# FINAL REPORT ON VERY SERIOUS MARINE CASUALTY

| | | |
|---|---|---|
| **NAME & IMO No** | **:** | ESRA C |
| **FLAG** | **:** | Panama |
| **LOCATION OF ACCIDENT** | **:** | Diliskelesi / KOCAELİ |
| **DATE OF ACCIDENT** | **:** | 9/8/2021 / 14:12 LT |
| **FATALITY/INJURY** | **:** | 1/- |
| **DAMAGE&POLLUTION** | **:** | - /- |

*Board Decision No: 09 / D-03 / 2022* *Date: 16 / 05 / 2022*

The sole objective of this investigation is to make recommendations for the prevention of similar accidents and incidents within the framework of the Transport Safety Investigation Center regulation. This report neither has the value of judiciary and administrative investigation nor bears the purpose to apportion blame or liability.

## LEGAL BASIS

This marine casualty has been examined by the provisions of the “DIRECTIVE OF INVESTIGATION OF MARINE CASUALTIES AND INCIDENTS” published and enacted in the Official Gazette dated 11/27/2019 and numbered 30961.

International Standards for Safety Investigations into Marine Accidents or Incidents (MSC 255(84) and Resolution A.1075 (28) and International Maritime Organization Decisions on Recommended Practices (Accident Investigation Code) and Directive 2009/18/EC of the European Union have also been taken into account for the procedures and principles of the investigation.

# TABLE OF CONTENTS

# LIST OF FIGURES

# ABBREVIATIONS

**GMT** : Greenwich Mean Time

**WBT** : Water Ballast Tank

**TST** : Top Side Tank

**OHS** : Occupational Health and Safety

**kW** : Kilowatt

**MT** : Metric Tons

**GMDSS** : Global Maritime Distress Safety System

**STCW** : Standards of Training Certification and Watchkeeping

**UTC** : Universal Time Coordinated

# SUMMARY


**Image 1:** Accident Location

*Note: All times used in the report are local time (GMT +3)*

On 3rd of September 2021, the vessel ESRA C berthed at Izmit Beldeport, the first port where carbon anode, steel coil, steel plate and plywood commodities loaded from Chinese ports would be unloaded. While the carbon anode cargo unloading operation was in progress, a row of cargo at hold number 4 fell over at about 2:10 PM on the 8th of September 2021, and the stevedore who was unlashing the sling of steel plate at that time, perished under the fallen load.

Following the accident investigation, it was concluded that the factors that contributed to the accident were leaving the stowage level of the load units over the tolerable level during the unloading procedure and failing to account for the balancing considerations produced by the non-standard sizes of load units, and the way the job was done, with no effective monitoring and decision-making mechanisms, had an impact on the process that led to the occurrence of the accident.

Recommendations were directed to the Ship's Operator and the Terminal Representative based on the results of the accident investigation.

# SECTION 1 - FACTUAL INFORMATION

## 1.1 Information on the Vessel

### 1.1.1 Basic Information on the Vessel

**ESRA C**

| | |
|---|---|
| Flag | Panama |
| Class Society | RINA (Registro Italiano Navale) |
| IMO Number | 9379662 |
| Type | Bulk/Dry Cargo Carrier |
| Place and Year of Building | Hakodake (Japan) / 2008 |
| Gross Tonnage | 19825 |
| Length Over All | 175,53 |
| Main Engine Power | Mitsubishi – 6840 kW |


**Image 2:** The vessel, ESRA C

### 1.1.2 Information on Vessel Navigation

**ESRA C**

| | |
|---|---|
| Port of Departure | Shanghai / China |
| Port of Arrival | Poti / Georgia |
| Passengers | - |
| Number of Crew | 23 |
| Minimum Safe Manning | 14 |
| Type of Navigation | International Unlimited |
| Cargo Condition | Carbon Anode / Steel Coil / Plywood / Steel Plate |

### 1.1.3 General Arrangement of the Vessel

ESRA C is a bulk/dry cargo carrier built in 2008 at Hakodake Dock/Japan. The vessel was designed with five holds and capable of carrying 31890 MT in the summer. The holds of the vessel were equipped with four cranes, each of which had a lifting capacity of 30 tons.

