FINAL MARINE SAFETY INVESTIGATION REPORT

VESSEL NAME / IMO No	**:** SYN ZANIA / 9346938
FLAG	**:** Italy
LOCATION OF ACCIDENT	**:** PETKİM Petrochemical Plant / İzmir
DATE OF ACCIDENT	**:** 01.07.2019 / 23:15 LT
CASUALTIES	**:** 1/-
DAMAGE / POLLUTION	**:** Partial deformation and paint damage on the superstructure and accommodation / No pollution

Committee Decision No: ... / DNZ-.... / 2020 *Date: … / … / 2020*

The sole purpose of this investigation is to make recommendations in order to prevent similar accidents and incidents within the framework of the legislation of the Transport Safety Investigation Center.

This report shall be inadmissible in any judicial or administrative proceedings whose purpose is to apportion blame or determine liability.

LEGAL BASIS

This marine accident was investigated in accordance with the By-law on the Investigation of Marine Accidents and Incidents which came into force after being published at the Official Gazette No.30961 on 27th of November 2019.

Investigation procedures and principles are further applied by considering Resolutions of International Maritime Organization (IMO) concerning International Standards and Recommended Applications for Safety Investigations Directed to MSC 255(84) (Casualty Investigation Code) and Resolution A.1075(28) Marine Accidents or Incidents, and European Union Directive 2009/18/EC.

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FIGURE LIST

SUMMARY

Figure 1: Location of the Accident

Note: All times used in the report are local time (GMT[1] +3)

M/T SYN ZANIA berthed to PETKİM petrochemical plant on 1st July 2019 to load Propane/Propylene gas. Following the completion of the necessary procedures, loading operations initiated at 22:30 with the gas phase and as of 23:00, it was proceeded to the liquid phase. Approximately 6 minutes after proceeding to the liquid phase, gas leakage get started from the loading manifold and within the following seconds a massive explosion occurred and fire broke out. With the effect of explosion and fire, the crew abandoned the tanker by jumping into the water. The fire was extinguished in 30 minutes with the firefighting operations and the cooling continued for a day. With the search and rescue operations, the crew was evacuated from the sea and carried through a safe location, however, the second engineer have lost his life due to drowning.

As a result of the accident investigation, it was concluded that the fire broke out by the burst of the loading/unloading hose that enables the connection between the ship/terminal since the increasing pressure in the cargo lines remained above the agreed pressure for 6 minutes after proceeding to the liquid loading phase.

Based on the results of the accident investigation, various recommendations addressed to Owner/Company Manager and Terminal Operator.

[1] GMT: Greenwich Mean Time

SECTION 1 – FACTUAL INFORMATION

1.1 The Vessel

1.1.1. Basic Ship Particulars

SYN ZANIA

Flag	Italy
Classification Society	RINA
IMO Number	9346938
Type	LPG TANKER
Building Place and Year	CANTIERE NAVALE DI PESARO-2008
Gross Tonnage	3836
Length Over All	95,47 meters
Main Engine Power	2380 kW

Figure 2: M/T SYN ZANIA

1.1.2. The Navigation

SYN ZANIA

Port of Departure	Marseille (France)
Port of Arrival	Ain Sukhna (Eygpt)
Number of Passengers	-
Number of Crew	16
Minimum Number of Seaman	15
Type of Navigation	Unrestricted
Cargo Condition	Propene/Propylene

1.1.3. General Layout

M/T SYN ZANIA is a tanker built in 2007 in order to carry liquefied petroleum gas. There are two cargo tanks and a compressor room on the deck close to midship. Its cargo carrying capacity is 4000 cubic meters. There are four conventional loading and unloading manifolds on the deck, on the port and starboard sides and each connected to cargo tank.

There are 14 ballast tanks on board, lined along the starboard and port. Moreover, there are fore and aft peak tanks and two bottom ballast tanks, on the port and starboard sides adjacent to the fore and aft peak tank. There are six wing tanks on board, used as fuel tank between ballast tanks and cargo tanks. There is also one fuel settling tank for each on the port and starboard sides in front of the engine bulkhead.

There is a bow thruster room on the stem. Vessel's engine room is equipped with 3 generators and the main engine with a power of 2380 KW. There is one emergency generator on the vessel's A deck. The vessel is equipped with a lifeboat with a free fall mechanism that is located on the master station deck on the portside quarter, a fast rescue boat that is located on the funnel deck on the starboard side quarter, and two inflatable life rafts that are located also on the same deck, one on portside and the other one on starboard side.

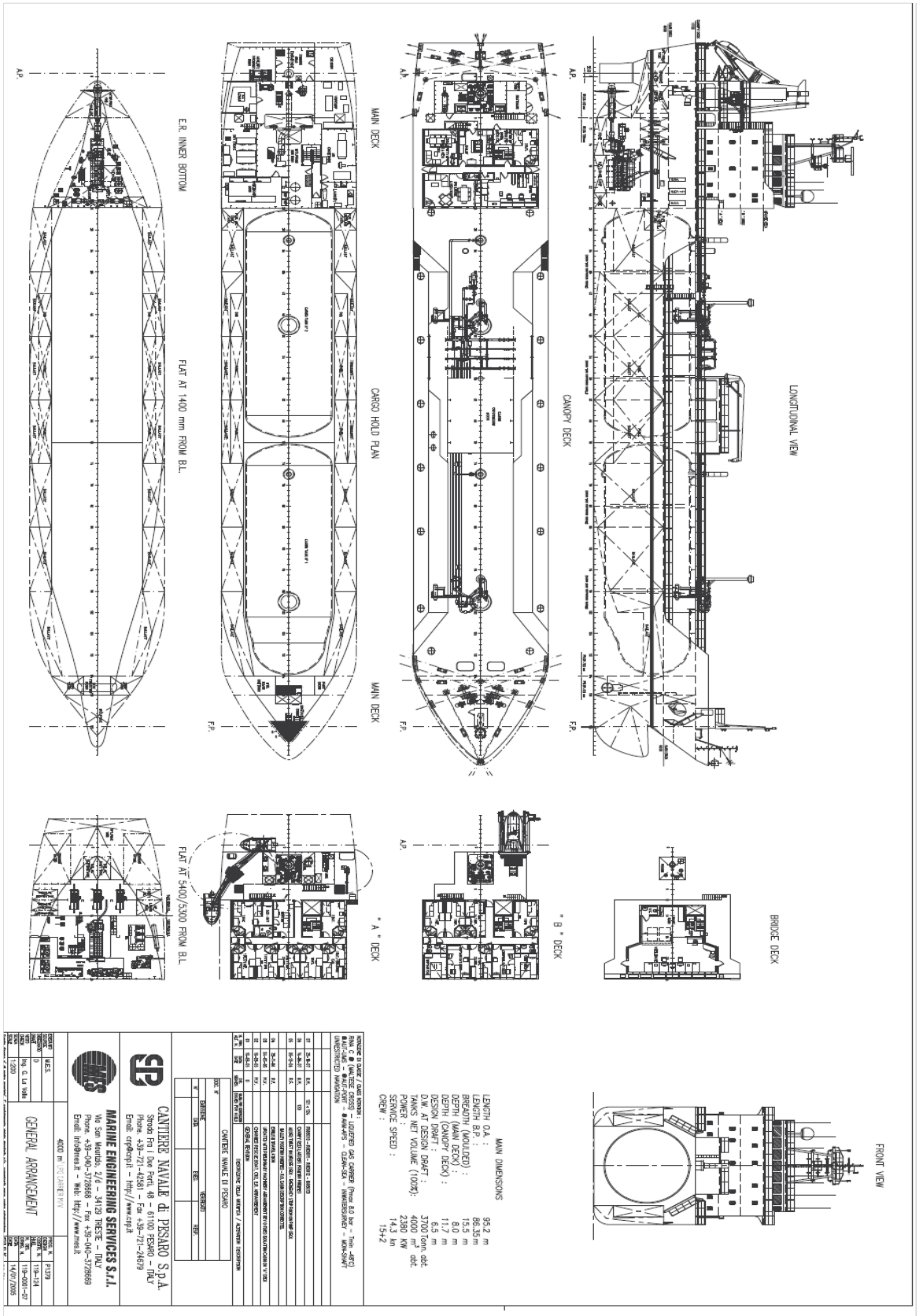


Figure 3: M/T SYN ZANIA General Arrangement

1.1.4. Fire Control Plan

Onboard, as a fixed fire extinguishing system, the main deck and accommodation are equipped with a sprinkler system whereas the engine room is equipped CO2 system. There is a fixed dry chemical powder spraying system close to the main deck filling manifolds. The dry chemical powder systems are available at the filling unit, accommodation, and the engine room on the ground floor. Further, a jet sprinkler system is available on the main engine, generators in the engine room and pump room.

Moreover, the fire pump is located in the engine room and the emergency fire pump is in the bow thruster room. To control these units separately, remote operation buttons are available on the wheelhouse, in the loading control room and the security room.

There are smoke detectors in all closed compartments and additionally, flame and heat detectors are available in the engine room. There are 4 gas detectors on the main deck. emergency escape equipment is available in all cabins of accommodation, on the wheelhouse and engine room. Fire alarm buttons are available in every closed compartment of accommodation and the engine room whereas the general alarm buttons are available on each floor of the accommodation and in the engine room. The main control panel of the alarms is located on the wheelhouse.

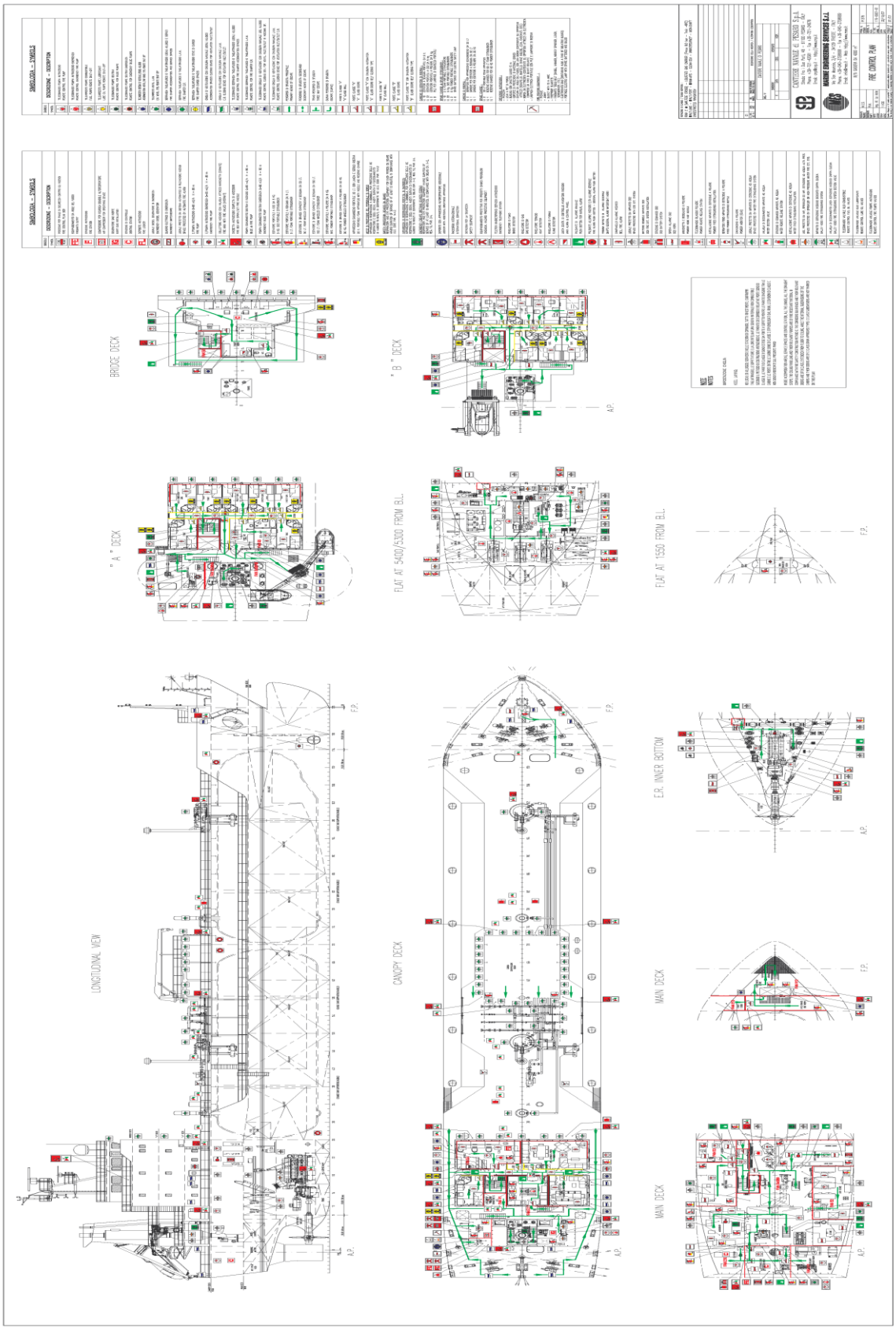


Figure 4: M/T SYN ZANIA Fire Control Plan

1.1.5. Safety Management System

The Italian Maritime Authority issued the Safe Management Certificate (SMC), dated 24.05.2019 and valid for 5 years, for the vessel. The Italian Maritime Authority again issued a Certificate of Compliance, dated 12.01.2017 and valid for 5 years, and the annual inspection was performed in Naples on 03.04.2019.

Port State Inspection has been carried out by the Georgian Maritime Authority in Batumi on 18.06.2018 under the Black Sea MOU[2] and nonconformity was not reported. Subsequently, Port State Inspection has been carried out in Marseille on 04.10.2018 under the Paris MOU and nonconformities was reported according to MARPOL[3] and BWM[4] rules.

1.2 Safe Manning and Key Personnel

According to "Safe Manning Certificate" dated 24.05.2019, issued by the Italian Maritime Authority, it was observed that there were sufficient seafarer on board. At the time of the accident, there are 16 personnel on board, including the master. They are, respectively, 1st Officer, 2nd Officer, 3rd Officer, Deck cadet, Chief Engineer, 2nd Engineer, 3rd Engineer, Electric Officer, Gas Staff, three Able Seaman, Deck Boy, Wiper and Cook. While the crew were appointed to the vessel, "Unmanned Machinery Space" criteria were considered.

1.2.1 Master

The master is an Italian. He was 40 years old at the time of the accident. He is qualified to work as a Master on vessels of 3000 GRT and above. He has been serving as a master on vessels for about 4 years. He had been the Master of SYN ZANIA for 3 weeks. He has been working in the company for 14 years, in various positions. He stated that he has been working in gas tankers for 20 years. He was in his cabin at the time of the accident.

