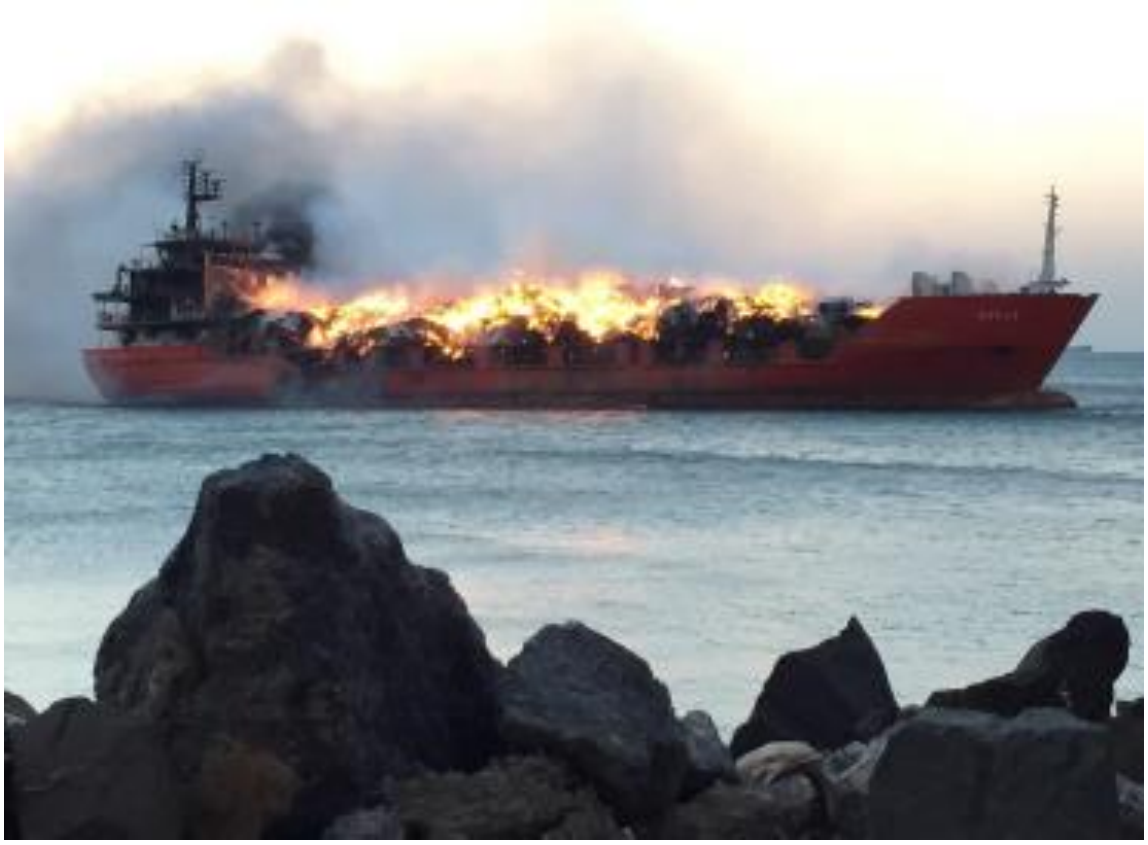
REPUBLIC OF TURKEY

MINISTRY OF TRANSPORT, MARITIME AFFAIRS AND COMMUNICATIONS

Accident Investigation Board

Accident Investigation Report On

The Fire Onboard RETAJ



Denbirport Port / Iskenderun / Turkey

14th of January 2015

Report Number: 08/2015

PURPOSE

This marine accident was investigated in accordance with the Bylaw on the Investigation of Marine Accidents and Incidents which came into force after being published at the Official Gazette No.29056 on 10th July 2014. Investigation procedures and principles are further applied by considering Resolutions of International Maritime Organization concerning International Standards and Recommended Applications for Safety Investigations Directed to MSC 255(84) (Accident Investigation Code) and Resolution A.1075(28) Sea Accidents or Incidents, and European Union Directive 2009/18/EC.

Purpose of the Marine Accident Investigation is to provide the improvement of the legislation and applications directed to the safety of life, goods and environment by achieving the real reasons which cause the occurrence of marine accidents, and thereby, to avoid a repeat in occurrence and to provide the mitigation of negative impacts and consequences following the accident.

Marine accident investigation shall be inadmissible in any judicial and administrative proceedings whose purpose or one of whose purposes is to attribute or apportion liability or blame,