A Mitsubishi 6840 kW main engine and three 400 kW generators are installed in the vessel's engine room. The vessel has forepeak, aft peak, and five TST and WBT ballast tanks on port and starboard side. It has a total ballast capacity of 13224 $m^3$. ***Image 3*** depicts the general arrangement plan of the vessel.

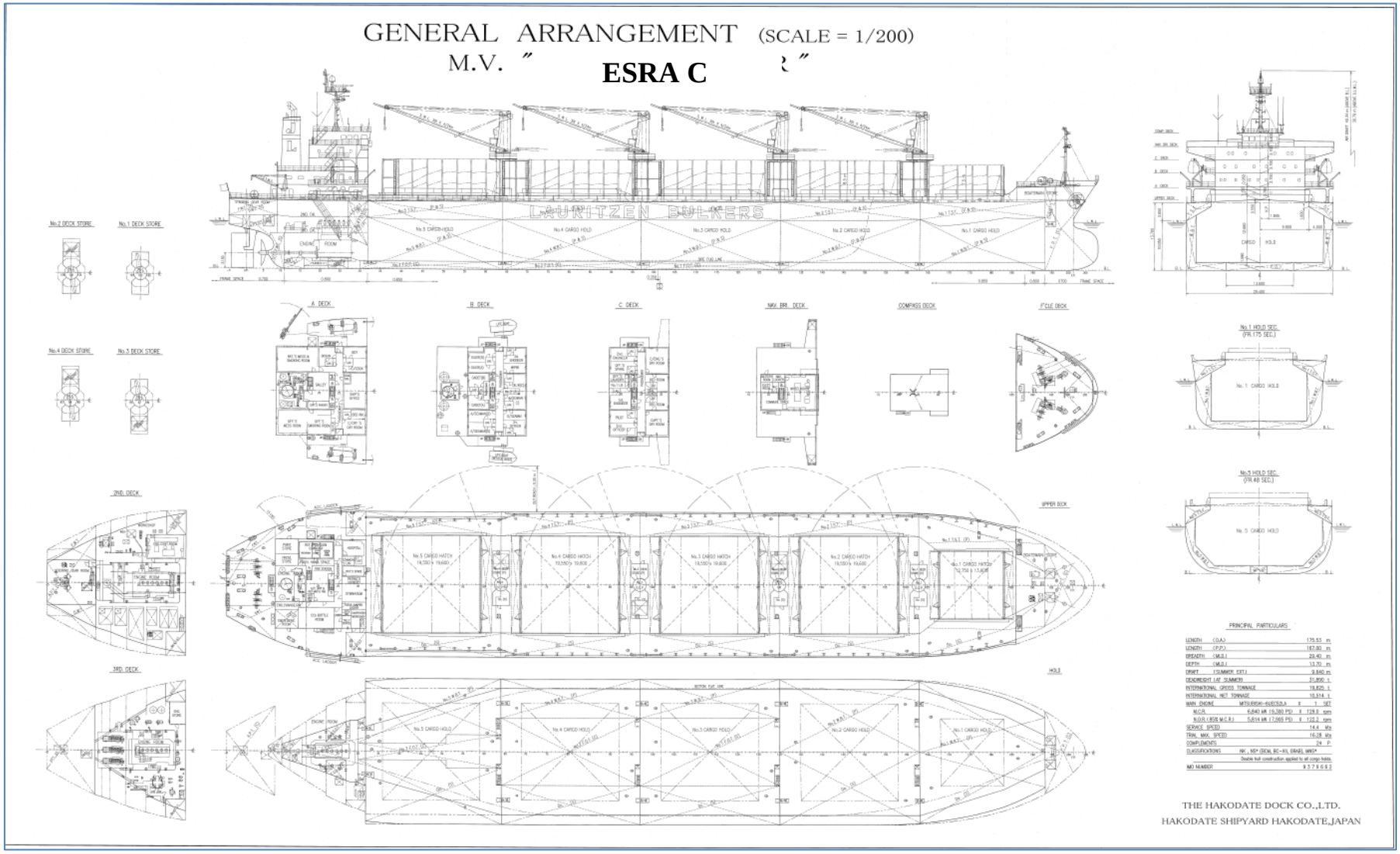


**Image 3**: General Arrangement Plan of ESRA C

## 1.2 Information on Manning and Key Crew

A Minimum Safe Manning Certificate dated 21 November 2018 was issued to the vessel, ESRA C by the Panama Maritime Authority according to the "International Unlimited" navigational territory. There were 23 crew members on board, including the Master.

Six of the crew members of the vessel were Georgian, while the other 17 were Turkish, and the working language was Turkish. Georgian crew members had no difficulties while communicating in Turkish.

There were one forklift operator and two stevedores in the hold where the unloading operations were carried out during the accident. A crane operator controlled the vessel crane no. 3 and undertook the loading operations.

### 1.2.1 Master

The Master is a Turkish citizen. He was 40 years old at the time of the accident. He is qualified as an Oceangoing Master. He has 17 years of experience serving aboard vessels. In 2020, he began working for that company. For the last five months, he has served as Master on the vessel ESRA C. It was also observed that he possessed the GMDSS General Radio Operator (GOC) certificate, as well as the certifications required by the STCW convention. When the accident occurred, he was in his cabin.

### 1.2.2 Chief Officer

The Chief Officer is a Turkish citizen. He was 38 years old at the time of the accident. He is qualified as an Oceangoing Master. He has 15 years of experience serving aboard vessels. In 2017, he began working for that company. He has been working as a Chief Officer on board vessels since 2014. He has been serving as the Chief Officer on the vessel ESRA C for a total of 3.5 months at intervals. It was also observed that he possessed the GMDSS General Radio Operator (GOC) certificate, as well as the certifications required by the STCW convention. When the accident occurred, he was reading the draft from the shore.