[2] Black Sea MOU: Black Sea Memorandum of Understanding
[3] MARPOL: The International Convention for Prevention of Marine Pollution for Ships
[4] BWM Code: The International Ballast Water Management Code

1.2.2 Chief Mate

The Chief Mate is an Italian. He was 48 years old at the time of the accident. He is qualified to work as a Master on vessels of 3000 GRT and above. He had been the Chief Mate of SYN ZANIA for 3,5 months. He has been working on the company's vessels for 13 years. He has a total marine service of 31 years. He has been working in gas tankers for 30 years. He was in the Loading Operation Room at the time of the accident.

1.2.3 Watchkeeping Officer

2nd Officer is an Italian. He was 58 years old at the time of the accident. He is qualified to work as a 1st Officer on vessels of 3000 GRT and above. He has been serving on vessels for about 34 years. He had been the 2nd Officer of SYN ZANIA for about 2 months. He has been working on the company's vessels for 13 years. He was about to enter the accommodation on the port side from the main deck at the time of the accident.

1.2.4 Gasman

Gasman is an Italian. He was 45 years old on the accident date. He is qualified to work as an Able Seaman on vessels of 500 GRT and above. He has been serving on vessels for 28 years. He had been the Gasman of this vessel for about 15 days. He has been working on the company's vessels for 10 years and has been fulfilling the duty of Gasman since the beginning of 2018. He attended the first loading operation on this vessel. He was in the Loading Operation Room at the time of the accident.

1.2.5 2nd Engineer (Casualty)

2nd Engineer is an Italian. He was 57 years old on the accident date. He is qualified to work as a Chief Engineer on vessels with main engine driving force between 750 KW and 3000 KW. He was in the accommodation at the time of the accident. He is the only person who lost his life after the accident. Remarkable findings of the Autopsy report that was performed by the Consultants of the relevant hospital is as follows;

2nd Engineer Autopsy Report:

It was observed that the soot was smudged on the face, neck and front side of the body. Alcohol (ethanol, methanol) was sought but not found, CoHb[5] (Carboxyhaemoglobin) was sought and found to be 1.5%, alcohol (ethanol, methanol) was sought in intraocular fluid but not found, interalveolar oedema, anthracosis and congestion was found in the lungs, interalveolar oedema[6], anthracosi[7]s and congestion[8] in the lungs were detected.

1.3 The Marine Casualty

Time of Accident	01.07.2019 / 23:15 LT
Accident Type (IMO)	Very serious marine accident
Type of Accident	Explosion / Fire
Location of Accident	PETKİM Petrochemical Plant / İZMİR
Casualties	-/1/-
Damage	Deformation on Deck and Paint Damage, Deformation of Shore Connected Equipment and Structures
Pollution	None

1.4 Enviromental Conditions

Wind	4 knots from the north
Sea Status	Calm
Visibility	Good
Weather	Clear

[5] Carbon monoxide level of 0.5-3% in the blood is considered normal in adults
[6] Filling of air sacs of the lung with water
[7] Accumulation of carbon-derived substances in the lungs
[8] A passive condition due to the inability of the veins to carry blood from the tissue

1.5 The Cargo (Propene/Propylene)

It is used as a raw material for chemical and polymer production. Propene exists in gaseous form at room temperature and atmospheric pressure. Like other alkenes, it is colourless with an unsharp but unpleasant odour. Its basic physical and chemical properties are as follows;

a) Appearance	Gas
b) Colour	Colourless
c) Smell	Odourless
ç) Molecular Weight	42.08 gr/mol
d) Freezing Point	Not Applicable
e) Melting Point	- 185 °C
f) Boiling Point	- 48 °C
g) Self-Ignition Temperature	455 °C
ğ) Flammability	Highly flammable
h) Explosive Properties	(below-above) 2 %v - 11 %v
ı) Water Solubility	(at 25°C) 200 mg/l
i) Distribution Coefficient	1.77

Propylene is a combustible gas that is carried under pressure and is easily flammable. Contact with evaporating gas may cause a cold burn. Accidental spreads pose a serious fire and explosion hazard. During the fire, leakage must be prevented if possible. Since there is a possibility of uncontrolled firing, the tube/container must be continued to be cooled with water spray from a safe location without trying to put out the flames, the fire source must be isolated and the fire must be allowed to burn in itself..

1.6 Cargo Handling Plan and Loading Procedures

The preparation plan for loading operations carried out under SYN ZANIA Safety Management System (SOP - Part III / Pr3) as listed below:

When preparing your cargo layout always ensure that positive trim is achieved during discharge

When planning cargo layout have in mind discharge and loading sequences / operations at next port (or ports) of call.

Keep an eye on hog and sag. Check carefully your weight distribution and stresses on the load-master computer

Check that your cargo plan conforms with stability and survival capability requirements as indicated in the Loading and stability information booklet

Loading / discharging pre-plan must include stability and stresses calculations at various stages, on arrival, 25%, 50%, 75% and at the end of operation. Preplanning must comprises cargo, ballast and bunker. Each two hours during loading / discharging operations stability and stresses must be checked and recorded. Vessel with loading computer may print summary pages and attach to the plan (carried out the comparison of the loading computer with the approved stability booklet at least every month)

Always check cargoes with "Cargo hazard data sheet" for cargo compatibility.

Check cargo valves and manifold reducers for tightness prior to connect the shore arm/hose.

Further to the abovementioned items, keep also in mind and evaluate during Cargo Planning the seasonal load-line zones, water levels, port restrictions and shipboard limits. Master shall require to the Local Agent further information regarding port restriction and/or special requirements

LOADING PLAN

On the basis of the information exchanged during the pre-cargo transfer meeting, the ship's Officer in charge and the terminal representative should reach agreement on a loading plan. The approved loading plan should cover the following points:

- *Ship and shore cargo changeover*
- *Measures to prevent the contamination of cargo*
- *Clearing ship pipelines for loading*
- *Other movements or operations that may affect flow rates*
- *Measures to limit stresses and properly trim the ship*

RATES

Both the initial rate and the maximum loading rates should be specified, along with the topping off rates and the normal stopping times. The following factors should be taken into account:

- *The nature of the cargo to be loaded and its chemical and physical properties*
- *The arrangement and capacity of the ship's cargo lines*
- *The maximum allowable pressure, the minimum allowable temperature and flow rate in the ship/shore connecting system*
- *The maximum allowable pressure and allowable temperature in the tanks*
- *Any other control limitations*

Furthermore, the loading procedures are under SYN ZANIA Safety Management System (SOP - Part III / Pr5) as listed below:

SCOPE OF THE LOADING

Loading of the tanks is simply the process of introduction of bulk liquid to the tank(s) after conditioning of the tank(s) is complete, i.e. inerting, purging and cool down (where required).

FACTORS AFFETING THE LOADING PROCESS

The rate at which liquid may be loaded is governed principally by the way in which the vapour produced due to displacement by incoming liquid and/or any flashing which occurs, (due to the incoming liquid being at a higher saturation temperature than the prevailing tank condition) is handled. The rate of production of vapour is directly proportional to the loading rate of liquid and it is generally the ability to handle this vapour, rather than line size (and therefore liquid velocity), which eventually restricts the rate, presuming there is no limitation on the shore capability to provide liquid.

AIMS OF LOADING

The sole objective of loading is to fill the tanks to the prescribed level (which may not necessarily be the maximum permissible level of 98% full) in a controlled manner to gain the maximum commercial advantage.

PRATICAL CONSIDERATIONS

Before commencing loading, ensure that all safety precautions and local authority regulations have been complied with and that the quantity of cargo already on board (if any) be it liquid and/or vapour has been determined.

Particular items to be checked for the loading operation are:

- *conical strainers fitted to the loading manifolds*
- *tank level gauges released from the stowed position*
- *tank safety relief valves have the correct pilots installed*
- *ship/shore emergency procedures available and clearly understood*
- *estimated loading rate agreed*
- *cargo analysis available*

If vapour return to shore is available, it should be utilized to maximize the loading rate – the rilequifaction plant available on shorewill generally be larger than that on board with a inherent ability to handle greater vapour loads.

Depending on the cargo condition during loading, it may be necessary to run the rilequifaction plant to cool the cargo in addition to handling displaced and flash vapour –

this additional load will only serve to restrict the potential loading rate and if a great deal of cooling is required, the loading rate may be severely reduced.

Loading should commence slowly and be gradually increased as conditions stabilise - a high loading rate at the early stages, particularly if there is a large quantity of flash gas, may cause the tank pressure to rise rapidly and the safety relief valves to open,

If loading more than one tank simultaneously, cargo may be diverted from a full tank but any changes should be made gradually and in consultation with the shore personnel.

During the loading operation, regular checks must be made of all tank levels, not only to determine the loading rate but also to detect any valves that may have inadvertently been left open or are leaking, thereby allowing cargo to pass to tanks or systems where it is not intended to go.

The tanks are fitted with level alarms set at 95% and 98% of full volume with the 98% alarm automatically initiating the closure of the liquid fill valves to the tank with the high level - this is a safety/protection device and must not be used as a deliberate means of control of loading.

On completion of loading to the predetermined level, the reliquefaction plant (if running) should be stopped to reduce evaporation on the liquid surface, thereby allowing an accurate sounding of the liquid level to be made. If necessary, the cargo should be carefully "topped off to the required level after the sounding has been made.

In case of tank's float gauge failure on twin tanks, port and starboard, must be considered the reading of the tank with float gauge working, it must to be sure that high level alarm is properly working.

The loading into a tank with gauge failure must be stopped if the high level alarm is activated before than gauge reading of the twin tank. During this operation, particular precautions must be taken to avoid list and trim of the vessel.

In case of independent tank's gauge failure, loading may be continued using all necessary precautions; avoid lis tand trim variation and stop loading when the high level alarm is activated.

During the loading - if vapour return line is not available - keep the cargo tank's pressure always 2/3 max of the safety relief valve set point

Adjust loading rate in order to satisfy requirements of point x) with ship's reliquefying plant.

High pressure alarm must never be excluded and set point must always be checked and kept within values of operating manuals

The cargo tank pressure must be always kept lower than value established in point x) including and mainly during the topping-up operation, which is obviously the most dangerous stage of loading of loading due to possible quickly increase of pressure.

The level gauge floats should be returned to the stowed position after loading has been completed.

Samples must be always taken. In case of pump failure, besides to contact the Company's Technical Department, the samples can be taken pressurizing the tanks by vessel's compressors or by nitrogen furnished by shore.

The above do not release the person in charge to follow carefully the procedures contained in the operating manuals and the purpose is to pay the due attention in order to avoid release of cargo vapour from safety valve.

Particular conditions that require different actions from the above instructions must be time by rime evaluated and discussed with the Company's Technical Department

Venting of vapour to atmosphere during loading should be avoided.

After cooling down

Difficulties that may occur during cooldown can result from inadequate drying. Ice or hydrate may form and ice-up valves and pump shaft. Throughout the cool-down, deepwell pump shaft should be turned frequently by hand to prevent the pumps from freezing up. In case of freezing pumps, stop the cargo operations and contact the Company's Technical Department in order to decide the correct steep to follow.

1.7 Terminal Information

1.7.1 Port Management

PETKIM Port is a port operator that has entered into service within the borders of Aliağa district of İzmir province in 1985 and has been operating on a total area of 47401 square meters. General cargo, bulk cargo, oil product tankers, chemical tankers and liquefied gas tankers are being loaded and unloaded on the port ***(Figure 4)***.

The liquid cargo is being handled at the berth no. 2 (175 meters in length - 9.5 meters in depth), berth no. 3 (120 meters in length - 5.5 meters in depth) and berth no. 5 (221 meters in length - 10 meters in depth), with a total length of 510 meters. The liquid products, such as EDC / VCM, acetic acid, benzene, hexane, heptane, propylene, MEG, naphtha, ammonia, caustic, paraxylene DEG, paraxylene ethylene, orthoxylene, PY gas, C4, ACN, aromatic oil that is imported and exported following the needs of petrochemical and refinery are being handled.

Figure 5: Port of PETKİM

1.7.2 Layout Plan for Berth No. 5

Liquid cargo berth no. 5, having 221 meters in length and 10 meters in depth, was built in the north-south direction. Three LEL gas detectors and one Toxic gas detector have deployed along the berth. The control panel of gas detectors is located in the “Joint Piping

Operation" building, right on the west of the berth. The loading operations are also being followed from the operation building. A fire alarm button and fire and foam hydrant mechanism are also available for possible fire response on the berth ***(Figure 5)***

Figure 6: Petkim Port Layout Plan

1.7.3 Cargo Handling Procedures for the Terminal

Instruction for C3 (Combustible Gas) Transfer (Document No: UR.64-IT-00048) that is performed by the Joint Piping Transfer Unit under the Safe Management System of the Port is as follows:

a) *Contact the laboratory before the vessel arrives, tell the factory to operate the pump and take a sample from the flange at the last point of the line.*
b) *Put a signal flag in front of the related filling arm before the vessel, which will be unloaded, approaches the berth.*
c) *Make sure the vessel berths so that the connecting flange of the vessel corresponds the related filling arm.*
d) *Wait until the Directorate of Port and Customs Services completes the customs procedures of the vessel confirms the Customs Release.*
e) *When the customs procedures are completed, contact the Loading Master and wait for the tanks to be checked by Petkim Survey.*
f) *Contact the ethylene factory and inform them to prepare for C3 transfer.*
g) *Take the tank opening level and temperature from the ethylene factory and record them on the form UR-OB-FO-00008.*
h) *After the confirmation for customs release has been received from the Directorate of Port and Customs Services, connect the filling arm or hose according to Quick Coupling and Instructions Manual for Filling Arms No. UR.64-IT-00003.*
i) *Open the relevant valves on the line by contacting the ethylene factory and initiate C3 transfer at minimal flow.*
j) *Have the Petkim Survey take samples from the vessel's tanks by contacting the Loading Master after the first cycle has been loaded.*
k) *Warn the vessel and factory authorities to avoid exceeding the designated quantity indicated in loading order from the Sales Directorate.*
l) *Near the completion of the transfer, contact the Ethylene factory and notify them to be ready to cease the transfer.*
m) *After getting the information of transfer completion from the Loading Master, have the transfer to be ceased and turn off the valve of the line.*

n) *PETKİM Supervisor calculates the quantity for the bill of lading by measuring the tank closure of the vessel together with the supervisor of the purchaser and reports the quantity to OBT personnel.*

o) *Take the tank closure level and temperature of the relevant factory and record them on the form UR-OB-FO-00008 and compare with factory values.*

p) *After the transfer was completed, contact the Loading Master and detach the filling arm or hose according to Quick Coupling and Instructions Manual for Filling Arms No. UR.64-IT-00003.*

q) *Before the detaching operations of the hose, contact the relevant factory (EO or ACN) and inform the flare operation to be carried out. Make sure that the factory switches to the same radio channel and have the steam injected into the flare in a controlled manner. Follow continuously until the operation is completed by the unit's and factory's personnel.*

r) *Keep the pressure on the line and transfer progress under constant control during the transfer and record on the form UR-OB-FO-00007. Do not leave your station before the vessel unberths.*

s) *Always wear personal protective equipment during the transfer.*

1.7.4 Scope of the Terminal Emergency Response Plan

Terminal Emergency Response Plan has been prepared in accordance with the following objectives to specify the things to be done in case of an emergency and the precautions to be taken for any emergencies that may occur at PETKİM petrochemical plant.

a) *Minimizing and controlling the adverse effects, arising from emergencies that may occur,*

b) *Preventing or minimizing adverse effects for the safety of life, property and environment,*

c) *Taking necessary precautions for the protection of human health and the environment,*

d) *Communicating necessary information to the relevant institutions/organizations,*

e) *Providing necessary restoration operations after the accident.*

The following statements are included in the Terminal Emergency and Response Plan;

"Emergency Response and Evacuation Instruction of PETKİM Port" for the evacuation ships and vessels in the port in case of any emergency occurs in PETKİM Port is available and open to all interested persons on in the company's digital archive. This instruction also contains the precautions to be taken by the Emergency Management Team. Aliağa Port Authority will be informed in any emergency that will occur and may join the Emergency Management Team, if it deems it necessary, as well as it may directly decide the issues, such as the evacuation of ships or vessels in port and have the decisions to be exercised. Aliağa Port Authority will first be notified immediately and a detailed report will also be delivered as soon as possible.