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SUMMARY

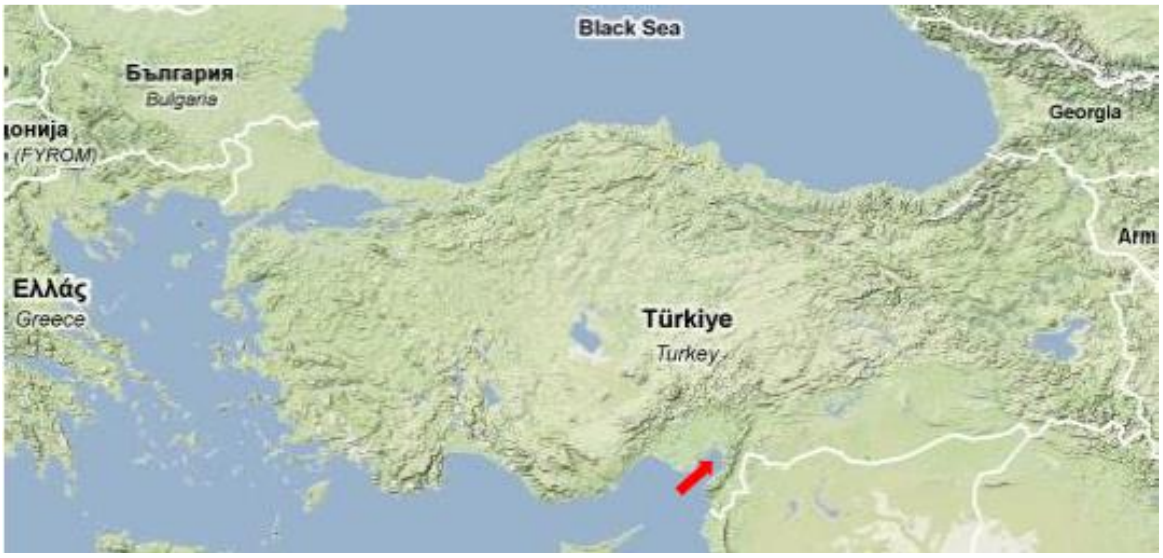

Figure 1. Location of the accident

A fire broke out on 14th of January 2015 in the morning on the Togo flagged general cargo vessel RETAJ to which hay in the form of bales were being loaded at Denbirport Port Facility located at Bay of Iskenderun. The fire started between the bales of hay loaded on the deck and spread out on a large area over the deck in a very short time.

The fire was responded to by the port officials, the surrounding municipalities, the firefighters from the Forest management and the tugboat organization. Since the cargo on the deck prevented access to the fire lines, the vessel could not respond to the fire. As a result of the fire, the vessel became completely unusable, and fortunately, no injuries occurred.

Although there is no definite information about the cause of the fire, the possibility of that the fire was caused by smoking is emphasized since the presence of smokers during this and previous loadings was detected.

In the accident investigation, it was detected that the loading on the deck was carried out in a way to prevent the access to the fire lines of the vessel and the loading of bales on the deck in a way to lean on the front of the superstructure of the vessel made it easier for the fire to spread to the superstructure. At the same time, it was observed that there was no regulation for transporting hay load by vessels, especially transporting conditions on the deck, and the lack of FiFi notation of tugboats that intervened to the fire reduced the effectiveness of the response.

Recommendations have been made regarding the following;

1. Establishing an inspection and control mechanism for carrying out the loading at the ports properly,
2. Establishing a regulation for transporting hay load by vessels, especially transporting conditions on the deck,
3. Conducting real-like drills to see whether the facilities and capabilities stated in the written documents regarding fire and similar emergencies at the ports are functional and applicable.

1. FACTUAL INFORMATION

1.1 Information about the Vessel M/V RETAJ and the Accident

Information on the Vessel	
Owner	: Retaj Maritime Ltd.
Manager	: G.M.Z. Shipmanagement CO. S.A.
Flag and port of registry	: Togo, Lome
Type	: General cargo
Place and Year of Build	: 1978, J.J. Sietas Schiffswerft GMBH&CO Germany
IMO number	: 7711919
Classification Society	: Dromon Bureau of Shipping
Length Overall and Breadth (Beam)	: 82,14 / 15,45 m.
Gross Tonnage / Net Tonnage	: 2578 / 1315
Main Engine Type and Power	: One MAK brand 8MU453AK model 1471 kW diesel main engine
Information on the Accident	
Type of Accident	: Very Serious Marine Casualty
Date and Time	: 14th of January 2015 / 9:40 LT
Location of the Accident	: Dock 5 at the pier belonging to DENBIRPORT Port Facility located at the coordinates 36°39'53.54"N / 36°12'29.30"E, Sarıseki / Iskenderun / Turkey
Number of people on board	: 12 vessel personnel/crew
Injured/Fatality/Missing	: None
Damages	: The fire was effective almost all over the vessel and the vessel became unusable.
Pollution	: The bales of the hay loaded on the vessel caused pollution by spreading to the sea with the effects of burning and wind.

1.1.1. General Features of the Vessel

M/V RETAJ was built in 1978 in Germany and has a single hold and a load carrying capacity of 4130 m^3 bales. Its length overall is 89 meters and its breadth is 15,45 meters and its height is 6,9 meters. It is equipped with McGregor type hatch covers. The propulsion system is driven by a single main engine and it also has a bow thruster. The engine room of the vessel can be operated as unmanned. According to the Minimum Safe Manning Certificate, there is no restrictions regarding the navigation zone and it must be manned with at least 8 personnel.

1.2. Environmental Conditions

On the day of the accident, the weather was clear, but there was a wind in NNE (north-northeast) at a force of 4, which was locally effective in the region and called as Yarık Kaya (Split Stone).

1.3 Transported Cargo

Hay in the form of bales with approximate dimensions of (120 x 70 x 240) – (120 x 90 x 240) cm and weight of varying between 350 and 400 kg were being loaded to the vessel. Hay is obtained by cutting and drying meadow grass, legumes or other herbaceous plants, and used as feed especially for livestock such as cattle, horses, goats and sheep and are usually stored in the form of bales. The hay must be completely dried before getting baled and it must be stored dry.

Haycocks produce internal heat due to bacterial fermentation and continue to produce heat through the respiration process until the humidity rate of the hay falls below 40%. If the hay is very humid when it is baled or if it gets wet in the storage, the heat produced by the respiration process may be sufficient to initiate combustion. Therefore, the humidity rate of hay should be paid great attention against the risk of sudden combustion (Cargohandbook, 2015).