### 1.2.3 Foreman

The Foreman is a Turkish citizen. He was 32 years old at the time of the accident. He has 14 years of experience serving as a Stevedore and Crane Operator in port operations. He has been working

for that company for three months. He was trained and certified for crane operation, and as a Signalman/Slinger. His working hours was from 8 a.m. to 4 p.m. When the accident occurred, he was supervising another crew on another vessel.

### 1.2.4 Forklift Operator

The Forklift Operator is a Turkish citizen. He was 50 years old at the time of the accident. He has been working as a Forklift Operator for nearly 20 years. He was trained and certified for forklift operation. His working hours was from 8 a.m. to 7 p.m. When the accident occurred, he was standing near the Forklift in the hold number 4.

### 1.2.5 Crane Operator

The Crane Operator is a Turkish citizen. He was 48 years old at the time of the accident. He has been a crane operator for 25 years. He possessed a construction equipment certificate. He operates cranes in loading/unloading operations in ports on behalf of a subcontractor. He has been working in the same company as a crane operator for about a year. His working hours was from 8 a.m. to 4 p.m. When the accident occurred, he was operating vessel crane number 3.

### 1.2.6 Stevedore, the Casualty

The stevedore is a Turkish citizen. He was 55 years old at the time of the accident. According to the information obtained, he has been working as a stevedore in ports for many years. It was found that he was delivered on-the-job training by the company for which he worked. His working hours was from 8:00 a.m. to 4:00 p.m., it was found that he had worked overtime based on the workload. When the accident occurred, he was in the hold number 4.