The emergency notifications will include information, such as the date, time, place, cause and details of the incident, the details of the vessels in the port and the casualties if any, and as the new details arrive, they will also be communicated to the port authority. To provide the coordination between the Port Authority and other emergency teams, the communication channels, such as telephone, wireless, an e-mail will be efficiently used, 24/7 contact will be provided, the information will be regularly exchanged and the emergency will be responded in coordination.

In case of any possible explosion, fire or emergency signs are seen in adjacent/close plants, the precautions will be increased primarily in the plant, teams and equipment will be made ready to help neighbouring plant and the coordination with these plants and other institutions, such as the port authority will be provided.

Further, the "Emergency Response Handbook of PETKİM Port", created under the scope of the emergency fight against marine pollution, includes the followings;

- *Early prevention of the pollution by determining its effects that may occur in coastal and marine sites and minimization of them with gathering responses,*

- *Control procedures of the pollution threat that may occur in the plant,*

- *Institution/organization and/or person/persons responsible for coordinating, administering, responding related to the execution of the plan and materials and equipment,*

- *Discontinuation of the emergency, indications of the disappearance of conditions under emergency response and the transition to the normal order,*

- *Cleaning and rehabilitation procedures and methods for the cleaning and re-use of the area affected by the accident after the emergency response conditions have disappeared,*

- *Recovery of living creatures affected by pollution and the recreation of their habitat*

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 Course of Events

M/T SYN ZANIA unberthed the Lavera terminal in Marseille, France in ballast on 27.06.2019 and started to navigate towards the loading port of Aliağa / PETKİM. It reached the PETKİM port on 01.07.2019 without encountering a significant situation during the journey. The vessel, as of 20:05, went alongside to PETKİM berth no. 5 from the port side to load propylene (C3) ***(Figure 7).***

After berthing is completed, the agent boarded the vessel to complete the vessel's entry procedure and initiate the operations with the Master. In the meantime, at 20:15 the terminal staff brought two 6-inch and two 3-inch Loading-Unloading hoses that enable cargo transfer to the berth no. 5.

Then, terminal staff together with "Loading Master" and an employee of a survey company, a "Cargo Surveyor", boarded the vessel. A Safety Meeting was organized with the 1st Officer in the loading control room at 21:00 to fulfil the routine procedure for cargo handling. They exchanged views on the loading plan, safety precautions in the meeting and mutually prepared and signed Vessel/Shore Loading Protocol, Vessel's Coast Guard Checklist and Pollution Prevention Checklist. Yet, the Loading Master delivered the Terminal Rules and The Safety Data Sheet that contains information on the contents and hazards of the cargo to the 1st Officer in exchange of a signature. Also, the 1st Officer delivered the Data Sheet of Past Loadings, Calibration Certificates of Measuring Devices onboard and the Preparation List to the Loading Master.

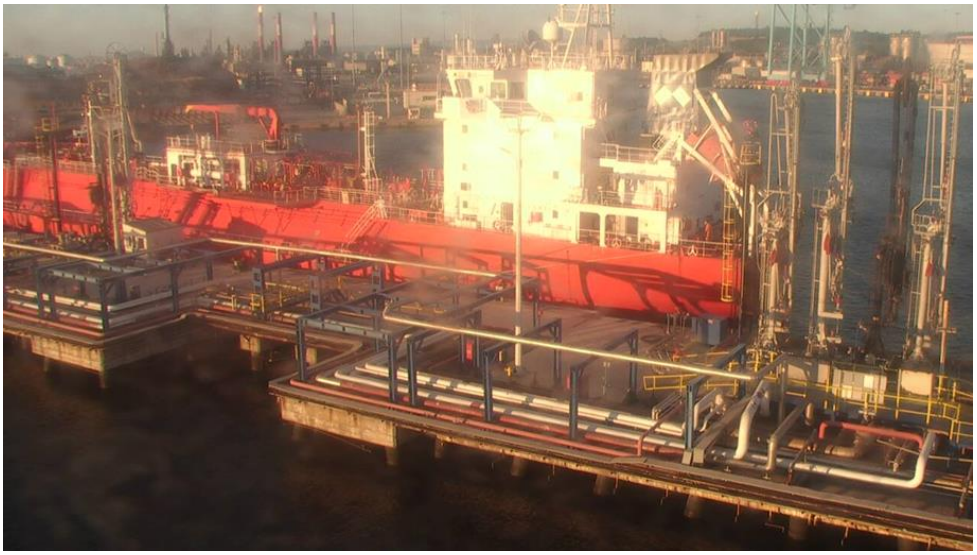


Figure 7: SYN ZANIA; Berthing

Subsequently, at 21.30 Cargo Surveyor and 1st Officer made the necessary measurements and calculations regarding the cargo and delivered the related reports to the Loading Master. The Loading Master notified the Terminal Joint Piping Unit to connect the hose required for loading. Terminal staff from the Joint Piping Unit completed the grounding process first and then the connection of the Loading-Unloading hoses, previously brought to the berth, between the vessel and the shore at around 22:25.

The nitrogen test and the leakage test, performed by putting detergent on manifold joints was performed with the participation of the terminal staff and the crew to check leakage on hose connections, which is a routine procedure. After notifying the Loading Master that there was no inconvenience, the Loading Master confirmed the factory and the vessel to prepare for loading ***(Figure 8)***

Figure 8: Loading-Unloading Hoses Connection Time

Figure 9: Initiation of Loading with Gravity and Departure of Terminal Staff

As previously agreed with the 1st Officer, the loading operation with gravity[9] was initiated as of 22:35. Meanwhile, terminal staff who had completed the hose connections also left the berth ***(Figure 9).***

At the time when the loading was initiated with gravity, the compressors were also activated simultaneously for the maintenance of the temperature value of the cargo, loaded by the vessel. The loading initiated with gravity continued for about 30 minutes and at the

[9] The flow of cargo from land to ship with its specific gravity without any pump aid

point where everything is fine and after mutual agreement, the Loading Master asked the factory to activate the 1st pump.

At 23:05, the pump is activated and it was proceeded to load the cargo in the liquid phase. In the meanwhile, the Loading Master was in his office at Berth 5 and the 1st Officer was in the Vessel Loading Control room. Approximately 6 minutes after the initiation of loading with the pump, around 23:11, a sudden gas leak occurred and about 10 seconds later, a massive explosion took place ***(Figure 10 – 11 - 12)***.

Following the explosion, the leaking gas started to burn ***(Figure 13)***. During the gas leakage, the seafarer who was on watch on the gangway at the port entry of the tanker rapidly moved towards the stern, where he considered to be a safe zone. In the meanwhile, there was no other crew either on the deck or on the berth. The Master was in his cabin, the 1st Officer and the Watchkeeper were in the Loading Control room, and the other crew were in various areas within the accommodation.

Figure 10: The Moment of Leakage (23:11:35)

Figure 11: Another Snapshot for Leakage (23:11:42)

Figure 12: The Moment of Explosion (23:11:45)

Figure 13: The Moment of Fire Outbreak (23:11:47)

2.2 Course of Events After the Accident

2.2.1 SYN ZANIA

Immediately after the explosion and subsequent fire, the 1st Officer in the Loading Control room insulated the pipeline on the port side of the vessel by pressing the "Emergency Shutdown Button" (ESD). Thereafter, he also activated the sprinkler[10] system by engaging the emergency fire pump with the button in the loading control room.

Meanwhile, the Master saw the explosion and fire from his cabin and immediately went down the Loading Control room. He met the 1st Officer there and after he learned that the Officer had pressed the ESD button and activated the emergency fire pump, he also raised the fire alarm at 23:13. Later the crew left the compartments in a panic where they were randomly found and gathered starboard quarter where they considered to be a safe zone. The Master asked the 1st Officer and Watchkeeper to return to the accommodation and check whether there was anybody remained inside or not. The 1st Officer and Watchkeeper checked the accommodation, went back to the stern and reported to the Master that no one remained inside. Thereafter, the Master asked the 1st Officer to check the rescue boat. The 1st Officer reported that there was no access to the rescue boat and the lifeboat, and the port side of the vessel was covered with flames.

The Master called the terminal staff with the radio which was allocated to them by the terminal and asked the loading to be ceased and them to be rescued by reporting their position on board. In the meanwhile, some crew tried to get away from the vessel by jumping into the sea or going down by the rope dangled to the sea. Thereafter, 8 crew members staying on board was ordered by the Master to abandon the vessel and they abandoned the vessel by jumping into the sea.

Some of the crew swam towards the shore where they considered to be relatively close. In the meanwhile, they managed to pull and take the 2nd Engineer who remained still on the sea to the shore. The 1st Officer tried to bring the 2nd Engineer back to life by applying cardiopulmonary resuscitation and giving mouth-to-mouth resuscitation but failed.

[10] an active method of fire extinguishing that consists of a water supply system that provide an adequate pressure and flow to a water distribution pipe system on which water jets are connected

2.2.2 Terminal

Loading Master who saw the explosion moment from his office in the Joint Piping Operation Building instructed the technicians in the Joint Piping Operation to cease the loading immediately. After getting the information that the loading had been ceased by contacting the factory by radio immediately. They left the building and moved to a safe place for them so that the Emergency Response Teams were able to work efficiently and the life safety of port officers and the security officers were ensured.

One day after the explosion, risk and action plan meeting was held with the attendance of provincial, judicial and administrative teams, relevant vessel's crew and the port officers in the administrative building of the port.

Later, at 17.10, the crew who boarded the tanker put it into "black-out"[11] condition and turned off the manifold valve. Port teams who boarded the tanker with the crew completed the necessary gas measurements. When boarding the tanker was ensured to have no risk, other teams also boarded to make necessary examinations and to switch the VDR device to recording mode. At 19.10, VDR device was switched to recording mode and other teams completed their works and got off the tanker at 20.30.

2.3 Search&Rescue and Fire-Fighting

2.3.1 Searh&Rescue

At 23:12, following the explosion, the crew began to leave the compartments in the accommodation randomly. The Master of the tanker moved to the stern by raising the general alarm at 23:13 (VDR). Some of the crew who gathered at the starboard quarter, which is safer than the fire location, began to leave the vessel due to the panic. The Master asked the 1st Officer to check the rescue boat and the 2nd Officer to return to the accommodation and check whether there was anybody remained inside or not. In the meantime, the Master reported their locations to the coast by calling with radio before he ordered to abandon the tanker. The Master who learned the rescue boat was unavailable and that there was no other crewmember remained inside, ordered the eight crew onboard

[11] Shutdown of driving machinery and other auxiliary machines of the vessel, such as boiler, generator, alternator and separator

to abandon the vessel and they abandoned the tanker and jumped into the sea by the ropes, dangling from the mooring pipe.

The crew who jumped into the sea began to swim away from the tanker randomly. Meanwhile, the pilot boat named SANMAR CAMADAN, who received the distress call and berthed at the berth no. 2, moved at 23:15. Tugboat named GÖKSU-V, moving from the other side of berth No. 5 started to take the tanker's crew who had been swimming in the sea aboard. The Master of SANMAR CAMADAN, who learned that the crew was on the GÖKSU-V tugboat, moved towards GÖKSU-V and took eight crewmembers aboard in safe condition. SANMAR CAMADAN returned to berth no. 2 at 23:27 and left the eight crewmember taken aboard to the berth for being taken by the ambulances. ***(Figure 14).***

SANMAR CAMADAN, who learned that there were 16 crewmembers on board, departed from the berth no. 2 and proceeded to the scene to search the rest of the crew. Again, she learned from the radio that there was another crewmember on GÖKSU-V and moved towards GÖKSU-V, took one crewmember aboard and returned to the berth no. 2 at 23:36 (Camera) ***(Figure 15).***

SANMAR CAMADAN, who had left nine crewmembers to berth no. 2 safely, departed the berth again, and learned from the VHF that there were crewmembers at the end of the berth No. 5 and proceeded to take the rest of the crew aboard. SANMAR CAMADAN, who saw 6 crew members, 5 standing and 1 lying down, on the rocks at the end of berth No.5, proceeded towards that way and took 5 standing crew aboard. SANMAR CAMADAN, who learned from his friends that the lying crewmember had lost his life, reported the situation to the land unit by radio and left the scene to avoid endangering the life of the crew onboard. She brought and left the five crewmembers on board safely to the berth No. 3 where ambulances are present at 23:49 ***(Figure 16)***.

SANMAR CAMADAN, who safely transports 14 crew members to ambulances, moved to the scene again to search the remaining 1 crew member. In the meanwhile, as a result of the searches carried out by the Fire Safety and Rescue personnel directed by the Port Director, one crew member was removed from the tanker and left to the safe zone. The ambulance took the 2nd Engineer who was found unconscious at berth no. 5, from the

scene and refered to the hospital. Meanwhile, SANMAR CAMADAN, who learned that the last remaining crew member was found onboard and rescued, ceased its operations.

As a result of search and rescue activities, 15 of the 16 crew members of the tanker were safely rescued, but the 2nd Engineer died.

