATEGORY | | | | ALC: NOT | 22 | SK MATR | × | | |
| | Frequent - Possibility of repeated incidents | More often than once per voyage | 4 | Human losses | Major pollution/ | Excessive/ | high cost | Major national & | | | 2 | FR. | 3 3 | 4 | S |
| - | | | | / Idianacs | Full scale respon | tse damige > | 00000015 | impod | Э | 1 L(| 1) T (1 | 6 | L (3) | M (4) | M (5) |
| | Probable - Possibility of isolated incidents | Once per year | m | Serious injury to personnel | Moderate pollutik Significant resou | on/ Moderato roes damage | cost or | Considera Me incord | QUENC | 2 L(| 2) M(4 | - | M(6) | H(8) | H(10) |
| - | Omniand David Taria | | | | commitment | 1000005) | | yand and | ISN | 3 10 | () M(6 | (| H(9) | H(12) | H(15) |
| | accurring sometime | years | 2 | Number of minor injuries / Medical treatment for | Little pollution / Limited response short duation | tof (\$10000-1 | 8 10 | Sight impact | High=Intole | 4 M(| t) H(3 edium=Tolerabl | e Risk | H(12) ow=hegli | H(16) pole Risk | H(20) |
| 1 | Remote-Notlikely b occur | Orce per 10 where | | Few minor | Minimum polluto | A/ Minimum o | ost / | Zein | | | | | | | |
| | Very unlikely- Practically impossible | Once per 30 years or more | - | injuries | nondod | rise damage < \$10000 | | impact | | | | | | | |
| - 1 | | | | | | | | | | | | | | | |
| 1 | | Die | L Idant | Gantion | | Risk Asse | ssment | | 2 | | | - Miles | | | |
| | | 2 | I Inent | lication | | | | | Ris | k Analysis | | | | Initial risk evaluation | |
| 0 | No. No. No. | Hazard | T | | 2 | Potential zardous event | | - | Existing contro | d measures | | | U | æ | |
| | Tools from store | | | | Seric | ous injury to onnel | Always and sa | s wear prop | er PPE as boil | er suits, goo | gles, gloves | e | 2 | W | |
| | Chipping | | | | Seric | ous injury to onnel | Always and sa | s wear prop | er PPE as boil Dust mask to | er suits, goo | ggles, gloves ust appears | - 3 | 2 | W | |
| 10 | F: Frequency, C: Conseq | uence, R: Risk | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |] [| |
| | _ | Circle I | 1 CO MA | | | | | | ALCONDUCTION DURING ALCONDUCTION | | | | | | |

| ГОР | 1AR DEUTSCHLAND GmbH E | ORM RA 001: RISK A | NALYSIS – RISK ASSESSMENT | Integrated Management System M | 4anual 14 |
|-----------------------------|--|-------------------------|----------------------------------|--------------------------------|-----------------------------|
| ALTERNATIVE W | AYS TO CONDUCT THE WORK | | | | |
| | | Risk Treatm | ent | | Residual risk evaluation |
| Hazard No. | Additional Risk Control Measur | res | Responsible | Action Timeline | FCR |
| 1 Slips a | ind trips. Tools damaged | | C/0 | Prior/ during the work | 1 2 L |
| 2 Hitting | fingers and feet. Flying metal or paints. Inhalation | on of dust | C/O | During/after the work | - |
| Note F. Frequency, C: Col | nsequerce, R. Risk | | | | - |
| De sur sus danadas te | In State of the st | et Control Magenrae | | | |
| Yes Describe: | | | | | |
| No | | | | - | |
| Contingency plans (to | o facilitate safe management and recovery of the | situation in case of ar | iy unplanned occurrences) | | |
| Emergency case | Contingency Plans | | | | |
| Risk Management Tea | W | | | | |
| Name | | Rank / Title | Signature | ate | |
| | | c/o | | 02.09.2016 | |
| | | BOSUN | | 02.09.2016 | |
| Remarks: | | | | | |
| Risk Assessment revi | iewed/approved by: | | | | |
| Name | | Rank / Title | Signature | ate | |
| | | MASTER | | 02.09.2016 | |
| Remarks: | | | | | |
| | | | | | |
| L | lesito No.027 Date: 05.022013 | _ | Revision No 007 Date: 05.02 2012 | ⁶ d | abe 2 of 2 |
| | 19905 14005 1 0010: 00:05:50 15 | | | | 1 |