### 1.2.7 The Other Stevedore

The other stevedore is a Turkish citizen. He was 53 years old at the time of the accident. He has been working as a stevedore in ports on behalf of a subcontractor for 11 months. His working hours was from 8:00 a.m. to 4:00 p.m., it was stated that he had worked overtime based on the workload. It was stated that he was delivered on-the-job training by the company for which he worked. When the accident occurred, he was in the hold number 4.

## 1.3 Information on Accident

| | |
|---|---|
| Date/Time of Accident | 8th of September 2021 / 2:12 PM (UTC +3) |
| Accident Type (IMO) | Very Serious Marine Casualty |
| Type of Accident | Occupational Accident (Falling a Cargo Over) |
| Location of Accident | Diliskelesi / Kocaeli |
| Injured/Dead/Missing | -/1/- |
| Damage | - |
| Pollution | - |

## 1.4 Information on Environment Conditions

The following are the weather and sea conditions data extracted from the ESRA C Deck Logbook on the day of the accident:

Wind: East, 4 based on Beaufort scale; Sea: 2 based on Beaufort scale; Sky: Partly cloudy; Visibility: Good

## 1.5 Cargo (Block Carbon Anode)

The ship was loaded with four distinct types of cargo from various Chinese ports. As shown in ***Image 4***, the block carbon anode, which fell over during the accident, was loaded aboard the vessel in two sizes, weighing roughly 1 and 1,5 tons each.

As shown in ***Image 5***, the block carbon anode is a non-metallic solid composed of petroleum coke and pitch coke. It is made ready to be loaded with a ratchet strap and self-chocked for convenient handling.

**Image 4:** A View from the loading operation

**Image 5:** Block Carbon Anode

# SECTION 2 – NARRATIVE

***Note: The sequence and time of the incident that leads to the marine accident under investigation and the location of people mostly depend on the eyewitness statements and interviews.***

## 2.1 Chronology of the Accident and Developing Events

| **Date and Time (Month/Day/Year)** | **Events** |
|---|---|
| 9/3/2021 | The vessel, ESRA C berthed safely at Izmit Beldeport port. |
| 9/3/2021 | The required procedures for customs clearance and unloading operations were completed. |
| 9/3/2021 / 2:30 – 7:00 p.m. | The procedure for the Chief Officer changeover on board was completed. |
| 9/3/2021 / 3:00 PM | The unloading operations have begun. |
| 9/8/2021 / 2:00 PM | The unloading operations proceeded at the holds number 2 and 4 by employing the vessel cranes number 1 and 3. |
| 9/8/2021 / 2:06 PM | The unloading operations were suspended at hold number 4. |
| 9/8/2021 / 2:10 PM | The crane number 3 changed the placement of the first steel plate on which the Forklift moves on the hold number 4. |
| 9/8/2021 / 2:12 PM | Three rows of cargo on the block that was close to port wing fell over as the forklift was relocating the second steel plate on which the forklift was moving, and a stevedore was caught under the cargo. |
| 9/8/2021 / 2:13 PM | The Chief Officer noticed the accident and notified the Master. |
| 9/8/2021 / 2:13 PM | The unloading operation suspended. |
| 9/8/2021 / 2:14 PM | The Master reported the accident to the Emergency Aid Center and sought assistance, and instructed the crew to undertake first-aid preparations. |
| 9/8/2021 / 2:17 PM | The Port responsible persons boarded the vessel. |
| 9/8/2021 / 2:25 PM | The fire brigade arrived at the vessel. |
| 9/8/2021 / 2:35 PM | The medical staff arrived at the vessel with an ambulance. |

| | |
|---|---|
| 9/8/2021 / 2:42 PM | A carrier basket was used to get two Health Care Staff and a Stevedore down the hold number 4. |
| 9/8/2021 / 2:49 PM | A carrying basket was used to transport two Health Care Staff and a Stevedore who got down the hold, as well as a Stevedore who was already in the hold at the time of the accident, to the main deck. |
| 9/8/2021 / 2:49 PM | The Health Care Staff pronounced the casualty dead. |
| 9/8/2021 / 3:02 PM | The Police team arrived at the vessel. |
| 9/8/2021 / 4:30 PM | The Crime Scene Investigation Team concluded their investigation. |
| 9/8/2021 / 4:37 PM | The Stevedore who had been escorted down the hold used forklifts to lift cargo that had fallen on the casualty. |
| 9/8/2021 / 4:46 PM | A carrying basket was used to transport the casualty and stevedore to the shore. |