1.4 Sequence of Events

1.4.1. Events before the Accident

Related to the loading of 15.000 tons of hay cargo pressed and baled to be exported to the Turkish Republic of Northern Cyprus by the company Ader Tarım Ürünleri Ltd.Şti (Ader Agricultural Products Co.Ltd.) from the DENBIRPORT Port Facility which belongs to Denizciler Birliği Deniz Nakliyat ve Ticaret A.Ş. (Denizciler Birliği Shipping and Trading Inc.) and operates in Iskenderun, an agreement was drawn up between the aforementioned company and port facility. Within the scope of the agreement, the first ship loading started in November 2014 and the loadings continued with different ships. Togo flagged M/V RETAJ is also included in the loadings. RETAJ approached the port for loading at the dates of 20th of November 2014, 3rd of December 2014, 15th of December 2014 and 25th of December 2014, and left the port completing the loading without any problems. In order to carry out the 13th loading from the port which is also within the scope of the agreement, RETAJ approached the port for the 5th time on 11th of January 2015 and loading started in the evening on the same day. The hold was loaded with 600 tons and after the loading was completed, the hold covers were closed. Then, the bales were loaded on the hatch covers in a way to form 7-8 tiers and the loading was completed in the morning on 14th of January 2015. However, the master of RETAJ requested one more tier to be loaded and the requested loading started at 08:30.

1.4.2. The Moment of the Accident

At around 9:40, the loading to the starboard bow of the vessel was in progress and the person, the so-called slinger, was working on the bales of hay onboard. In the meantime, the slinger saw that smoke was coming from the 1st or 2nd bottom tiers of bales loaded on the hatch covers near portside midship. Thereupon, the crane operator was warned about the fire by this person and a fire alarm on the portside was sounded. In the meantime, a fire call was made by calling the Iskenderun Fire Company at around 09:43.

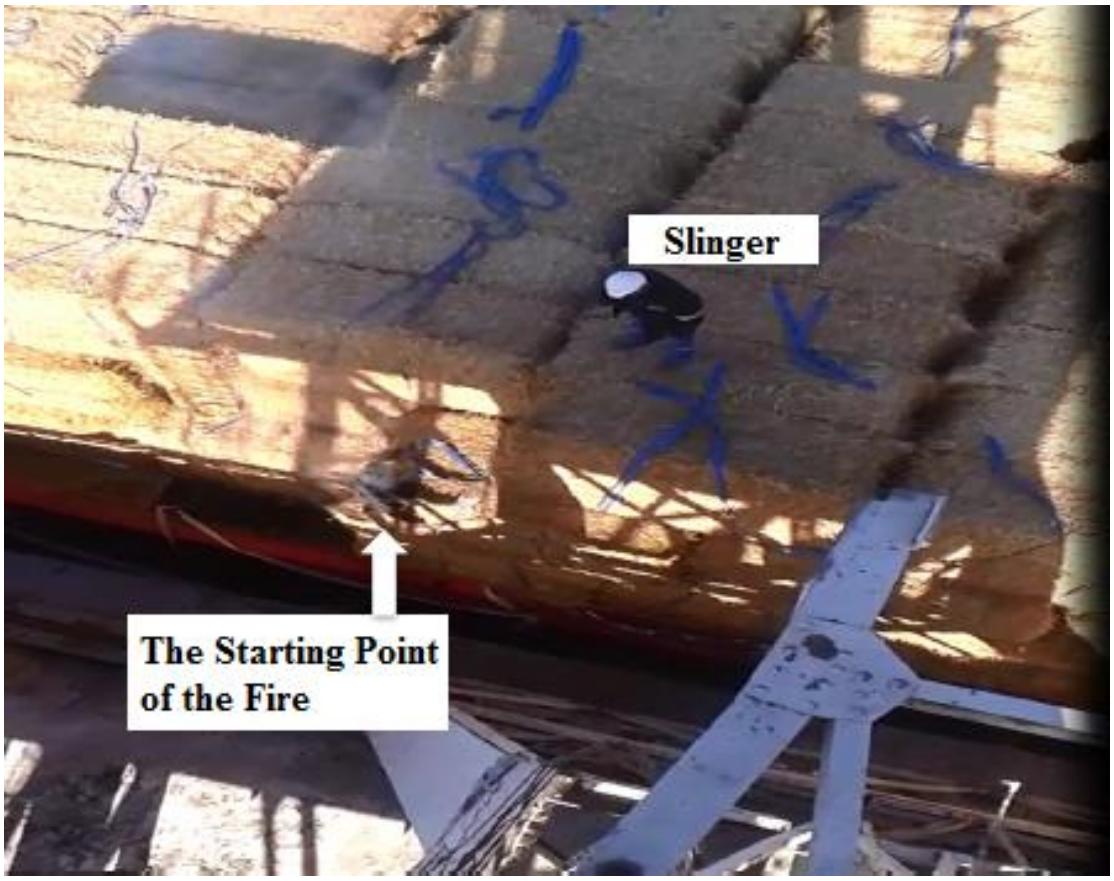

Figure 2. The moment that the fire was noticed

1.4.3 Events after the Accident

Response from Shore: After the fire alarm sounded, the people at the pier started to respond to the fire immediately. First of all, fire hoses were started to be pulled from the fire line located at the port to the point where smoke from the vessel was arising in order to respond with water. On the other hand, while the fire hoses were being pulled, a worker at the pier responded with dry chemical powder tubes.