Figure 14: Evacuation Moment of the First Crew Group to Berth 2 (23:27 LT)

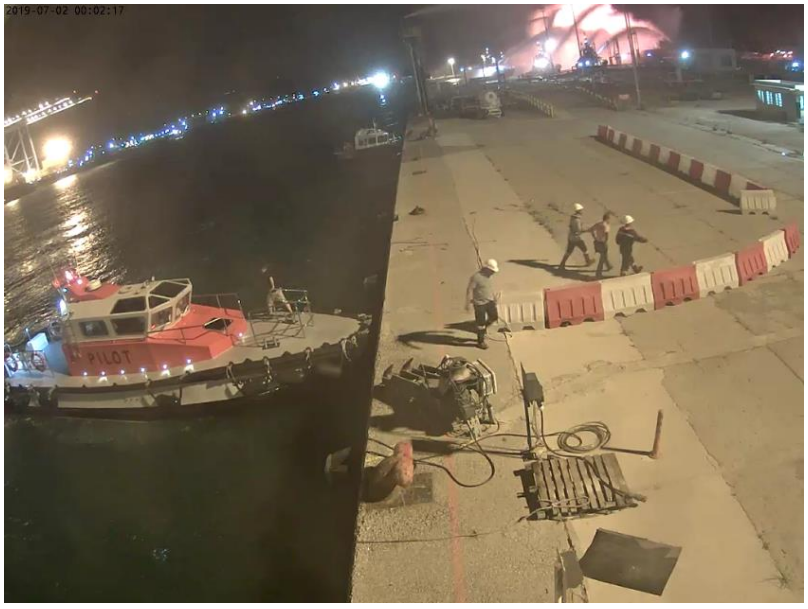


Figure 15: Evacuation Moment of the First Crew Group to Berth 2 (23:36LT)

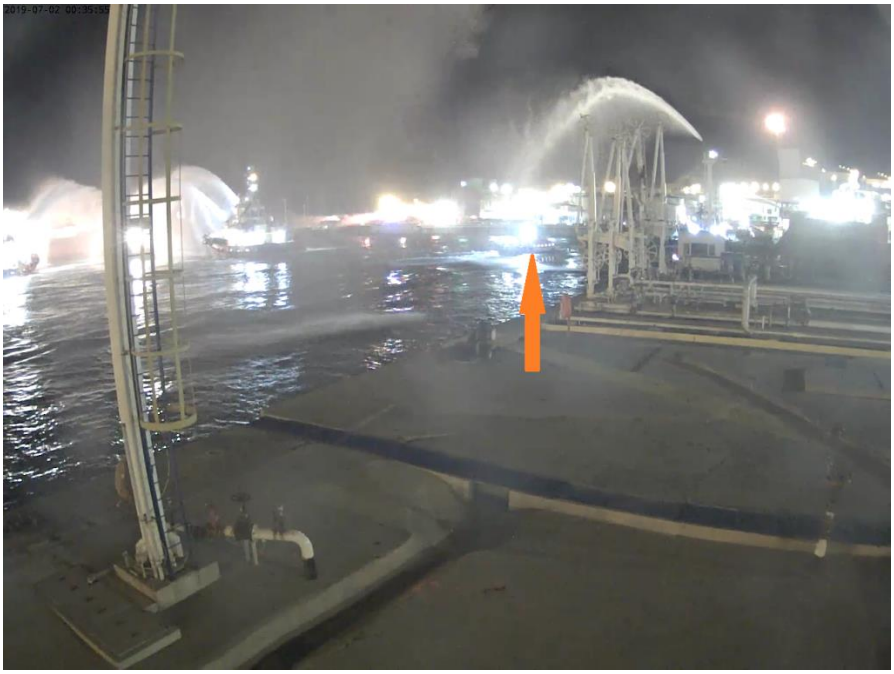


Figure 16: Evacuation Moment of the First Crew Group to Berth 3 (23:36 LT)

2.3.2 Fire Fighting

Around 23:12, as soon as the first flare and subsequent explosion had occurred, the 1st Officer in the Loading Control Room first insulated the tanker from the shore by pressing the "Emergency Shutdown" button (ESD) and then he activated the "Sprinkler" system from the Loading Control Room where the fire pump existed. However, since he could not reach the user panel of the fixed chemical powder extinguishing system on the deck, this system could not be engaged.

At the same time, the Loading Master at the Joint Piping Operation Building who saw the explosion and flames instructed to cease the loading immediately by calling the factory and Joint Piping Foreman reported that all pipelines to berth no. 5 has been isolated.

Further, the Pilot in the restroom who saw the explosion and flames reported the incident to the Port Operation Director and PETKİM Fire Department, PETKİM Technical Security and PETKİM Infirmary was informed through the radio channel.

At 23:12:20, the PETKİM Fire Safety and Rescue Center teams who received fire notification departed with one leading vehicle and four fire trucks and arrived at the scene at 23:15:10. Fire extinguishing and cooling operations were simultaneously initiated at the product lines and onboard with vehicles that were deployed around the berth No. 5.

Within the same time frame, the fire extinguishing and cooling operations were initiated with 5 tugboats and one pilot boat by the sea. Besides, the fire continued to be responded from the berth gradually by measuring the heat degree of the flame through thermal cameras.

Furthermore, crossfire extinguishing and cooling operations continued by activating the foam and fire hydrants on the berth. Meanwhile, two tugboats capable of cooling and sprinkling (water mist) with a long-distance water jet, called Fi-Fi[12], and three other tugboats with fire extinguishing capacity continued the operations. ***(Figure 17)***

Figure 17: A Snapshot of Fire Fighting

As a result of the response of PETKİM Fire Safety and Rescue Teams by land and 5 tugboats by the sea, the fire was extinguished at around 23:45 and taken under control. Thereafter, water mist was applied against any possible gas leakage and the tanker was continued to be cooled off by the sea to prevent overheating ***(Figure 18).***

The ongoing cooling works by measuring the heat with the thermal camera was continued on 2nd July 2019 and the heat was brought to reasonable levels at noon. However, cooling works continued for 20 days from the sea, and despite any danger, other tugboats were on their piers and 2 fire trucks on land were ready at the accident scene.

[12] Fire Fighting

Figure 18: A Snapshot of Cooling Operations

2.3.3 Precautions to Probable Environmental Pollution

PETKİM Environment Team and 10-person marine emergency team of a private company that serves PETKİM were sent to the scene to respond to environmental pollution that may be caused by the accident. Due to the probable risk of spillage during the accident, the two pre-booming boats blocked the exit of PETKİM Port with 600 meters of oil barrier.

The barrier was removed due to the beginning of the port traffic in the morning hours, however, PETKİM Environment Team stood by at the scene.

2.4 Damage

In consequence of the investigations that were conducted after the accident, it was observed that various damages occurred on board and the coastal plant. Due to the massive explosion, windows on the wheelhouse and bridge wings and the glass of the pressure monitoring board on tank numbered two was broken. ***(Figure 20)***.

As a result of the fire broke out after the explosion, the plastic and insulation materials on deck and fire-fighting hoses burned. Further, the deformations and coating burnt on the steel parts of the vessel due to the ongoing fire draw attention ***(Figure 21)***.

Several coating burnt and material burnt are noticed in the accommodation on the port side of the deck. One of these is the life raft on the lifeboat deck ***(Figure 22)***.

Furthermore, serious damage on the berth was observed. Loading-unloading units on the berth, which was the most affected area by the fire, collapsed together with the concrete structure due to the heat. Additionally, local deformations and coating burnt on the piping system that was located on the berth also draws attention ***(Figure 23).***

Figure 19: A Snapshot of SYN ZANIA after Fire Fighting

Figure 20: A Snapshot of Indicator Board and Bridge

Figure 21: The Snapshots of Fire Hose Station and Insulation Materials

Figure 22: The Snapshots of Accommodation Structure and Life Raft

Figure 23: The Snapshots of Berth Damage

BÖLÜM 3 –ANALYZES

When evaluating the marine casualty examined, it is aimed to determine the factors causing the accident formation to reach useful conclusions leading to safety recommendations on the root causes of the accident by taking into account the data obtained during the sequence of events and the investigation.

3.1 Probable Cause of The Accindent

Several judicial and administrative investigations were conducted by also the attendance of the Accident Investigation Team at the scene after the accident. The Accident Investigation Group that was appointed by UEİM[13] boarded the vessel with port authority officers and other officials on 3rd July 2020 in the afternoon after the necessary measures were taken in the following hours. The Group examined other sections of the vessel, primarily the area where the explosion occurred, and the fire broke out.

In consideration of these examinations and the data obtained, the findings regarding the cause of the accident are as follows;

- The Loading-Unloading hose that was used for the connection between the tanker and the shore was ruptured 5-6 minutes after proceeding to the liquid phase of the loading operation and after 10-15 seconds, the leaking gas was first exploded by reaching its flashing point likely because of static electricity and thereafter begun to burn.
- The Loading-Unloading hose that was used in loading operations was complying the standards, however, due to the fact that the pressure in loading lines was ranged at 35 bars and above for 5 minutes, the pressure quantity that the Loading-Unloading hose could resist per unit tested was exceeded and thereby the hose was ruptured.
- Although it was agreed before loading operations that the loading pressure would be a maximum of 15 bar according to the loading protocol between the port authority officer and the authorized tanker officer, the fact that the pressure was ranged at 35 bars and above for 5 minutes suggested two probabilities:

[13] Transport Safety Investigation Center in Turkish

a) The valves or one of the valves on the cargo transferring circuit to the vessel's tanks were closed, or
b) The loading pump started to operate above the agreed value for some reason.

3.2 Probable Source of Ignition

The examinations made at the scenery and the visual data obtained after the accident put forth the following probabilities on the ignition source that caused flaming:

- A sparkle that developed due to the friction caused by the spiral wires that were exposed by the rupture of the Loading-Unloading hose being rubbed against each other or the vessel ***(Figure 24)***,
- Heat dissipation of any heat-protected lightings located onboard and on the port plant in a way to cause ignition.

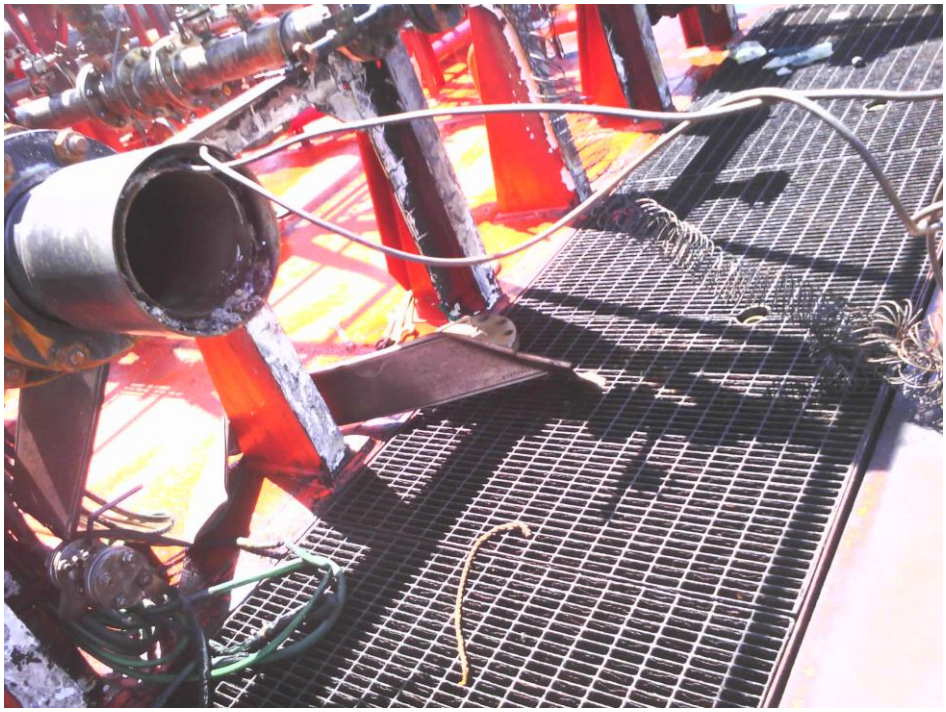


Figure 24: A Snapshot of the Loading-Unloading Hose after Fire Fighting

3.3 Cargo Handling Procedures

3.3.1 SYN ZANIA

The planning and implementation stages of safe loading operations of the vessel under the Safe Management System have been indicated respectively in the clause *"1.6* ***Hata! Başvuru kaynağı bulunamadı."***

After the accident, SYN ZANIA officer (1st Officer) and other Watchkeepers (Officer, gasman and A/B in shift) mutually discussed including pre-accident operations. information and documents that were submitted with regard to the operations carried out by the vessel for the planning of the loading operation were also examined.

Given the possible factors that caused the fire, the hose is believed to be ruptured when the pressure on the loading/unloading hose increased above acceptable values together with increasing pressure on load lines, as a result of the fact that one of the valves on the lines that transfer the cargo to the vessel tanks was closed. This possibility raises the question under what conditions the valves may be in closed state.

During the examinations on the vessel after the accident, it was found that the first and second manual valves located on the inlet circuit of the port side manifold that would be used for loading operations were closed. It was stated in the interviews held by the crew that said valves were in the open position before loading, however, the crew boarded the vessel to put her in "blackout" state against the possible risks after the fire and only the first manual valve on the manifold inlet was closed.

It is known that the butterfly and the check valves on loading circuits onboard are closed in case the cargo flows excessively and thus, there may be huge pressure fluctuations, which may lead to the line, hose or metal arm failures and even cause damage to berth structures. These failures are usually caused by the default of the valve disk to be fully parallel and open to the flow while it is on. This may generate a closure force that can cut the valve spindle in butterfly valves and hold-open pin in check valves. Therefore, when cargo or ballast passes through circuits, it is critical to check whether such valves are fully open or not.

In this context, the "ullage"[14] survey conducted by the independent surveyor firm after the accident and the gravity loading form taken by the terminal were examined, it was understood that there was an increase in gaseous form of 0.132 MT on board, but there was no load intake in liquid form. But given the differences in the environment and tank temperatures and measuring device, this quantity corroborates the opinion that there was no cargo intake to the vessel.

Although it is stated that the valves were brought to the loading position by the vessel, when the ullage survey report and gravity loading form is examined, it is understood that the said valve was not opened either at all or fully before loading, and this was also not checked. ***(Annex-1) (Annex-2)***

Given the conditions mentioned above, it was evaluated that the said valve was not opened or not fully opened during the preparation on board before loading, this was not noticed during the loading with gravity, but the pressure on the load lines reached unexpected values due to the closed valve with the loading by the pump.

Yet, as can be seen from the pressure monitoring log of the loading pump, it was found that the pressure rose to approximately 35 bar, it continued to flow at this pressure value for 6 minutes and in this process, even though the pressure was well above the desired value, no automatic warning or closing system had been activated.

As a result of such evaluations, these conditions are considered to be among the factors that contributed to the accident.

3.3.2 Terminal

The transfer instruction that will be performed by the Joint Piping Transfer Unit under the Safe Management System of Port has been indicated respectively in the clause *"1.7.3 Hata! Başvuru kaynağı bulunamadı.*"

The relevant officers have been interviewed with regard to the procedures followed by the Terminal before loading and necessary information and documents have been provided.