**Image 6:** A View Following the Accident

# SECTION 3 – ANALYSIS

***While analysing the marine casualty under investigation, it is aimed to identify and determine the factors that caused the accident by considering the sequence of events and data obtained during the investigation as well as to draw useful conclusions that lead to the safety recommendations on root causes.***

## 3.1 Cargo Operations of the Vessel

### 3.1.1 Loading Operations of Block Carbon Anode

During the accident investigation, the methods and procedures followed to load various types and sizes of cargo aboard the vessel were examined. Both the statements and the records, such as the loading plan, indicate that various types and sizes of cargo were loaded aboard the vessel from several Chinese ports and that those cargoes would be unloaded at different ports.

It is quite important to properly prepare each hold and distribute the weight for that kind of loading. On this occasion, a "Supercargo"[1] was deployed to the vessel for loading operations, and the loading and securing of the cargoes proceeded in accordance with his/her directives.

***Images 7*** and ***8*** illustrate how the block carbon anode cargo, the subject of the accident, was loaded into hold number 4 alongside with other cargo, as well as securing of the cargo.

It was previously stated that the block carbon anode cargo was loaded in various sizes, together with the self-wrapped and polyester ratchet strap protection, and each unit weighed around 1-1.5 tons.

As shown in ***Image 7***, the block carbon anodes were stowed such that they laid on the bulkhead between holds 4 and 3. The back of the block carbon anode cargo was then loaded with steel coils, and plywood was stacked on top of it, as shown in ***Image 8***. The block carbon anode cargo, which came out after the second row, was shown to be secured inside the vessel with proper lashing equipment in order to prevent longitudinal cargo movement throughout the navigation of the vessel due to the height difference that resulted after the cargo was loaded.

[1]The person who is designated to manage loading, unloading, and cargo-related operations aboard ships, having the qualifications of a Master or Chief Officer.

The block carbon anode cargo, on the other hand, seems to be a standard type of cargo, but it is clear from ***Image 5*** that it was not manufactured in a geometrically smooth-edged shape.

Equipping such non-standard size and possibly to be damaged cargoes with the proper equipment and making them ready for loading is another fact.

It was found that each unit of the block carbon anode cargo was prepared for loading with ratchet strapped polyester protection on top and a brace-lath underneath. The contact surface of the loads is reduced by the brace-lath, yet the damage is avoided. Although it may seem dangerous to put the other block on the top of the non-standard cargo, it can be noted that a successful loading is accomplished when it is loaded in blocks and after a proper lashing precaution.

However, taking into consideration the hold design of the vessel, it is a fact that there will be gaps between the cargo blocks during the loading of this kind of cargo. Therefore, it is possible to fill the gaps between the cargo blocks with a process called "chocking"[2] by using "dunnage"[3] and loading the cargo blocks on a smooth surface. Nonetheless, similar procedures were followed throughout the loading of a vessel, as can be seen in ***Images 7*** and ***8***.

[2]The process for properly feeding the gaps between cargoes using the dunnage.
[3] Tools for security, separation, and ventilation, such as permanent or temporary wood, canvas, and paper inserted between them, used to protect the cargo from being damaged and to store it well.