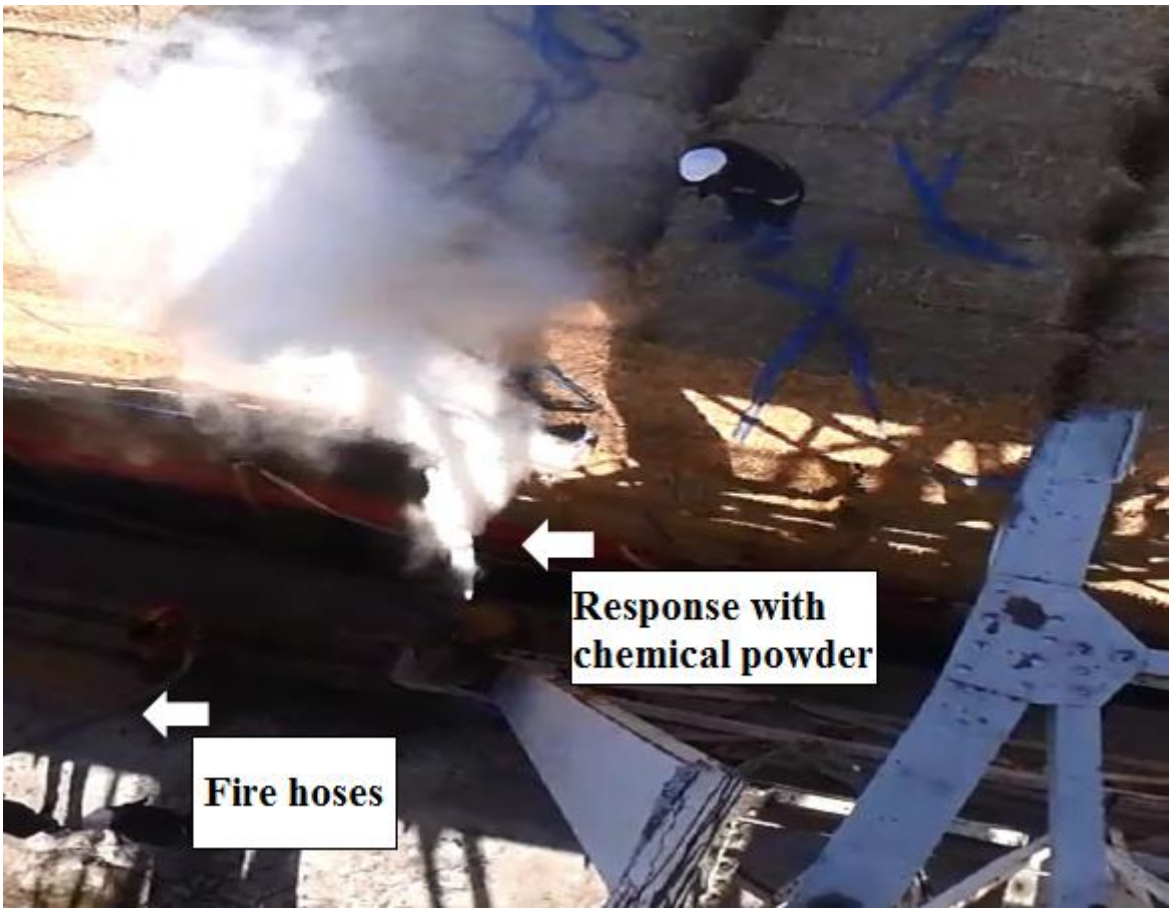

Figure 3. Initial response to the fire

However, the response made with chemical powder did not make a visible contribution to the extinguishing activities with the effect of the wind. Since it was understood that the responses to the fire from the pier would be insufficient due to the effect of the wind, it was considered as appropriate that the fire hose be extended to reach the vessel by crane and that the response be made by the slinger on the bales of hay. Meanwhile, second response made with chemical powder from the pier. In this very moment, the flames appeared at the point where the smoke was arising and in a very short time, the flames reached the bales at the top. With the effect of the wind blowing strongly, the flames started to spread rapidly towards the portside bow and starboard of the vessel by igniting the parts of the bales exposed to open air. Meanwhile, the fire hose and nozzle were delivered to the slinger on the bales of hay within 2-3 minutes. However, as the water pressure was insufficient and the nozzle and hose connection could not be made completely, the response made by the aforementioned person for 4-5 minutes was insufficient and the person left the vessel due to the excessive increase of the smoke and went to the pier.