[14] A method of monitoring the load quantity by measuring the empty volume pressure in the load tanks

According to the evaluations under this scope, it was observed that the terminal carried out the procedures before loading were followed.

However, following the initiation of the cargo flow to the vessel, under the Warning included in Terminal Instruction,

"r) Keep the pressure on the line and transfer progress under constant control during the transfer and record on the form UR-OB-FO-00007. Do not leave your station before the vessel unberths."

Since the pressure could not be monitored effectively at 35 bar and above for 5-6 minutes, as can be seen from the pressure monitoring log of the loading pump, they failed to respond the high line pressure early ***(Annex-1)***.

The foregoing condition is considered to be one of the other factors that contributed to the accident.

3.3.3 Loading-Unloading Hose Used in Cargo Transfer

For cargo transfers, Composite Chemical Gasso Flex SST PTFE type hose of 6 inches in diameter and 8 meters in length belong to the terminal was used at the connection between the shore and the tanker. (***Figure 25)***

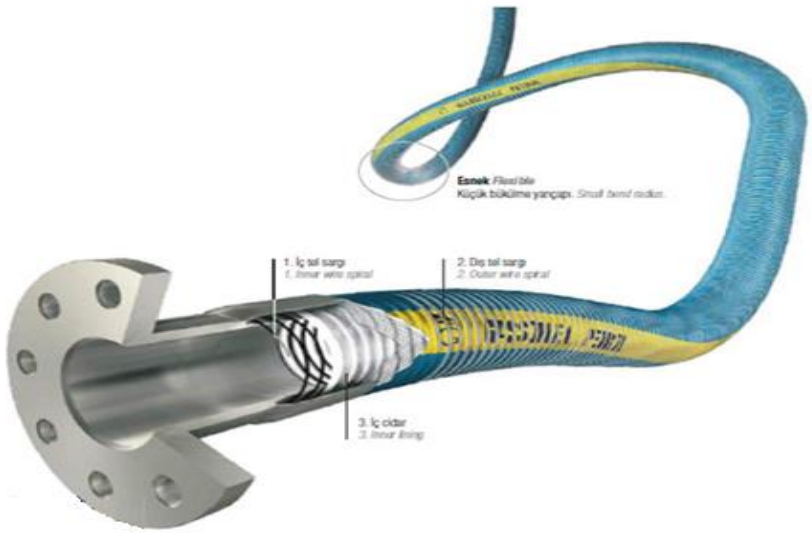


Figure 25: Physical Appearance of the Loading-Unloading Hose (Figurative image)

Additionally, another hose of 3 inches in diameter and 4 meters in length was used to allow a gas return. The reduction was used to enable the hose flanges to correspond with the vessel manifolds ***(Figure 26)***

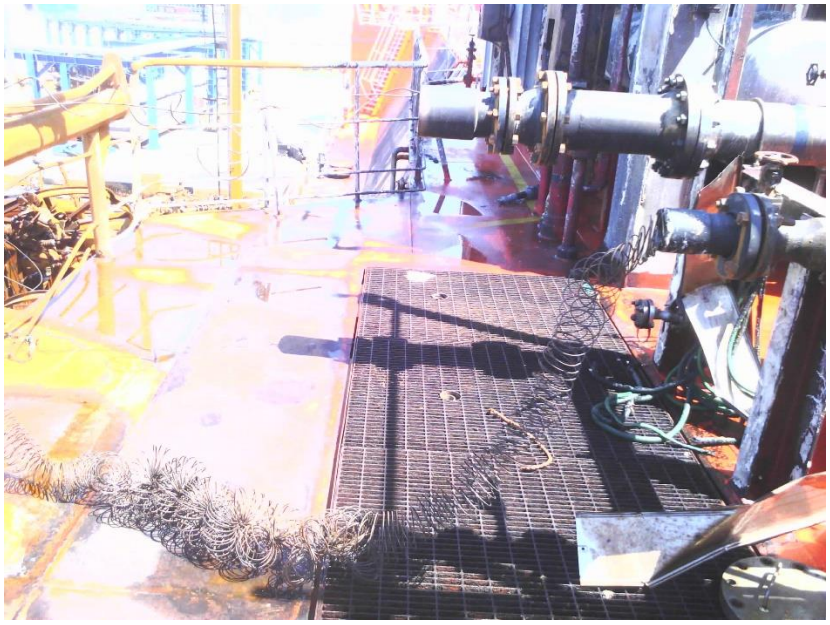


Figure 26: Appearance of the Hoses after Fire Fighting

Hoses were connected by the Terminal officers under the supervision of the 1st Officer of the vessel and the Loading Master. The Loading-Unloading hose used for connection was tested for pressure and sealing by a certified body on 28.06.2019 and reported to be suitable for use. Further, we witnessed that the used hose was certified in accordance with the criteria, specified under the ISGOTT[15] Rules.

It has been found in the certificate that the sudden burst pressure of the Loading-Unloading hose is 70 bar and the hose is suitable for C3 type cargo filling only if the maximum operating pressure is 14 bar ***(Annex– 3)***.

As can be seen from the pressure monitoring log of the factory pump, considering that the pressure ranged at 35 bar and above up to 6 minutes before the explosion time, the hose is considered to burst as a result of exposure to high pressure above acceptable values for 6 minutes.

Based on the foregoing issues, it has been evaluated that there was no fault in the used hose and reduction and the hoses were connected following the procedures.

[15] International Safety Guide for Oil Tankers and Terminals

3.3.4 Safety Meeting and Safety Check List

The points to be considered under ISGOTT rules with regard to the process of Safety Control Meeting and Safety Checklist of the Vessel/Terminal ***(Annex-4)*** are listed as follows;

The Master is responsible for fulfilling all obligations incumbent on the vessel. Similarly, the terminal officer must also check the liabilities incumbent on the terminal. To fulfil these obligations, it must be made sure that both parties fully accept the safety standards required by the operation.

They can accomplish this as follows;

- *Confirmation that the authorized persons have satisfactorily completed the checklist. In case of any concern, completion of the checklist by senior staff,*
- *Access to the relevant records,*
- *Performance of joint audits where necessary.*

To maintain the safety environment, a Terminal Officer and a Responsible Officer must perform periodical checks onboard and at the terminal within the time frames before and after the commencement of operations to make sure that the obligations agreed in the checklist are managed effectively.

If it is found that basic safety requirements are not met, both parties may suspend cargo and ballast operations until the situation is remedied.

Additionally, a clause that is included in Permanent Company Orders under Safe Management System of the Vessel contains the following Instruction;

"Fulfillment of a good night watch for tracking tank levels, especially during loading and monitoring the loading rate to determine the estimated end timing"

In consideration of the interviews with the parties and the data obtained, we evaluated that the loading operations were carried out under the Safety Control Meeting held before loading and Permanent Company Orders. However, no specific instruction was found at vessel on how and in what periods the pressure gauges were monitored at vessel for the

possibility of sudden pressure increase in the loading lines and no data was available on how the tank levels were monitored.

These causes are considered to be among the other factors that contributed to the accident.

3.4 Emergency Actions

3.4.1 SYN ZANIA

As a result of examination on board and the terminal, the scenery, examination of footages documents obtained and the interviews held with the relevant crew, some findings have been reached in respect of the emergency management on board after the accident under International Safe Management Code (ISM Code) and Safety Management System of the Vessel.

It was found in the records that the drill was held with the scenario of "Fire after an explosion in the cargo section" on 28.06.2019, three days before the accident. As can be understood from the relevant drill records in ***Annex-5***, it was noted that a successful drill was performed with the participation of all crew. When the drill details were examined, there were problems in practising the actions that were followed and performed during the scenario-event at the time of the accident.

Yet, it was found in the statements that all crew did not attend to drills and it was evaluated that this situation did not raise the crew awareness, which is an important factor in risk management, to the expected level.

In the interviews held with the crew, the Master had difficulties in controlling his crew due to panic, caused by explosion and fire and some crew abandoned the vessel by jumping into the sea without taking any order for abandonment. The crew stated that the thermal effect of open flame and fire that was dissipated from the vessel towards the port quarter by the wind prevented the access to the lifeboat floor on the port side, which was the gathering point, and thereby using a lifeboat for abandonment was considered to be unsafe and the strong thermal effect also prevented the rescue boat and inflatable life raft to be used ***(Figure 29)***.

Besides, as again can be seen from the expressions and footages, the vessel was abandoned by means of the ropes that were dangled from the mooring pipes and only two crew was able to wear lifebuoy ***(Figure 27-28)***

As can be understood from the autopsy report of the 2nd engineer who lost his life, the fact that the cause of death is drowning has once again indicated the importance of the use of equipment to survive in the sea.

Additionally, when the use of the fire system equipped onboard is examined, they tried to repond the fire by activating only the sprinkler system, and as the fixed dry chemical powder extinguishing station and balls, the effective extinguishing method in gaseous fires, that was deployed onboard remained at the fire scene, they could not access and thus the systems could not be used.

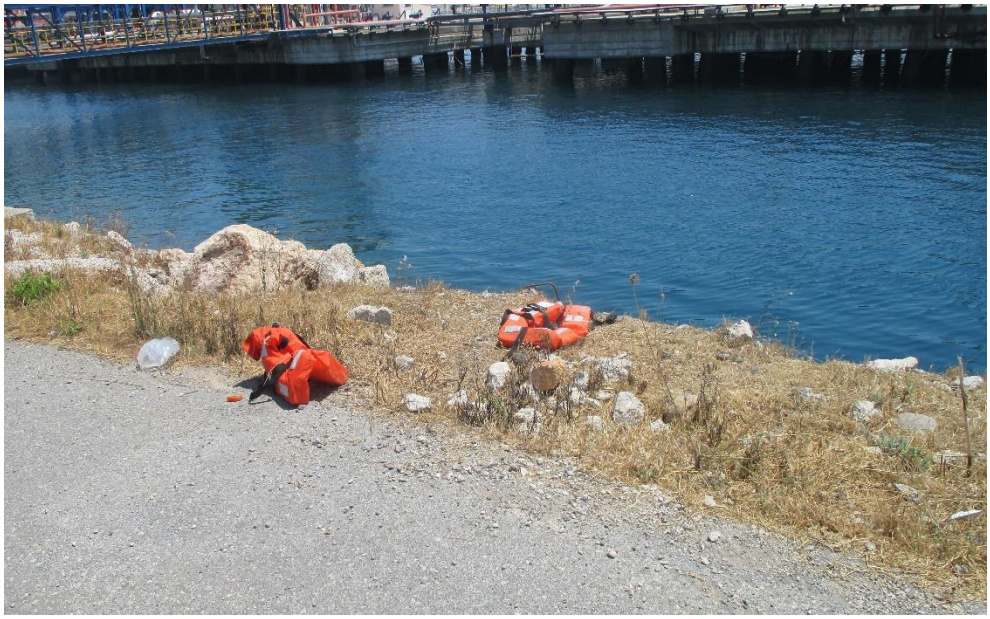


Figure 27: Life Jackets Found at the Shore

Figure 28: The Wire Rope Used for Abandoning

Figure 29: Locations of the Lifeboat, the Rescue Boat and the Life Raft

3.4.2 Terminal

Fire Fighting

As a result of the examination of the post-accident footages and the fire response report obtained, it is evaluated that the fire responding operations were managed and performed in accordance with the procedures and scenarios included in the Emergency and Response Plan of PETKIM Port.

Search & Rescue

It is considered that the crew who abandoned the vessel was taken out of the sea quickly and safely in terms of both emergency management and response.

Besides, it is found out in the records that some crew members who came ashore by swimming were safely evacuated by the pilot boat. Also, a first-aid was applied to the 2nd engineer who was taken ashore unconscious by the vessel crew first and thereafter he was referred to the hospital by the ambulance that arrived at the scene. However, it was not possible to rescue the victim.

SECTION 4 – CONSEQUENCES

4.1 After proceeding to the liquid flow phase, the pressure on the loading pump ranged around 35 bars for 6 minutes.

4.2 The possibility that one of the valves on the vessel cargo circuits was closed/ have been closed caused the pressure on the lines to increase.

4.3 The hose was ruptured in consequence of being exposed to high pressure above acceptable values for 6 minutes due to the increase in pressure on cargo transferring lines.

4.4 The increase in pressure on cargo transferring lines was not noticed until leakage neither by the vessel nor the terminal.

4.5 There was no warning system for the sudden pressure changes on cargo transferring lines.

4.6 The Loading-Unloading hose that was used in loading operations was complying the standards and tested periodically.

4.7 No specific instruction regarding the pressure monitoring periods against the possibility of sudden pressure increase in the loading lines was found in the Safety Checklist of the Vessel/Terminal that was issued before the loading operations.

4.8 According to the “ullage” survey after the accident and the gravity loading form, there was no cargo intake into the vessel tanks.

4.9 The problems came up in practicing the actions that were followed and performed during the abandonment drill, which was exercised under the Safe Management System, at the time of the accident.

4.10 The fire responding and search and rescue operations by the Port Operation after the accident was performed in accordance with the procedures and scenarios included in the Emergency and Response Plan.

4.11 The sprinkler system among the fire extinguishing systems available on board was able to be used against the fire outbreak, however, it was not possible to use other extinguishing systems and equipment.

SECTION 5 - RECOMMENDATIONS

The following recommendations are made by considering the analysis and results obtained from the accident investigation.

The Ship Owner / Manager are recommended;

19/06-20 To circulate this Safety Investigation Report throughout the fleet in order to draw the crewmembers attention,

20/06-20 To take effective actions in order to ensure active participation to abandonment drills according to the Safety Management System.