**Image 7:** A View from Hold Number 4 While Loading and Lashing Block Carbon Anode

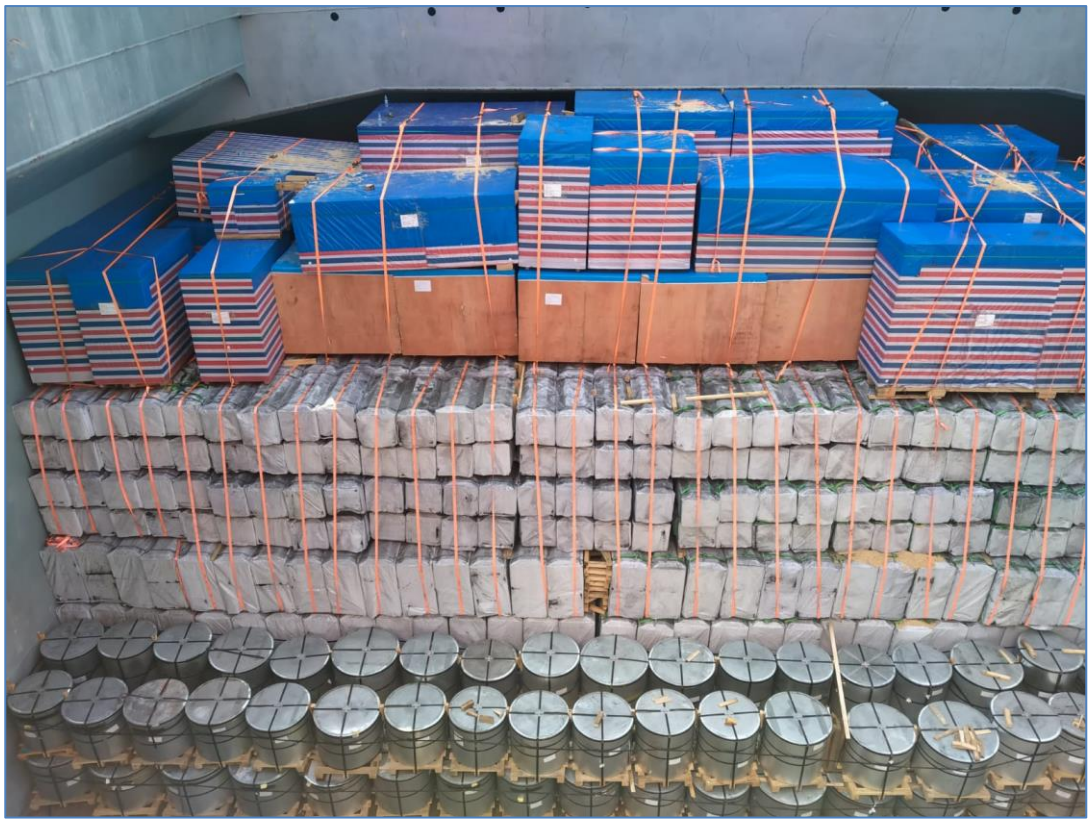

**Image 8:** A View from Hold Number 4 After Loading

### 3.1.2 Unloading Operations of Block Carbon Anode

According to the working schedule before the accident, two Stevedores, a Forklift Operator and a Crane Operator were assigned for each shift to carry out unloading operations at the hold number 4. A Foreman was also assigned to each shift to command all unloading operations on board. Besides, the port allocates a shift supervisor to monitor the loading and unloading operations of vessels that are moored at the port.

The vessel crew cut and opened the longitudinal lashings fastened at the loading port before beginning the unloading operations. Besides, it was noticed that certain cargo units were secured together with ratchet straps[4] and loaded in this manner in order to ease their transportability at the loading port.

It was learned that these straps were cut by the stevedores while the unloading operation was in progress. Similarly, some units in the cargo block that fell over were also observed to be strapped in ***Images 10*** and ***11***.