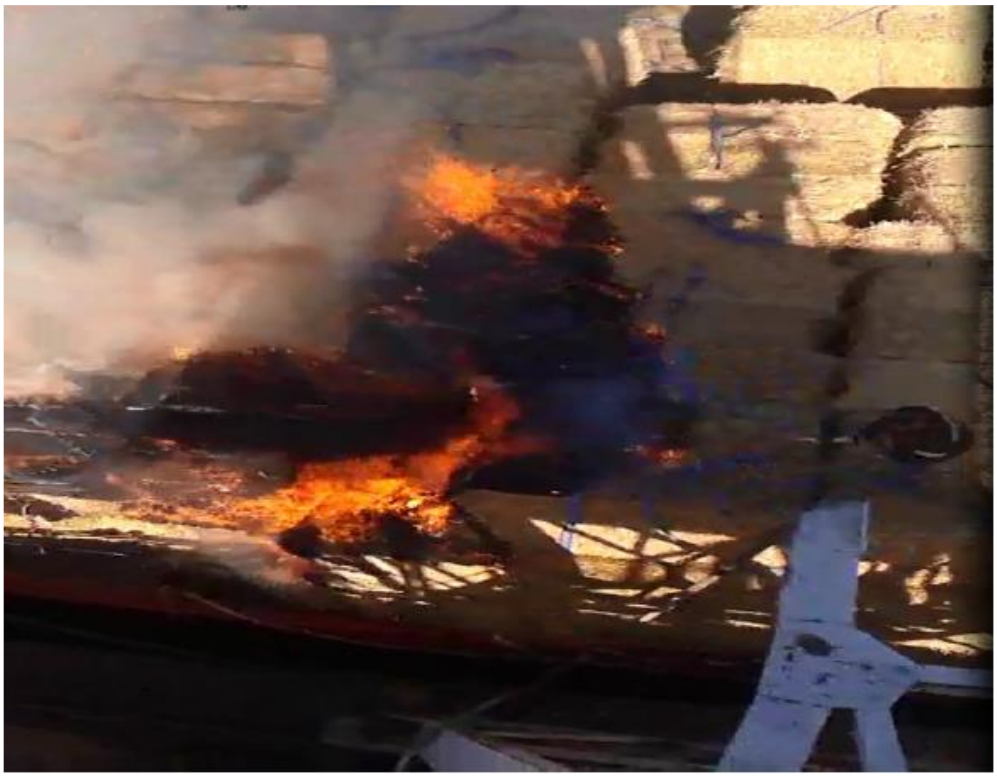

Figure 4. Spread of fire

The first fire truck reached the scene of the fire at about 10:00. Extinguishing activities were continued with a total of 4 fire trucks coming from the surrounding municipalities and the forest management but the fire could not be brought under control. The vessel's personnel were evacuated from the vessel at around 10:00-10:30 in cooperation with the military police/gendarmerie.

Interviews were made with Forestry Operation Directorate with the intention of responding the fire by a helicopter from the air but it was stated that the helicopter rentals were made in the summer months and there was no helicopter for firefighting.

Response by The Tugboat Organization: The Iskenderun office of the DEKAŞ-MEDMARIN Consortium, which serves as the authorized tugboat organization in the region, was informed by the master of the vessel M/V RETAJ via VHF that there was a fire on his vessel at about 9:50 and he requested an emergency response from them. Immediately after that, emergency response instruction was given to Dilovası 8, Dilovası 9 and K.F.Canbolat tugboats at Iskenderun Demir Çelik Limanı (Iron and Steel Port) and Poliport M tugboat at Iskenderun Port. Subsequently, Harbour Master, Limak Port and Med Marine General

Operations Directorate were informed about the incident. A team arrived by land to the scene of the fire for the operation planning and determination of the situation.

After the tugboats reached the scene of fire at between 10:20-10:30, K.F.Canbolat got the position as a “salvage master” in order to control the tugboats by the sea in coordination with the Harbour Master and water started to be pumped with the fire extinguishing balls from the tugboats. Excessive wind and bales of hay falling into the sea exposed the fire responding tugboats to serious risks. A tugboat was commissioned to protect other tugboats responding the fire in order to avoid the risk of spreading of the bales of hay, even though tugboats was carrying out cooling in a way to protect themselves.

Fire extinguishing activities continued until around 12:00 but the fire could not be extinguished. The strong wind caused the burning bales of hay on the deck to spread on the pier. Considering the fact that this situation also poses a danger on the pier and the risk of explosion of the fuels in the fuel tanks of the vessel, the vessel was instructed to leave the pier at 12:05 by the Harbour Master of Iskenderun. As the vessel was docked by anchoring, stopper was used, and Dilovası 9 tugboat threw a line/rope to the hook, the vessel was drifted for a certain distance and got moved off the port, Dilovası 8 cut the anchor chain and freed the vessel from the anchor and the freed vessel was hauled from the port with approximate water depth of 4.5 meters to 400 meters away and it was grounded. After this stage, extinguishing and cooling activities carried out continuously.

Two tugboats belonging to BOTAŞ reached the scene of the fire in order to respond the fire but the tugboats could not approach the vessel due to insufficient water depth at the point where the vessel was grounded and could not contribute to the extinguishing activities.

1.5. Iskenderun DENBIRPORT Port Facility

DENBIRPORT Port Facility is an establishment of Denizciler Birliği Deniz Nakliyatı ve Ticaret A.Ş. and is located at the Bay of Iskenderun. The facility has an 812.68 meters long pier perpendicular to the sea and is suitable for berthing of general cargo, bulk cargo ships and oil/product and chemical tankers up to 60.000 DWT. The facility is located on D817 highway and on 6th Region Adana-Iskenderun railway line, and is 13 km away from Iskenderun and 110 km away from Adana airport.

1.5.1. Fire Fighting Facilities

At DENBIRPORT Port Facility, a firefighting team has been formed with 16 personnel in total, 10 of whom are permanent personnel of the Port and 6 of whom are from subcontractor company. They were trained for the first response to fire but they did not have any training on fire response techniques for ship fires. There is a fresh water tank with a capacity of 600 m^3 in the facility and pumps with the capacity of 50, 90 and 110 kW are used to pump water from the water tank into the fire line. In addition, feeding can be supplied from the sea to the fire line with a diesel pump. There are fire cabinets and hydrants available on the pier at certain intervals. Two separate emergency plans are implemented at the port facility, including the same provisions that the subcontractor company and the port facility's own personnel are assigned.

1.6. Damage Sustained By the Vessel Due to the Fire

In the investigation carried out on the vessel, it was observed that the fire was effective throughout almost all over vessel including the fore peak. The hold covers on the stern on the deck have collapsed in a wide and deep way and deformation occurred on the other hold covers. The fire also spread into the hold, the superstructure, including holds and the bridge, was almost completely burned and the vessel became unusable.