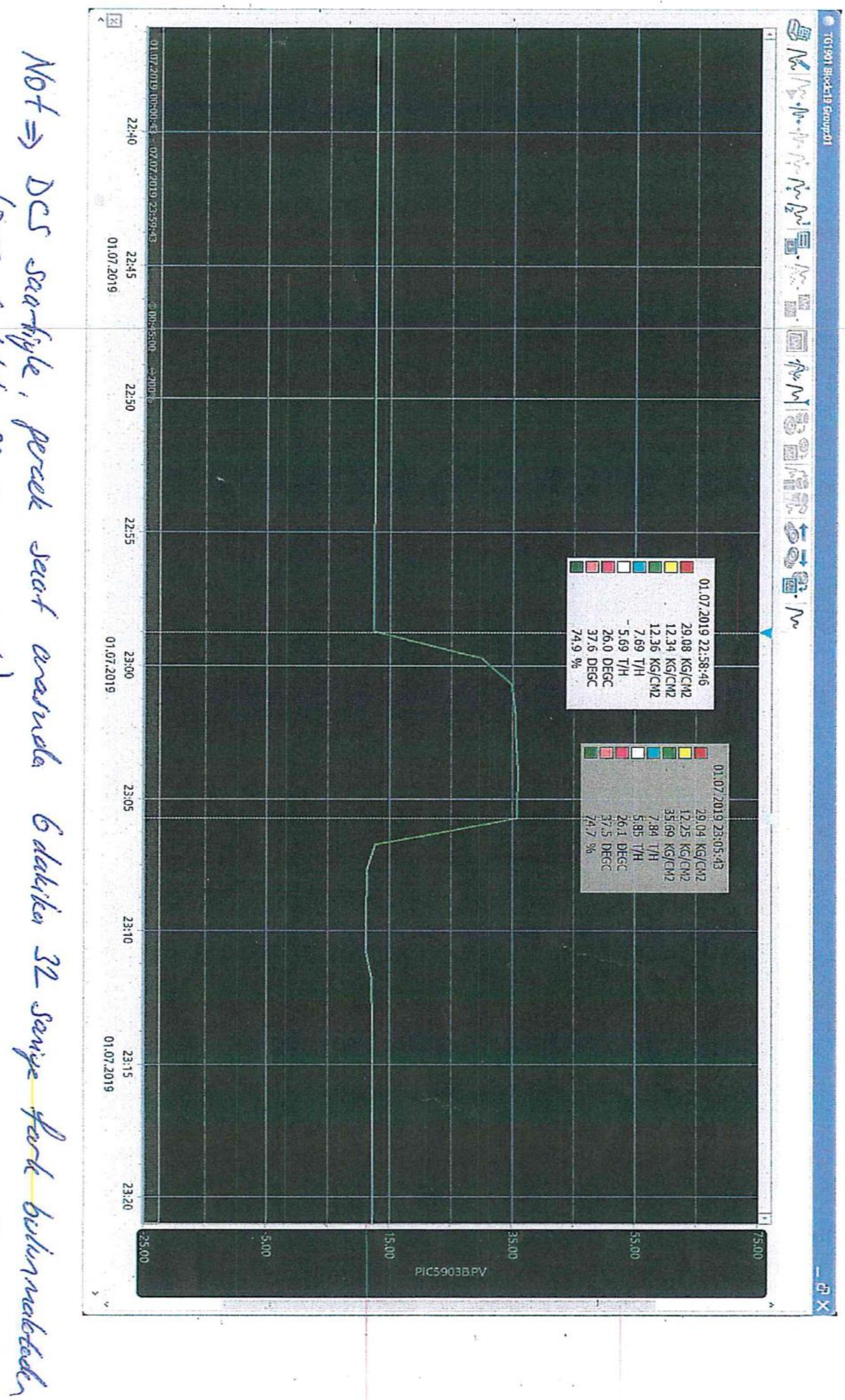
21/06-20 To Revise "Loading Procedures" in a way to include tank level and line pressure continuous monitoring that are carried out under the Safety Management System of Company/Vessel and/or integrating an early alerting mechanism for sudden pressure changes,

The Terminal is recommended;

22/06-20 To take effective actions in order to ensure efficient monitoring of the transfer progress and line pressure included in Transfer Instruction,

ANNEXES

ANNEX – 1



There is a 6' 32" time difference between the real tine and the log

ANNEX – 2

Tankvision Professional

Endress+Hauser
People for Process Automation

PSP_01.07.19 22.30-02.07.19 00.00 (D-507/B)

Date/Time	Product Level (mm)	Product Temperature (°C)	Reference Density (kg/l)	Total Mass (t)
01/07/2019 22:45:00	10,226	28.1	0.5245	636.0
01/07/2019 22:46:00	10,226	28.1	0.5245	636.0
01/07/2019 22:47:00	10,226	28.1	0.5245	636.0
01/07/2019 22:48:00	10,226	28.1	0.5245	636.0
01/07/2019 22:49:00	10,226	28.0	0.5245	636.2
01/07/2019 22:50:00	10,226	28.0	0.5245	636.2
01/07/2019 22:51:00	10,226	28.0	0.5245	636.2
01/07/2019 22:52:00	10,226	28.0	0.5245	636.2
01/07/2019 22:53:00	10,226	28.0	0.5245	636.2
01/07/2019 22:54:00	10,226	27.9	0.5245	636.4
01/07/2019 22:55:00	10,226	27.9	0.5245	636.4
01/07/2019 22:56:00	10,226	27.9	0.5245	636.4
01/07/2019 22:57:00	10,226	27.9	0.5245	636.4
01/07/2019 22:58:00	10,226	27.9	0.5245	636.4
01/07/2019 22:59:00	10,226	27.9	0.5245	636.4
01/07/2019 23:00:00	10,226	27.8	0.5245	636.6
01/07/2019 23:01:00	10,226	27.8	0.5245	636.6
01/07/2019 23:02:00	10,226	27.8	0.5245	636.6
01/07/2019 23:03:00	10,226	27.8	0.5245	636.6
01/07/2019 23:04:00	10,226	27.8	0.5245	636.6
01/07/2019 23:05:00	10,226	27.8	0.5245	636.6
01/07/2019 23:06:00	10,226	27.7	0.5245	636.8
01/07/2019 23:07:00	10,226	27.7	0.5245	636.8
01/07/2019 23:08:00	10,226	27.7	0.5245	636.8
01/07/2019 23:09:00	10,226	27.7	0.5245	636.8
01/07/2019 23:10:00	10,226	27.7	0.5245	636.8
01/07/2019 23:11:00	10,226	27.6	0.5245	636.9
01/07/2019 23:12:00	10,226	27.6	0.5245	636.9
01/07/2019 23:13:00	10,226	27.6	0.5245	636.9
01/07/2019 23:14:00	10,226	27.6	0.5245	636.9
01/07/2019 23:15:00	10,226	27.6	0.5245	636.9
01/07/2019 23:16:00	10,226	27.6	0.5245	636.9
01/07/2019 23:17:00	10,226	27.7	0.5245	636.8
01/07/2019 23:18:00	10,226	27.8	0.5245	636.6
01/07/2019 23:19:00	10,226	27.8	0.5245	636.6
01/07/2019 23:20:00	10,226	27.9	0.5245	636.4
01/07/2019 23:21:00	10,225	27.9	0.5245	636.3
01/07/2019 23:22:00	10,225	27.9	0.5245	636.3
01/07/2019 23:23:00	10,224	27.9	0.5245	636.2
01/07/2019 23:24:00	10,221	27.9	0.5245	636.0
01/07/2019 23:25:00	10,215	28.0	0.5245	635.4
01/07/2019 23:26:00	10,212	28.0	0.5245	635.2
01/07/2019 23:27:00	10,211	28.0	0.5245	635.1
01/07/2019 23:28:00	10,209	28.0	0.5245	635.0
01/07/2019 23:29:00	10,206	28.0	0.5245	634.8
01/07/2019 23:30:00	10,206	28.0	0.5245	634.8
01/07/2019 23:31:00	10,206	28.0	0.5245	634.8
01/07/2019 23:32:00	10,206	28.0	0.5245	634.8
01/07/2019 23:33:00	10,206	28.0	0.5245	634.8
01/07/2019 23:34:00	10,206	28.0	0.5245	634.8
01/07/2019 23:35:00	10,206	28.0	0.5245	634.8

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Date/Time	Product Level (mm)	Product Temperature (°C)	Reference Density (kg/l)	Total Mass (t)
01/07/2019 23:36:00	10,206	28.0	0.5245	634.8
01/07/2019 23:37:00	10,206	28.0	0.5245	634.8
01/07/2019 23:38:00	10,206	27.9	0.5245	635.0
01/07/2019 23:39:00	10,206	27.9	0.5245	635.0
01/07/2019 23:40:00	10,206	27.9	0.5245	635.0
01/07/2019 23:41:00	10,206	27.8	0.5245	635.2
01/07/2019 23:42:00	10,206	27.8	0.5245	635.2
01/07/2019 23:43:00	10,206	27.7	0.5245	635.3
01/07/2019 23:44:00	10,206	27.7	0.5245	635.3
01/07/2019 23:45:00	10,206	27.6	0.5245	635.5
01/07/2019 23:46:00	10,206	27.6	0.5245	635.5
01/07/2019 23:47:00	10,206	27.5	0.5245	635.7
01/07/2019 23:48:00	10,206	27.5	0.5245	635.7
01/07/2019 23:49:00	10,206	27.5	0.5245	635.7
01/07/2019 23:50:00	10,206	27.5	0.5245	635.7
01/07/2019 23:51:00	10,206	27.4	0.5245	635.9
01/07/2019 23:52:00	10,206	27.4	0.5245	635.9
01/07/2019 23:53:00	10,206	27.4	0.5245	635.9
01/07/2019 23:54:00	10,206	27.4	0.5245	635.9
01/07/2019 23:55:00	10,206	27.3	0.5245	636.1
01/07/2019 23:56:00	10,206	27.3	0.5245	636.1
01/07/2019 23:57:00	10,206	27.3	0.5245	636.1
01/07/2019 23:58:00	10,206	27.3	0.5245	636.1
01/07/2019 23:59:00	10,206	27.3	0.5245	636.1
02/07/2019 00:00:00	10,206	27.3	0.5245	636.1

NOT ⇒ Toplam kütle değeri sıcaklık değerine göre değişiklik göstermektedir.

⇒ Tankvision bilgisayarı saati ile gerçek saat arasında yaklaşık 12 dakika fark vardır. (12 dk. ileride)

Note ⇨ The total mass value varies according to the temperature value.

⇨ Tankvision co[redacted]e.

Report Printed: 05 Jul 2019 12:04:44

ANNEX - 3

EK6/2

[redacted]

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[redacted]

APPROVED DISTRIBUTOR

BASINÇ TEST SERTİFİKASI

Acc/3.1 EN 10204

REF NO: K293

MÜŞTERİ : [redacted]
SİPARİŞ NO :
İRSALİYE NO : 154607
SİPARİŞ MİKTARI :1 ADET
SERTİFİKAYA KONU MİKTAR: 1 ADET
SİPARİŞ TARİHİ:24/01/2019

TEDARİK EDİLEN HORTUM: KOMPOZİT KİMYASAL GASSO FLEX SST PTFE
HORTUM KODU:
HORTUM TANIMI: 6" KİMYASAL HORTUM 8 METRE

HORTUM YAPISI:
İÇ SPİRAL: PASLANMAZ
DIŞ SPİRAL: PASLANMAZ
İÇ KATMANLAR: POLİPROBLEN

BAĞLANTI UCU A: 6" 150LB DÖNER FLANŞ
BAĞLANTI UCU B: 6" 150LB DÖNER FLANŞ
A UCU MATERYAL/ÇAP: 6" FLANŞ
B UCU MATERYAL/ÇAP: 6" FLANŞ

ELEKTRİK İLETKENLİĞİ: $<10^6\ \Omega$

MAKSİMUM ÇALIŞMA BASINCI : 14 BAR
TEST BASINCI : 21 BAR
PATLAMA BASINCI :70 BAR
TEST SÜRESİ :7 DAKİKA

TESTTEN ÖNCEKİ UZUNLUK : 800CM
TEST SIRASINDAKİ UZUNLUK: 945CM
TEST SONRASI UZUNLUK : 840CM

İŞBU RAPORLA YUKARIDA DETAYLARI BELİRTİLEN HORTUMUN VERİLEN SİPARİŞE UYGUN OLARAK ÜRETİLDİĞİNİ VE UYGULANAN TEST SONUCUNDA SİPARİŞTE BELİRTİLEN BÜTÜN ŞARTLARA UYGUN OLDUĞUNU TEYİT EDERİZ.

NOT: ÜRÜN BASINÇ EKİPMAN YÖNETMELİĞİNE GÖRE ÜRETİLMİŞTİR.
2014/68/UE (GRUP 1, II ve Art. 4.3,I ve GRUP 2, I ve Art. 4.3)

İSTANBUL 26 / 03 / 2019

[redacted]

[redacted]

TARİH : Kontrol Tarihi :28.06.2019
Rapor Tarihi :29.06.2019
SAYI : Rapor No :30.6/7137/62

Cevaplarınızda yazımızın tarih ve sayısının belirtilmesini rica ederiz.

DOLUM-BOŞALTIM HORTUMU TEST RAPORU

Hortumun markası	: ETEHA
Hortumun seri numarası	: H-36-2
Hortumun uzunluğu	: 8 m.
Hortumun çapı	: 6 inch
Hortumun transfer ürünü	: C3
Uygulanan Basınç	: 15 bar

DENEY

Dolum-Boşaltım Hortumunun giriş ve çıkışları kapatılarak, 25 derece su ile 15 bar basınçta, 30 dakika süreyle test basıncı uygulanmış ve test sonunda hortumda herhangi bir deformasyon veya sızıntı olmadığı görülmüştür.

SONUÇ :

Yukarıda teknik özellikleri ve test sonundaki durumu belirtilen Dolum-Boşaltım Hortumunun kullanılması teknik yönden uygundur.

ANNEX – 4

EK-1

[redacted] [redacted]

GEMİ/SAHİL EMNİYET KONTROL LİSTESİ - SHIP/SHORE SAFETY CHECK LIST

Date/Time (Tarih/Saat) : 01 / 07 / 2019 ..... : ..... Ship's name (Gemi İsmi [redacted]

Berth (Rıhtım) : TKR-II ☐ TKR-III ☐ TKR-V ☒ Cargo (Yük) : PGP Loading

LİSTE DOLDURMA TALİMATI:

INSTRUCTIONS FOR COMPLETION:

Operasyonların emniyeti için tüm maddelerin uygun olarak işaretlenmesi gerekmektedir. (kutunun içine ☑ işaretl yaparak). Eğer olumlu olarak işaretlenemiyorsa sebep belirtilmelidir ve gemi ile terminal arasında alınacak önlemler üzerinde mutabık kalınmalıdır. Herhangi bir maddenin uygun olmadığı varsayıldığı yerde açıklamalar kısmına not düşülmelidir.

The safety of operations requires that all substance checking affirmatively. If an affirmative substance checking is not possible, the reason shold be given and agreement reached upon appropriate precautions to be taken between the ship and terminal. Where any substance is not considered to be applicable a note to that effect should be inserted in the remark column.

-Kod sütunundaki A, P veya R harflerinin olması şunları ifade eder.

-The presence of this symbol in the "ship" and "terminal" indicates that checks shall be carried out by the party concerned. The precence of letters " A" and "P,R" in the column " Code" indicates the following.

A- Herhangi bir işlem ve mutabakat bu kontrol listesinin açıklamalar kısmına yazılmalıdır. Diğer durumlarda her iki tarafın imzası gereklidir.

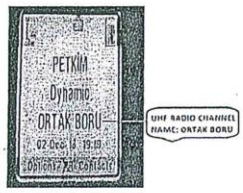
A- The mentioned procedures and agreement shall be in writing and be signed by both parties.