During the interviews, it was learned that the way of unloading before the accident was as follows;

Steel plates that were used to make forklift manoeuvre easier were placed beneath or near the cargo block so that it may be unloaded by crane. The forklift moved on those steel plates and left the cargo units taken from the cargo block onto the steel plates close to the middle section of the hold. The Stevedores slung the cargo units with a chain sling and signalled the Crane operator to unload the cargo units. ***(Image 9)***

The images from the accident scene indicate that the steel plates were displaced after five rows of cargo had been unloaded. Considering that the accident took place during the unlashing of the slings after the second steel plate was placed, the question raises of what factors could have contributed to the cargo blocks falling over.

To list these factors;

- Relatively high level of cargo blocks
- Irregular stacking of the block due to lack of smooth edges of the cargo units

[4]These are specific straps that are attached to the surface on which a cargo will be transported and utilized to secure the cargo.

- Oscillation due to ongoing unloading operations
- The contact of the cargo block with the steel plate in such a way as to destabilize the cargo block during getting the steel plate close to the cargo block.

The accident was found to have taken place as a consequence of combining some or all of the preceding factors at that time. When each of the above factors is examined separately, a five-units-high cargo block that was close to the wings without being secured inside the vessel at that time, irregular stacking of four-floor units atop the first-floor unit of different size, as seen in ***Image 11***, and finally the possible contact of the steel plate that was getting closer to the cargo block with the block have considered having caused the cargo units losing their weight balance and falling over. The casualty, who was close to the cargo block and was detaching the sheet metal from the sling at that time, was unable to escape despite the warnings and perished by being trapped beneath the fallen block. Besides, no evidence of the vessel oscillation was identified in the video footage retrieved from the vessel.

According to these evaluations, the factors that contributed to the accident are considered to be the cargo units being stacked over the permissible level during the unloading operation, as well as the inability to account for non-standard cargo unit sizes that pose balancing risks.

**Image 9:** A View from the Ongoing Unloading Operation After the Accident


**Image 10:** Horizontal View of Fallen Cargo Block


**Image 11:** Vertical View of Fallen Cargo Block

### 3.1.3 Occupational Safety Meeting and Risk Management

The Master is responsible for fulfilling all the responsibilities of the vessel before and during the loading and unloading operations at the port. Similarly, the Terminal or the Shipper Representative should be aware of their respective obligations. The necessary safety standards for the operation must be fully acceptable to both parties to fulfil these requirements.

Terminal/Shipper Representative and Master or an authorized officer must hold a “Safety Meeting” to identify the risks and take precautions prior to and during the operations to maintain a safe environment and the outcomes must be periodically followed-up throughout the operations by developing a safety checklist. If basic safety requirements are found to be failed during the observations, both sides may suspend the load operations until the problem is fixed.

Based on the interviews with the parties and the data gathered, it was found that an occupational safety meeting was conducted before the planned operations, as indicated above. The vessel operator issued a “Vessel/Shore Safety Check List” under the Vessel Safety Management System, and risks were assessed and documented. The OHS Checklist that was produced by the company that assumed the unloading operation was also reviewed.

The statement reflects that the customary risk assessment that was undertaken by the vessel operator was limited to informing the vessel crew exclusively, but not shared with the port representatives. The documentation by the company who assumed the unloading operation reflects that the staff who would work in the unloading operations were reminded of the occupational safety regularly but limited to remarks on notifying staff about potential risks associated with the operation to be undertaken.

Consequently, while assuming that the occupational safety meeting was conducted between the Chief Officer who had left the vessel and the relevant Port Representative, the fact that the Chief Officer’s changeover was on the same day and that stevedores were unaware of the agenda of the meeting presents the issue of why the meeting was convened. Moreover, this accident has once again revealed that failing to inform the stevedores of the hazards associated with the cargo contents, apart from the customary warnings, has become a routine.