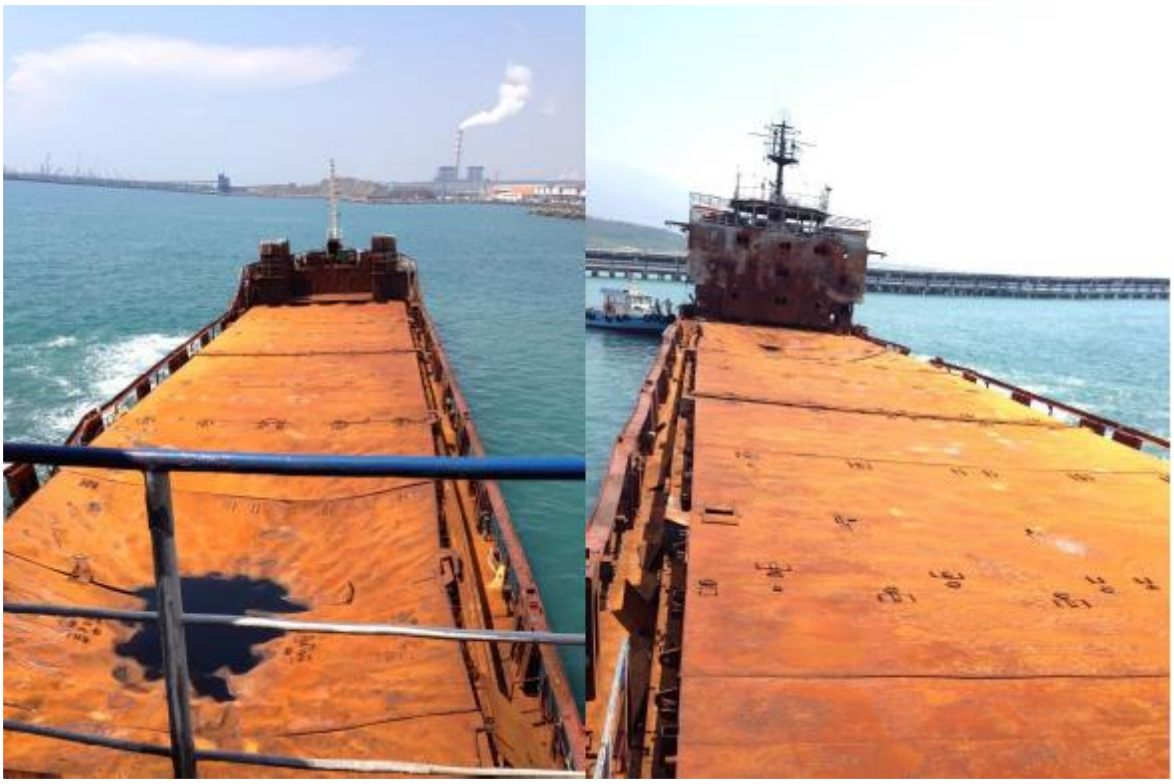

Figure 5. Vessel's deck and superstructure after fire

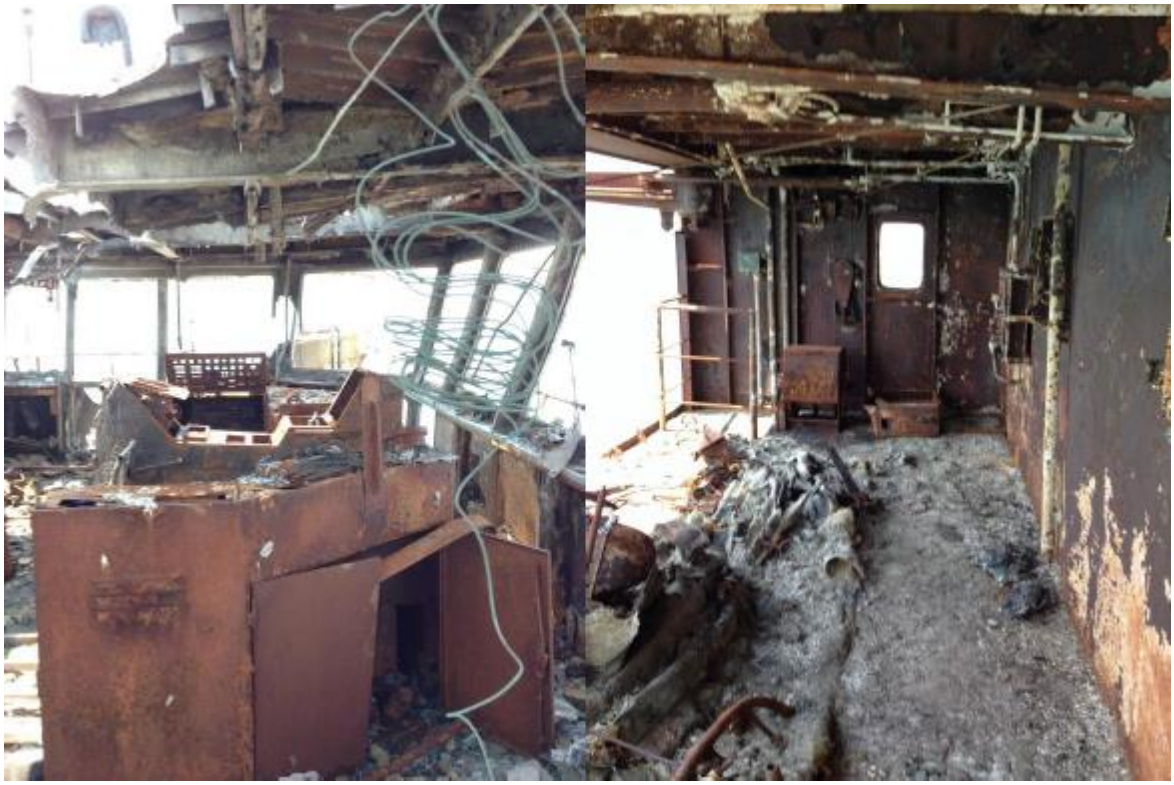

Figure 6. Bridge and accommodation space after fire

2. ANALYSIS

2.1. The Cause of Fire

The operator of the crane used in ship loading, using mobile phone, recorded the fire as a video, which started with little smoke arising from the 1st or 2nd tiers of bales located at the bottom on the hold covers near portside midship and broke out with smokes getting denser afterward and with flames appearing right after that. However, the images in these records do not give an accurate and precise idea of the cause of the fire. Besides, two possibilities are emphasized: cigarettes and the characteristics of the cargo.

2.1.1. Cigarette

During the interviews conducted with both vessel and port facility personnel, it was seen that people were especially conscious about not smoking because of the easily flammable characteristics of hay load. However, during the interview with the master of the vessel M/V RETAJ, it was stated in one of the previous loadings that a person working at the port was smoking on the bales of hay and he took a photo of him. When the master was asked whether this situation was shared with the port authorities and whether he had notified the Harbour Master in writing, he stated that no sharing and notification had been made with the port authority. In addition, the above-mentioned records show that there is a lighter and cigarette pack in the crane which was used in ship loading. Considering this, it is considered that one of the causes of the fire may be cigarette-related.

2.1.2. Cargo-related

Haycocks produce internal heat due to bacterial fermentation and continue to produce heat through the respiration process until the humidity rate of the hay falls below 40%. If the hay is very humid when it is baled or if it gets wet in the storage, the heat produced by the respiration process may be sufficient to initiate combustion. Therefore, the humidity rate of hay should be paid great attention against the risk of a sudden combustion. If the moisture rate of the hay is below 20%, it is considered to be completely dry. Combustion problems usually

occur between the 5th and 7th days of baling. If the temperature of the bale is below 49°C, there is a slight danger, and bales between 49°C and 60°C should be taken away from the haycocks. Combustion may start if the bale temperature rises above 60°C. On the other hand, the hay should not be exposed to any flame or heat source as it is highly flammable.

The loader stated that the load was completely dry and that they had not encountered any cargo-related combustion incidents before. However, there is always a risk of fire due to the nature of the cargo as described above. Therefore, it is thought that it will be safer to monitor the moisture and temperature of the bales before loading. Although it is not possible to determine precisely whether the fire is caused by internal heating caused by bacterial fermentation, there should be a regulation related to performing the moisture and temperature controls of the bales prior to loading.

2.2. Loading on the Deck