P- Cevabın olumsuz olması durumunda, operasyon Liman yetkililerinden izin alınmadan yapılamaz.

P- In case of a negative answer the operations shall not be carried out without the permission of the Port Authority.

R- İşaretli maddeler zaman zaman tekrar kontrol edilmelidir.

R- Marked items checked regularly.

A) Dökme Sıvı Genel, Fiziksel Kontroller Bulk Liquid General, Physical Checks	Gemi/ Ship	Sahil/ Terminal	Kod/ Code	Açıklama/ Remarks
1- Gemi/sahil arasında emniyetli geçiş vardır. *There is a safe Access between ship and shore.*	☒	☑	R	Ship's Gangway
2- Gemi emniyetli bir şekilde rıhtıma bağlanmıştır. *Ship is securely moored*	☒	☑	R	
3- Gemi/sahil arasındaki haberleşme faaldir. *The agreed ship/shore communication system is operative.* 	☑	☑	A R	System: Shore Radio UHF Channel Name: ORTAK BORU ~~Backup Radio: OBT 949 UHF~~ Backup System: Mobile Phone LM Phone No: +90 553 019 60 61, VERBAL Call Sign: Loading Master and Ship's Name Ship's Phone No: .....
4- Acil çekme halatları doğru olarak yerleştirilmiş ve donatılmıştır. *Emergency towing-off pennants are correctly rigged and positioned.*	☒	☑	R	Required
5- Geminin yangın hortumları ve acil müdahale teçhizatı yerinde ve kullanıma hazırdır. *The ships fire hoses and firefighting equipment are positioned and ready for immediate use.*	☐		R	
6- Terminal yangın hortumları ve acil müdahale teçhizatı yerinde ve kullanıma hazırdır. *The terminal's fire hoses and firefighting equipment is positioned and ready for immediate use.*		☑	R	
7- Gemi eşya ve yakıt hortum, devreleri manifoldları iyi durumda, kullanılacağı amaca uygun ve yerine gereğince bağlanmıştır. *The ship Cargo and bunker hoses, pipelines and manifolds are in good condition, properly rigged and appropriate for the service intended.*	☑			
8- Terminal eşya ve yakıt hortum ve dolum kolları iyi durumda, kullanılacağı amaca uygun ve yerine gereğince bağlanmıştır. *The terminal Cargo and bunker hoses or arms are in good condition, properly rigged and appropriate for the service intended.*		☑		

[redacted] [redacted]

GEMİ/SAHİL EMNİYET KONTROL LİSTESİ - SHIP/SHORE SAFETY CHECK LIST

9- Eşya transfer sistemi, bağlantıdan önce kör flanş ile izole edilmiştir. *The Cargo transfer system is sufficiently isolated and drained to allow safe removal of blank flanges prior to connection.*	☑	☑		
10- Gemideki frengi tapaları uygun olarak takılmış, tavalar yerinde ve boştur. *Scuppers and save-alls on board are effectively plugged and drip trays are in position and empty.*	☑		R	
11- Geçici olarak açılan frengi tapaları sürekli takip edilmektedir. *Temporarily removed scupper plugs will be constantly monitored.*	☑		R	
12- Sahildeki yağ çukurları uygundur. *Shore spill containment and sumps are correctly managed.*		☑	R	
13- Geminin kullanılmayan eşya ve yakıt manifoldları kör flanşla sıkıca kapatılmıştır. *The ship's unused Cargo and bunker connections are properly secured blank flanges fully bolted.*	☑			
14- Terminalin kullanılmayan eşya ve yakıt manifoldları kör flanşla sıkıca kapatılmıştır. *The terminal's unused Cargo and bunker connections are properly secured with blank flanges fully bolted.*		☑		
15- Tüm eşya, balast ve yakıt tank kapakları kapalıdır. *All Cargo, ballast and bunker tank lids are closed.*	☑			
16- Kullanılmayan deniz ve borda tahliye vanaları kapalı ve görünür şekilde bağlıdır. *Sea and overboard discharge valves, when not in use, are closed and visibly secured.*	☑			
17- Yaşam mahalli, iç bölmeler ve makine dairesindeki tüm dış kapılar, açıklıklar, lumbuzlar kapalıdır. Makine dairesi havalandırmaları açık olabilir. *All external doors, ports and windows in the accommodation, stores and machinery spaces are closed. Engine room vents may be open.*	☑		R	
18- Gemi acil yangın müdahale planları görülecek şekilde dışarıya yerleştirilmiştir. *The ship's emergency fire control plans are located externally.*	☑			Planın yeri/Location: NEAR ACCOMODATION
İnert Gaz Sistemi – Inert Gas System	**Gemi/ Ship**	**Sahil/ Terminal**	**Kod/ Code**	**Açıklama/ Remarks**
19- Sabit IGS basıncı ve oksijen miktarını kayıt edici cihazlar çalışıyor. *Fixed IGS pressue and oxygen content recorders are working.*	☑		R	
20- Bütün kargo tankları %8 veya daha az oksijen içerir ve pozitif basınçtadır. *All Cargo tanks atmosphere are with oxygen content of %8 less by volume and at positive pressure.*	☑		PR	
B) Dökme Sıvı Genel – Sözlü Doğrulama Bulk Liquid General – Verbal Verification	**Gemi/ Ship**	**Sahil/ Terminal**	**Kod/ Code**	**Açıklama/ Remarks**
21- Gemi kendi makinesi ile harekete hazırdır. *The ship is ready to move under its own power.*	☑		PR	
22- Gemide etkin bir güverte nöbeti, gemi ve terminalde operasyonu takip edecek yeterli görevli vardır. *There is an effective deck watch in attendance onboard and adequate supervision of operations on the ship and in the terminal.*	☑	☑	R	
23- Sahilde ve gemide acil bir durumda müdahale için yeterli personel vardır. *There are sufficient personnel on board and ashore to deal with in emergency.*	☑	☑	R	
24- Eşya, yakıt ve balast elleçleme için prosedürlerde mutabakat sağlanmıştır. *The procedures for cargo, bunker and ballast handling have been aggreed.*	☑	☑	AR	
25- Gemi ve sahil tarafından kullanılacak acil durum sinyali ve prosedürü açıklandı ve anlaşıldı. *The emergency signal and shutdown procedure to be used by the ship and shore have been explained and understood.*	☑	☑	A	3 x STOP by Shore Radio
26- Eşyaya ait MSDS formu talep edildiğinde karşı tarafa verildi. *Material Safety Data Sheets (MSDS) for the cargo transfer have been exchanged where requested.*	☑	☑	PR	
27- Elleçlenmekte olan eşyanın içindeki zehirli maddeler ile bağlantılı tehlikeler tanımlandı ve anlaşıldı. *The hazards associated with toxic substances in the cargo being handled have been identified and understood.*	☑	☑		H_2S Content: Benzene Content:
28- Uluslararası standartlarda sahil yangın bağlantısı vardır. *An international shore fire connection has been provided.*	☑	☑		
29- Mutabık kalınan gemi tankları havalandırma sistemi kullanılacaktır. *The agreed tank venting system will be used.*	☑	☑	AR	Method: closed
30- Kapalı operasyonlar için mutabakat sağlandı. *The requirements for closed operations have been agreed.*	☑	☑	R	
31- P/V sisteminin çalışması doğrulandı. *The operation of P/V system has been verified.*	☑			
32- Buhar dönüş devresi bağlandı ise çalıştırma parametrelerinde mutabakat sağlandı. *Where a vapour return line is connected, operating parameters have agreed.*	☑	N/A	AR	only for emergency

[redacted] [redacted]

GEMİ/SAHİL EMNİYET KONTROL LİSTESİ - SHIP/SHORE SAFETY CHECK LIST

33- Eğer donatılmışsa, yüksek seviye alarmları test edildi, çalışır durumda. *Independent high level alarms, if fitted, are operational and have been tested*			A R	
34- Gemi sahil bağlantısında uygun elektrik izolasyonu sağlanmıştır. *Adequate electrical insulating means are in place in the ship shore connection.*			A R	
35- Sahil hatlarında çek valf bulunmaktadır. Ters akışı önleyecek prosedürlerde mutabık kalındı. *Shore lines are fitted with a non-return valve, or procedures to avoid back filling have been discussed.*			P R	
36- Sigara içme yerleri tanımlandı ve sigara içme koşulları gözden geçirildi. *Smoking rooms have been identified and smoking requirements are being observed.*			A R	Nominated smoking rooms: Crew Mess, Officers Messroom On shore smoking not permitted
37- Sıcak iş kuralları gözden geçirildi. *Naked light regulations are being observed.*			A R	
38- Gemi/sahil telefonlar, cep telefonları, el telsizleri ve benzer elektronik cihazların kullanımı konusunda mutabakat sağlandı. *Ship/shore telephones, mobile phones, radios and pager requirements are being observed.*			A R	
39- El fenerleri onaylanmış tiptedir. *Hand torches (flashlights) are of an approved type.*				
40- Sabit VHF/UHF telsizleri ve AIS donanımı doğru güç modunda veya kapalıdır. *Fixed VHF/UHF transceivers and AIS equipment are on the correct power mode or switched off.*				
41- El VHF/UHF telsizleri onaylanmış tiptedir. *Portable VHF/UHV transceivers are of approved type.*				
42- Geminin ana telsiz verici anteni topraklanmış ve radarı kapalıdır. *The ship's main radio transmitter aerials are earthed and radars switched off.*				
43- Tehlikeli bölge içindeki seyyar elektrikli cihazların bağlantıları güç kaynağından ayrılmıştır. *Electric cables to portable electrical equipment within the hazardous area are disconnected from power.*				
44- Pencere tipi klima cihazları devre dışıdır. *Window type air conditioning units are disconnected.*				
45- Kimyasal gazların girebileceği yaşam mahalleri pozitif basınç ile korunmaktadır ve havalandırma sistemi girişleri kapalıdır. *Positive pressure is being maintained inside the accommodation and air condition intakes, which may permit the entry of cargo vapours are closed.*				
46- Pompa dairesinde yeterli mekanik havalandırma olması için önlemler alınmıştır. *Measures have been taken to ensure sufficient mechanical ventilation in the pump room.*			R	
47- Acil durumda kaçış olanağı bulunmaktadır. *There is provision for an emergency escape.*				
48- Operasyonlar için maksimum rüzgar ve dalga değerinde mutabakat sağlandı. *The maximum wind and swell criteria for operations have been agreed.*			A	Stop cargo at:25 knots Disconnect at:28 knots Unberth : 30 knots
49- Gemi güvenlik zabiti ve Liman tesisi güvenlik görevlisi güvenlik yönergelerinde mutabık kaldılar. *Security protocols have been agreed between the Ship Security Officer and Port Facility Security Officer, if appropriate.*			A	
50- İnertleme ve devre temizliği için sahilden alınacak nitrojen operasyonunda mutabakat sağlandı. *Where appropriate procedures have been agreed for receiving nitrogen supplied from shore, either for inerting or purging ship's tank's. or for line clearing into the ship.*			A P	

İnert Gaz Sistemi – Inert Gas System Eğer gemi bir inert gaz sistemi (IGS) ile donatılmışsa veya donatılmasını talep etmişse, aşağıdaki form doldurulmalıdır. *If the ship is fitted or is required to be fitted, with an inert gas system (IGS) the following statements should be addressed:*	Gemi/ Ship	Sahil/ Terminal	Kod/ Code	Açıklama/ Remarks
51- IGS çalışır ve iyi durumdadır. *The IGS is fully operational and in good working order.*			P	
52- Güverte sızdırmazlık sistemi veya eşdeğer sistem çalışır durumdadır. *Deck seals, or equivalent, are in good working order.*			R	
53- Basınç ve vakum kırıcılardaki sıvı seviyeleri doğrudur. *Liquids levels in pressure/vacuum breakers are correct.*			R	
54- Sabit ve seyyar oksijen analiz cihazlarının kalibrasyonları yapılmış ve çalışmaktadır. *The fixed and portable oxygen analyzers have been calibrated and are working properly.*			R	
55- Her bir tankın IG valfi (eğer varsa), doğru bir şekilde bağlı ve kilitlidir.			R	

[redacted] [redacted]

GEMİ/SAHİL EMNİYET KONTROL LİSTESİ - SHIP/SHORE SAFETY CHECK LIST

All the individual tank IG valves (if fitted) are correctly set and locked.				
56- Eşya operasyonları ile ilgili tüm personel, inert gas ünitesinde arıza olması durumunda tahliye işleminin durdurulması ve terminale bilgi verilmesi gereğini bilmektedir. *All personnel in charge of cargo operations are aware that, in the case of failure of the inert gas plant, discharge operations should cease and the terminal be advised.*	☐			

Tank Yıkaması – Tank Cleaning Eğer gemi iskelede bağlı iken tank yıkaması planlıyorsa aşağıdaki form doldurulmalıdır. *If Ship is planning to clean alongside, the following statements should be adressed.*	Gemi/ Ship	Sahil/ Terminal	Kod/ Code	Açıklama/ Remarks
57- Gemi sahil tesisine yanaşık kaldığı esnada tank temizlik operasyonları planlamıştır. *The tank cleaning operasyon are planned during the ship's stay alongside the shore installation.*	Y☐ N☐	Y☐ N☑		
58- Cevap evetse, tank temizliği için prosedür ve onaylarda mutabakat sağlandı. *If yes, the procedure and approvals for tank cleaning have been aggred.*	☐	N/A		
59- Tanklarda gaz free yapılması işlemine izin verildi. *Permission has been granted for gas freeing operations.*	Y☐ N☐	Y☐ N☑		