The way in which the accident occurred, on the other hand, has proved that documentation by itself does not develop awareness and that periodic warnings at short intervals are required to keep personnel vigilant to hazards. Against this background, given workers' proclivity to put their personal safety on the back burner due to their heavy work schedules, the way the work was undertaken and its progress without an appropriate monitoring and decision-making system was considered as factors that contributed to the occurrence of the accident.

## 3.2 Similar Accidents

### 3.2.1 ALİ OSMAN E

On January 10, 2018, while the loading of profile pipes on the dry cargo vessel ALİ OSMAN-E at the port in Derince district of Kocaeli province, the profile pipes stacked on the port side rolled over and a stevedore who was unlashing the slings at that time trapped under the profile pipes and perished. ***(Image 12)***

**Image 12:** A View Following the Accident on ALİ OSMAN E

As a result of the accident investigation, the process that lead to the rollover of the cargo units and the assessment of the risks are considered to be similar to the ESRA C accident. When the two accidents are compared, it was evaluated that the profile pipes that were loaded at a given stacking

level on the vessel, ALİ OSMAN E were fastened one another, but the cargo units were rolled over since the swing angle of the vessel due to the forklift manoeuvres were above the tolerable angle of the cargo stacking level. On the other hand, the circumstances that led to the accident were discovered to be the result of a lack of an effective risk assessment between the parties prior to loading. In this regard, despite the fact that the ESRA C accident involved unloading operations, it is deemed significant since the circumstances that caused the accident is similar.

### 3.2.2 CANSEL

On November 26, 2019, while the M/V CANSEL was loaded concrete blocks for use as bulk material in the area of the natural gas transmission line between Turkey and Greece at Karabiga Municipality Dock, Çanakkale, the cargo block on which the Chief Engineer, who was inside the hold to assist the loading operations, was standing slid and collapsed, and the Chief Engineer fell from a height and died. ***(Image 13)***

As a result of the accident investigation, it was evaluated that no occupational safety meeting between the parties was conducted before loading, where the risks would be assessed and the loading plan would be shared, and that the transhipment operation of the vessel RV DERINSU, which was alongside the vessel CANSEL while the loading operations were in progress, caused the cargo blocks aboard the vessel to oscillate, and the cargo blocks that had previously been stacked without being secured to each other or the vessel slid. Against the backdrop, it is considered to be similar to the ESRA C accident with reference to the significance of risk assessment and the comprehension of the factors that affect the stability of the cargo blocks.

**Image 13:** A View Following the Accident On CANSEL

## SECTION 4 – CONCLUSIONS

**4.1** The accident resulted from the cargo units being stacked over the permissible level during the unloading operation, as well as the inability to account for non-standard cargo unit sizes that pose balancing risks.

**4.2** The way unloading work was undertaken and its progress without an appropriate monitoring and decision-making system was one of the factors that contributed to the occurrence of the accident.

**4.3** An “Occupational Safety Meeting” between the Vessel representative and the Terminal representative was conducted and documented prior to the unloading operation.

**4.4** Considering the sequence of events that led up to the accident, the risks that may result from the unloading cargo have drawn inadequate consideration under the “Vessel/Shore Safety Check List” and the “OHS Control Form” issued by the Terminal Representative.

## SECTION 5 – RECOMMENDATIONS

***The following recommendations are directed by considering the analysis and conclusions obtained from the accident investigation.***

**The Ship Operator is recommended**

**12/03-22** To take effective measures in order to assess the risks together with the Contractor Representative, including trainings, before planning the loading/unloading operations, by considering the safety of the crewmembers, the stevedores, the environment, and cargo, as well as the risks particular to the operation to be undertaken,

**The Terminal Representative is recommended**

**13/03-22** To develop a procedure for enforcing risk-reduction/prevention measures, particularly the cargo height tolerance while identifying the risks associated with the operations to be undertaken with the Vessel Representative before beginning the loading/unloading operations,

**14/03-22** To train Stevedores and Foremen in order to improve monitoring the loading/unloading operations by company employees and raise awareness of hazard identification and assessment.