The loading on the deck on the vessel is not only made onto hold covers but also in a way to reach the port and starboard boardside boundaries and to lean on the front of the superstructure.

Therefore,

- The area between the hatch coamings and the boardside stanchions, which provides passage in head-stern direction, became unsuitable for use and passage.
- Fire hydrants on the portside of the vessel could not be used.
- The bales of hay leaning on the front of superstructure made it extremely easy for the fire to spread to the superstructure.

The owner of the vessel was imposed a fine with an administrative sanction decision by Iskenderun Harbour Master in accordance with Articles 2 and 11 of the Law on Ports No. 618 and Articles 11, 20(ı) and 39 of the By-law on Ports due to the fact that the loading on the deck was not carried out properly and within the safety framework.

The Denbirport Iskenderun Port Facility was imposed a fine with an administrative sanction decision again by Iskenderun Harbour Master in accordance with Articles 2 and 11 of the Law on Ports No. 618 and Articles 20(ı), 26, 27(7) and 39 of the By-law on Ports due to the fact that the loading on the deck was not carried out properly and within the safety framework, that it is allowed and it is not notified to the Harbour Master.

2.3. Respond to the Fire

It took 3-4 minutes for the fire to start and to reach the bales at the top tiers and to spread very rapidly after the smokes, which was the indicator that there is a combustion started in the hay load in forms of bales on the deck on the vessel, after noticed. The strong wind blowing that day was extremely effective in the spreading of the fire in such a quick way. Fire was responded by the port facility, fire brigade and tugboat organization and each of them was discussed separately below.

Port: In Denbirport Port Facility, a firefighting team has been formed with 16 personnel in total, 10 of which are permanent personnel of the Port and 6 of which are from subcontractor company. They were trained for responding simple fires but they did not have any training on response techniques for ship fires.

As soon as the fire was noticed, port employees on the pier and onboard the vessel started to respond the fire immediately. However, since the water pressure was insufficient and the port worker who responded the fire on the bales of hay could not make the nozzle and hose connection completely, the response carried out for 4-5 minutes was insufficient. The insufficiency of the water pressure was caused by the fact that the water was transmitted from the fire tank with a volume of 600 m^3 with the gravity and without putting the pumps into use.

Afterwards, the pumps were put into use but when the pumps were put into use, the fire already spread over a large area.

Fire Brigade: Shortly after the fire started, the first fire truck reached the scene of the fire at around 10:00. Extinguishing activities were continued with a total of 4 fire trucks coming from the surrounding municipalities and the Forest management but the fire could not be brought under control due to the fact that the fire spread considerably when fire trucks reached the scene of the fire.