C) Dökme Sıvı Kimyasallar – Sözlü Doğrulama Bulk Liquid Chemicals – Verbal Verification	Gemi/ Ship	Sahil/ Terminal	Kod/ Code	Açıklama/ Remarks
1- Yükün elleçlenmesi için gerekli bilgiyi veren MSDS mevcuttur. *MSDS are available giving the necessary data for the safe handling of the cargo.*	☐	☐		
2- Eğer uygulandıysa, imalatçı inhibitor sertifikası temin edildi. *A manufacturer's inhibition certificate, where applicable, has been provided.*	☐	☐	P	
3- Yeterli koruyucu giysi ve ekipman (kendinden destekli solunum aygıtı dahil) derhal kullanıma hazırdır ve elleçlenen eşya ile uyumludur. *Sufficient protective clothing and equipment (including self-contained breathing apparatus) is ready for immediate use and is suitable for the product being handled.*	☐	☐		
4- Kazayla eşyaya temas edilmesine karşı alınacak önlemler anlaşıldı. *Countermeasures against accidental personnel contact with the cargo have been agreed.*	☐	☐		
5- Kullanılıyorsa otomatik durdurma sistemi ile eşya elleçleme debisi uygundur. *Cargo handling rate is compatible with the automatic shutdown system, if in use.*	☐	☐	A	
6-Yük sistem göstergeleri ve alarmları doğru olarak ayarlanmıştır ve iyi durumdadır. *The Cargo systems gauges and alarms are correctly set and in good order.*	☐	☐		
7- Seyyar gaz detektörleri, elleçlenen eşyanın özellikleri ile uyumludur. *Portable vapour detection instruments are readily available for the products being handled.*	☐	☐		
8- Yangınla mücadele araçları ve prosedürlerinde bilgi alışverişinde bulunuldu. *Information on firefighting media and procedures has been exchanged.*	☐	☐		
9 –Transfer hortumları, elleçlenen eşyanın etkilerine dirençli, uygun malzemelerden yapılmıştır. *Transfer hoses are of suitable material, resistance to the action of products being handled.*	☐	☐		
10 –Eşya elleçlemesi sabit boru hatları sistemi ile yapılmaktadır. *Cargo handling is being performed with the permanent installed pipeline system.*	☐	☐	P	
11 –İnertleme ve devre temizliği için sahilden alınacak nitrojen operasyonu için mutabakat sağlandı. *Where appropriate procedures have been agreed for receiving nitrogen supplied from shore, either for inerting or purging ship's tank's for line clearing into the ship.*	☐	☐	A P	

D) Dökme Sıvı Gazlar – Sözlü Doğrulama Bulk Liquefied Gases – Verbal Verification	Gemi/ Ship	Sahil/ Terminal	Kod/ Code	Açıklama/ Remarks
1- Yükün elleçlenmesi için gerekli bilgiyi veren MSDS mevcuttur. *MSDS are available giving the necessary data for the safe handling of Cargo.*	☑	☑		
2- Bir imalatçı inhibisyon sertifikası uygun olduğu yerde temin edildi. *A manufacturer's inhibition certificate, where applicable, has been provided.*	N/A	N/A	P	
3- Su püskürtme sistemi derhal kullanıma hazırdır. *The Water spray system is ready for immediate use.*	☑	☑		
4- Yeterli koruyucu giysi ve ekipman (kendinden destekli solunum aygıtı dahil) derhal kullanıma hazırdır ve elleçlenen eşya ile uyumludur. *Sufficient protective clothing and equipment (including self-contained breathing apparatus) is ready for immediate us and is suitable for the product being handled.*	☑	☑		
5- Kargo Tankı ve inter-barrier boşluğu yeterli miktarda inert yapıldımı ya da kuru hava ile doldurulduı mu?	☑			

[redacted] [redacted]

GEMİ/SAHİL EMNİYET KONTROL LİSTESİ - SHIP/SHORE SAFETY CHECK LIST

Hold and inter-barrier space are properly inerted or filled with dry air as required.				
6- Tüm kontrol vanaları çalışır durumdadır. *All remote control valves are in working order.*	☒	☑		
7- Kargo pompa ve kompresörleri iyi durumdadır ve maksimum çalışma basıncında gemi ve sahil arasında mutabakat sağlanmıştır. *The required Cargo pumps and compressors are in good order, and the maximum working pressures have been agreed between ship and shore.*	☒	☑	A	
8- Gaz sıvılaştırma ekipmanı çalışır durumdadır. *Re-Liquefaction or boil off control equipment is in good order.*	☒	☑		
9- Gaz detektörleri eşyanın özelliklerine uygun ayarlanmış, kalibrasyonu yapılmış, test ve kontrol edilmiş çalışır durumdadır. *The gas detection equipment has been properly set for the Cargo, is calibrated, has been tested and inspected and in good order.*	☒	☑		
10- Yük sistem göstergeleri ve alarmları doğru olarak ayarlanmış ve iyi durumdadır. *The Cargo systems gauges and alarms are correctly set and in good order.*	☒	☑		
11- Acil durdurma sistemleri test edildi, çalışır durumdadır. *Emergency shutdown systems have been tested and are working properly.*	☒	☑		
12- Acil kapatma vanaları, otomatik vanalar ve benzer cihazların kapanma oranları/basınçları hakkında gemi ve sahil birbirini bilgilendirdi. *Ship and shore have informed each other of the closing rate of ESD valves, automatic valves or similar devices.*	☒	☑	A	
13- Elleçlenecek kargonun max/min sıcaklık ve basınç değerleri hakkında gemi ve kıyı arasında bilgi değişimi yapılmıştır. *Information has been exchanged between ship and shore on the maximum/minimum temperatures/pressures of the Cargo to be handled.*	☒	☑	A	
14- Tanklar, elleçleme esnasında sürekli olarak taşmaya karşı korunmaktadır. *Cargo tanks are protected against inadvertent overfilling at all times while any Cargo operations are in progress.*	☒			
15- Kompresör odası basınçlandırılmış ve alarm sistemleri çalışır durumdadır. *The compressor room is properly pressurised and alarm system is working.*	☒			[illegible] SPACE
16-Tank tahliye vanaları, doğru ayarlanmıştır ve vanaların durumu gözle izlenebilmektedir. *Cargo tank relief valves are set correctly and actual relief valve settings are clearly and visibly displayed. (record settings below)*	☒	☑		

ORTAK BİLDİRGE / *DECLARATION*

Bu kontrol listesini gerektiği yerde ortaklaşa olarak kontrol ettik, bilgimiz dahilindeki girişlerin doğru olduğundan emin olduk. Ayrıca ihtiyaç duyulduğunda kontrollerin tekrarlanması için gerekli düzenlemeyi yaptık ve kontrol listesindeki "R" kodları ile işaretlenen maddelerin 4 saati aşmayan aralarla yeniden kontrol edilmesi gerektiği kararına vardık.

We have also made arrangements to carry out repetitive check as necessary and agreed that those items code "R" in the check list should be re-checked at intervals not exceeding 4 hours.
If to our knowledge the status of any item changes we will immediately inform the other party.

GEMİ ADINA / *FOR SHIP*		SAHİL ADINA / *FOR SHORE*	
İsim / *Name*	[redacted]	İsim / *Name*	[redacted]
Görev / *Rank*		Görev / *Rank*	
İmza / *Signature*		İmza / *Signature*	
Tarih / *Date*		Tarih / *Date*	
Saat / *Time*		Saat / *Time*	21:00 LT

ANNEX – 5

Emesso da Ufficio SMS	Approvato da AMMINISTRATORE DELEGATO	Data 17.01.2019	Revisione 2	Page 1 of 2
INCENDIO *FIRE*				ISM-ECL-007

Nave: *Ship:* [redacted]		**Data:** Date: 28-6-2013	
Posizione: *Position:* NAVIGATION			
Motivo per la Compilazione *Reason fo the Compilation*	**Esercitazione** *Drill*	X	**Emergenza Reale** *Real Emergency*

n.	Azioni *Action*	SI *Yes*	NO *No*	N/A *N/A*	Ora *Time*
	APPENA E' STATO RILEVATO L'INCENDIO *AS SOON AS THE FIRE HAS BEEN DETECTED*				
1	**L'Ufficiale sul ponte è stato informato sul principio d'incendio attraverso gli avvisatori incendio manuali, telefono etc.** *Deck Officer has been informed on the beginning of a fire through the manual fire alarm, phone etc.)*		X		
2	**Attivare l' ALLARME INCENDIO** *Sound the "FIRE ON BOARD SIGNAL"*	X			10^00
3	**Chiamare il Comandante** *Call the Master*	X			10^00
4	**Radunare tutto l'equipaggio alla Muster Station, controllare se vi sono dispersi** *Muster all crew at Muster Station, check for missing persons*	X			10^05
5	**Fermare le operazioni del carico e/o del combustibile se in corso** *Shut down cargo and /or bunker operations if any*			X	
6	**Se necessario procedere con lo stacco in emergenza del braccio di terra** *If necessary proceed with the emergency disconnection of the shore arm*			X	
7	**Informare la sala macchina (se l'incendio non è in sala macchina o se non presidiata)** *Inform the Engine Room (if the fire is not in the Engine Room or if it is not manned)*	X			10^01
8	**Attivare la pompa incendio primaria o quella di emergenza** *Activate main or emergency fire pump*	X			10^00
9	**Isolare i circuiti elettrici della zona interessata dall'incendio** *Isolate all the electrical circuits of the area of the fire*	X			10^00
10	**Chiudere le porte tagliafuoco automatiche e manuali** *Close automatic and manual fire doors*			X	
11	**Chiudere le porte stagne** *Close watertight doors*	X			10^06
12	**Chiudere porte, osteriggi, oblò** *Close doors, skylights, portholes*	X			10^06
13	**Chiudere le serrande tagliafuoco, valvole combustibile, pompe combustibile, valvole casse servizio e decantazione etc** *Shut down Fire Dampers, fuel valves, fuel pumps, fuel service tanks, settling tanks etc.*	X			10^08
14	**Se in porto o nelle vicinanze, avvisare Autorità Portuali, servizi antincendio di terra, i vigili del fuoco.** *If in port or nearby, alert Port Authorities, shore fire service, fire brigades,*			X	
15	**Assicurarsi che il raccordo internazionale per il collegamento a terra sia propriamente sistemato sul posto** *Ensure that the International Shore Connection is properly fitted in place*			X	
16	**Ricevere prontezza della squadra antincendio / squadra recupero persone / squadra raffreddamento nella zona interessata dall'incendio** *Receive readiness of the fire team /rescue team / cooling team of the fire area*	X			10^10
17	**Evacuare il personale non necessario ed i passeggeri dall'area interessata dall'incendio, ed assicurarsi che tutti gli accessi siano interdetti** *Evacuate unnecessary personnel/passengers from fire area and ensure all accesses are interdicted*			X	
18	**Posizione nave disponibile in Stazione Radio, aggiornare come necessario il terminale satellitare e gli altri trasmettitori di soccorso automatici** *Vessel position available in radio room, satellite terminal and other automatic distress transmitters, updated as necessary*	X			10^00
19	**Informare la Compagnia - DPA** *Inform the Company - Designated Person ashore*	X			10^03
20	**In navigazione accostare/variare la velocità per minimizzare il diffondersi del fuoco** *At sea alter course and speed to reduce and minimize fire spread*	X			10^00
21	**Controllare se vi sono dispersi tra l'equipaggio** *Check for missing crew*	X			10^05
22	**Azionare i sistemi fissi estinzione incendio per la zona interessata:** *Operate fire extinghuishing system according to the area involved as follow:*	X			10^01
23	A- **Incendio in sala macchina** *Fire in the Engine Room*		X		
24	B- **Incendio nelle cucine** *Fire in the Galley*		X		
25	C- **Incendio nelle zone alloggio / Ponti esterni** *Fire in the Accommodation Area / External deck*		X		
26	D- **Incendio nella zona del carico** *Fire in the cargo Area*	X			10^01

[redacted]

Emesso da Ufficio SMS	Approvato da AMMINISTRATORE DELEGATO	Data 17.01.2019	Revisione 2	Page 2 of 2
INCENDIO *FIRE*				ISM-ECL-007

	SE L'INCENDIO NON E' STATO ESTINTO *IF THE FIRE HAS NOT BEEN EXTINGUISHED*					
	SE IN NAVIGAZIONE *IF AT SEA*					
27	**Preparare i mezzi di salvataggio** *Prepare lifesaving means*			X		
28	**Trasmettere segnali di pericolo alla navigazione su tutte le frequenze di soccorso** *Navigational warnings broadcasted on all distress frequencies*			X		
29	**Inviare messaggio di soccorso se l'incendio non è sotto controllo sulle frequenze di soccorso** *Distress message send if fire not under control on all distress frequencies*			X		
30	**Su ordine del Comandante procedere con l'abbandono nave** *On Master order proceed with the abandon ship*			X		
	SE IN PORT *IF IN PORT*					
31	**Se in porto fare scendere tutto il personale non direttamente coinvolto nelle operazioni** *If in port evacuate all the personnel not directly involved in the operations*			X		
32	**Coordinarsi con le autorità di terra per dirigere la nave fuori dal porto** *Coordinate with shore authority to direct the vessel out of the port*			X		
33	**Su ordine del Comandante procedere con l'abbandono nave** *On Master order proceed with the abandon ship*			X		
	SE L'INCENDIO E' STATO ESTINTO *IF THE FIRE HAS BEEN EXTINGUISHED*					
34	**Un'investigazione dell'area interessata è stata eseguita** *Thorough investigation of the area has been carried out*	X			10^{35}	
35	**È stato accertato che tutte le sorgenti di ignizione sono state eliminate** *Has been ascertained that all source of ignition have been removed*	X			10^{40}	
36	**L'area è stata opportunamente ventilata ed i fumi residui eliminati** *Area has been properly ventilated and all residual fumes blown out*			X		
37	**L'energia elettrica per la ventilazione meccanica è stata ripristinata** *Electrical power mechanical ventilation has been restored*	X			10^{45}	
38	**Accertare il danno all'installazione a terra se in porto** *Assess damage to shore installation if in port*			X		
39	**Accertare il danno al carico (se esiste)** *Assess damage to own cargo (if any)*			X		
40	**Determinare le cause dell'incendio** *Determine cause of fire*	X			10^{50}	
41	**Accertare danni alla nave** *Assess damage to own vessel*	X			10^{45}	
42	**Se c'è perdita d'olio collegata con l'incendio, informare le parti interessate (riferirsi al SOPEP o al piano VRP se entro le acque territoriali USA)** *If there is a spill of oil in connection with the fire, inform appropriate parties(refer to SOPEP or VRP plan if within USA territorial waters*			X		
43	**Se possibile, prendere foto dei danni provocati dall'incendio** *If available take photos of area damaged by the fire*			X		
44	**Informare se occorrono parti di rispetto** *Notify if spare parts required*			X		
	Annotare i tempi e fatti sul Giornale Nautico *Enter all times and facts in log book*			X		
46	**Valutare necessità presenza / rapporto del perito** *Surveyor attendance/report*			X		
47	**Valutare necessità presenza / rapporto del P&I e H&M** *P & I attendance / report*			X		
48	**Salvare i dati del VDR o del S-VDR se non automaticamente protetti** *Preserve VDR or S-VDR records if not automatically protected*			X		

Descrizione degli eventi (descrivere l'evento e la prontezza dell'equipaggio nel fronteggiarlo)
Summary of the event (describe the event and the promptness of the crew to face it)

SIMULATA ESPLOSIONE SEGUITA DA INCENDIO NELLOCALE COMPRESSORI CARICO
TUTTO L'EQUIPAGGIO SI' DIMOSTRATO PRONTO A FRONTEGGIARE L'EMERGENZA

Firma Ufficiale che compila il check list *Officer filling in the check list signature*	[redacted]
Firma del Comandante *Master Signature*	