Vessel: In the interview with the Master of the vessel, he stated that he gave a general alarm immediately after he noticed the fire. The Chief Engineer stated that he heard the general alarm and went to the bridge. Then he went down to the engine room again and closed the engine room casings. Although it is considered that these efforts by the Chief Engineer did not contribute to extinguish the fire, it is believed to contribute to the protection of the engine room.

The most effective response to this fire occurred on the deck could be by spraying water with nozzles from the fire line on the deck. However, since the loading on the deck was made in a way to prevent access to the fire cabinets, no response on the deck could be carried out.

Tugboat organization: The tugboats arrived at the scene of the fire at approximately 10:20 approximately 40-45 minutes after the fire started. The fact that the tugboats were approximately 4.5 nautical miles away and had a speed of 10.5 knots/hour caused an extension of their arrival time to the scene of the incident, but there was no remarkable delay. However, with the time elapsed, the fire spread over a large area and increased its effect.

On the other hand, tugboats did not have firefighting (FiFi) notation, although it is not a necessity. Therefore, it was necessary to respond with the available technical facilities of tugboats and under the negative effects of strong wind. After the decision made to make the ship leave the pier, the ship was grounded with a successful operation.

2.4. Regulations on Transport of Baled Hay by Sea

The UN number is a four-digit number that identifies commercially important dangerous goods or substances (such as explosive, flammable, toxic, infectious) in international transportation, and the cargoes with these numbers are carried/transported within the context of International Maritime Dangerous Goods Code, published by IMO (IMDG Code).

Hay is included within the IMDG Code with UN 1327 number under class 4.1 containing dangerous goods such as flammable solids, self-reactive substances and desensitized explosives. Transport of wetted, moistened or oiled hay by sea is prohibited and if transported by sea when it is not wet or oiled, it is subject to the rules of IMDG Code. If the humidity rate of the baled hay is less than 14% and is transported in closed cargo transport units, and at the same time, if the sender/consigner provides a certificate indicating that the cargo does not contain any dangerous substance with UN No1327, IMO 4.1 class and humidity rate is below 14%, the IMDG code requirements shall not be applied. On the other hand, the transport of hay load in forms of bales under or on deck without being placed in a cargo transport unit is in accordance with the provisions of the IMDG Code.

In the section on stowing and separating of the chapter related to hay in the code, it is stated that;

- It must be kept from animal and vegetable oils,
- If not transported in the closed cargo transport units, the bales must be covered with tarpaulin or similar materials,
- Loading spaces must be clean, dry and free of fuel and oil,
- Spark arresters must be provided in the ventilation covers in the loading spaces and all openings, entrances and covers opening into the cargo spaces must be kept securely closed,
- In cases where the loading is temporarily stopped, a watch must be kept against a fire when the hold cover remains open,

- Smoking must be prohibited in the vicinity during loading/unloading and firefighting equipment must be available at all times.

However, the abovementioned requirements are not fully fulfilled, and as stated in section 2.2, that the loading on the deck, especially, reached to the front of the superstructure of the vessel and closed passage ways in port - starboard direction prevented responding the fire with the vessel's facilities, and at the same time accelerated or caused the fire to spread the superstructure.

In this respect, it is seen that there is a need for regulations on hay loading/unloading carried out in the ports of our country and hay transport by ships considering the fact that a total number of 23 hay loadings totaling 19.300 tons were carried out in 2014 and 27 hay loadings totaling 13.500 tons were carried out in the first 6 months of 2015 in ports of Turkey. It is considered that it is especially important to consider the matter of loading on the deck in detail in the regulation to be made. As a matter of fact, the fire spread over a large area on the deck extremely quickly within 3-4 minutes.

3. CONCLUSIONS

1. Although the employees are conscious about the easily flammable characteristics of hay load, some of the people working in loading smoke during the loading. [2.1.1]

2. The humidity rate of the hay load is not measured before the loading. [2.1.2]

3. The loading on the deck was carried out in a way to prevent access to the fire lines of the vessel. [2.2.]

4. Loading the bales on the deck in a way to lean on the front of the superstructure of the vessel made it easier for the fire to spread to the superstructure. [2.2.]

5. There was no effective first response to the fire by the Port personnel and no response by the vessel personnel. [2.3.]

6. The tugboats arrived at the scene of the incident approximately within 35-40 minutes at the earliest. [2.3.]

7. The absence of a tugboat with FiFi notation reduced the effectiveness of the response to the fire. [2.3.]

8. Firefighting equipment was not available at all times. [2.4.]

9. There is no regulation on the conditions of transport on the deck. [2.4.]

4. ACTIONS TAKEN

Since the hay loading was in progress with other vessels in the port of Iskenderun after the accident, all subsequent loading operations were carried out under the supervision of the Harbour Master experts, especially ensuring that the fire lines, front of the superstructure and passage points remain clear and that the hay load on the holds is not excessive.

5. RECOMMENDATIONS

Directorate General of Maritime and Inland Waters Regulation is recommended that

1. Loading/unloading of dangerous cargoes carried out at the ports should be carried out in accordance with the rules and Harbour Masters should be instructed to make inspections and controls stricter.
2. Real-like drills should be conducted to see whether the facilities and capabilities stated in the written documents regarding fire and similar emergencies at the ports are functional and applicable.

Directorate General for Dangerous Goods and Combined Transport Regulation is recommended that

1. The humidity rate of the hay load should be measured before the loading and a regulation should be established especially regarding the conditions of transport of the hay on the deck.

SOURCES

http://www.cargohandbook.com/index.php/Hay (Date of access: 17.03.2015)