Marine Safety Investigation Unit

Transport Malta

MARINE SAFETY INVESTIGATION REPORT

Safety investigation into the collision between the

Maltese registered bulk carrier

EVANGELIA PETRAKIS

and the Bahrain registered container vessel

MAYSSAN

in the approaches to Xiazhimen TSS, East China Sea

in position 22° 44.10'N 122° 19.70'E

on 25 September 2014

201409/028

MARINE SAFETY INVESTIGATION REPORT NO. 23/2015

FINAL

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

This safety investigation report is not written, in terms of content and style, with litigation in mind and pursuant to Regulation 13(7) of the Merchant Shipping (Accident and Incident Safety Investigation) Regulations, 2011, shall be inadmissible in any judicial proceedings whose purpose or one of whose purposes is to attribute or apportion liability or blame, unless, under prescribed conditions, a Court determines otherwise.

The objective of this safety investigation report is precautionary and seeks to avoid a repeat occurrence through an understanding of the events of 25 September 2014. Its sole purpose is confined to the promulgation of safety lessons and therefore may be misleading if used for other purposes.

The findings of the safety investigation are not binding on any party and the conclusions reached and recommendations made shall in no case create a presumption of liability (criminal and/or civil) or blame. It should be therefore noted that the content of this safety investigation report does not constitute legal advice in any way and should not be construed as such.

MARINE SAFETY INVESTIGATION UNIT
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VDR of MV *Evangelia Petrakis*

GLOSSARY OF TERMS AND ABBREVIATIONS

AB	Able Seaman
AIS	Automatic Identification System
ARPA	Automatic Radar Plotting Aid
BA Chart	British Admiralty Chart
COLREGs	The International Regulations for Preventing Collisions at Sea, 1972 as amended
CPA	Closest Point of Approach
°C	Degrees Celsius
DSC	Digital Selective Calling
DWT	Deadweight Tonne
GPS	Global Positioning System
IMO	International Maritime Organization
LT	Local Time
LRS	Lloyd's Register of Shipping
m	Metre
MSA	Maritime Safety Administration of the People's Republic of China
MSIU	Marine Safety Investigation Unit
mt	Metric Tonnes
Nm	Nautical Mile
NKK	Nippon Kaiji Kyokai
OOW	Officer of the Watch
RPM	Revolutions per Minute
SMCP	Standard Marine Communication Phrase
STCW	The International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978, as amended
(T)	True course
TCPA	Time of Closest Point of Approach

TEU	Twenty Foot Equivalent Unit
TSS	Traffic Separation Scheme
UTC	Universal Time Co-ordinated
VDR	Voyage Data Recorder
VHF	Very High Frequency
VTS	Vessel Traffic Service

SUMMARY

At about 2257[1], on 25 September 2014, the Maltese registered bulk carrier *Evangelia Petrakis* and the 6921 TEU container ship *Mayssan* collided in the approaches to Xiazhimen Traffic Seperation Scheme (TSS), East China Sea. At the time of the accident, *Evangelia Petrakis* was enroute from Zhoushan to Zhangjiagang, China and *Mayssan* was approaching Xiazhimen TSS to embark pilot for Ningbo port.

Both vessels suffered extensive structural damage. There were, however, neither any injuries nor reported pollution.

The Marine Safety Investigation Unit (MSIU) found that the immediate cause of the accident was an inaccurate awareness of a situation which was dynamic and evolving during a critical period of time.

On the basis of the safety actions taken by the managers of MV *Evangelia Petrakis*, no recommendations have been made.

Background to the safety investigation

Since no evidence could be obtained from the Bahrain registered ship *Mayssan*, this safety investigation report has been prepared based on evidence collected from the officers and crew of *Evangelia Petrakis*, the findings of the Ningbo Harbourmaster and the Maritime Safety Administration of the People's Republic of China (MSA) into the circumstances on board *Evangelia Petrakis* leading to the collision. The sequence of events and timings were extracted from the VDR of *Evangelia Petrakis* and Ningbo VTS video / audio records at the time of the accident, which was kindly provided by the MSA.

The MSIU would like to acknowledge the support and assistance received from the MSA.

[1] Unless otherwise stated, all times are Ship's Time (UTC +8).

1 FACTUAL INFORMATION

1.1 Vessel, Voyage and Marine Casualty Particulars

Name	*Evangelia Petrakis*	*Mayssan*
Flag	Malta	Bahrain
Classification Society	Nippon Kaiji Kyokai	Lloyd's Register
IMO Number	9313060	9349526
Type	Bulk Carrier	Container
Registered Owner	Regency Freedom Company Ltd.	United Arab Shipping Co.
Managers	IOLCOS Hellenic Maritime Co., Ltd.	United Arab Shipping Co.
Construction	Steel (Double bottom)	Steel (Double Bottom)
Length overall	255.0 m	306.0 m
Registered Length	218.22 m	Unknown
Gross Tonnage	40485	75579
Minimum Safe Manning	16	Unknown
Authorised Cargo	Dry Bulk	Containers
Port of Departure	Zhoushan, China	Unknown
Port of Arrival	Zhangzhiagang, China	Ningbo, China
Type of Voyage	International	International
Cargo Information	Soya bean	Containers
Manning	24	Unknown
Date and Time	25 September 2014 at 2257 (LT)	
Type of Marine Casualty or Incident	Serious Marine Casualty	
	Serious Marine Casualty	Serious Marine Casualty
Location of Occurrence	In the approaches to Xiazhimen TSS in position Lat. 22° 44.10'N Long. 122° 19.70'E	
Place on Board	Forecastle deck, port and starboard bow, bulbous bow	Over side starboard side in way of cargo holds nos. 2 and 3
Injuries/Fatalities	None	None
Damage/Environmental Impact	None	None
Ship Operation	On passage	On passage
Voyage Segment	Transit	Unknown
External & Internal Environment	Dark, wind Northerly force 2, slight swell and good visibility.	
Persons on Board	24	Unknown

1.2 Description of Vessels

1.2.1 *Evangelia Petrakis*

Evangelia Petrakis is a dry bulk cargo ship classed with Nippon Kaiji Kyokai (NKK). She has seven cargo holds and is gearless. The vessel was built in 2007 in Shanghai by Hudong-Zhonghua Shipbuilding (Group) as Hull No. H1340A. The accommodation and the main machinery space are situated aft.

Evangelia Petrakis has a length overall of 225.0 m, a moulded breadth of 32.26 m and a moulded depth of 19.60 m. It has a summer draught of 14.25 m and a summer deadweight of 74476 mt.

The navigational equipment consists of two sets of radars with Automatic Radar Plotting Aids (ARPA), three sets of Very High Frequency (VHF) radiotelephone with Digital Selective Calling (DSC), two sets of Global Positioning System (GPS) Navigator, a gyro and magnetic compass, an echo sounder, a course recorder and an Automatic Identification System (AIS). Figure 1 shows a sketch of the bridge equipment arrangement on *Evangelia Petrakis.*

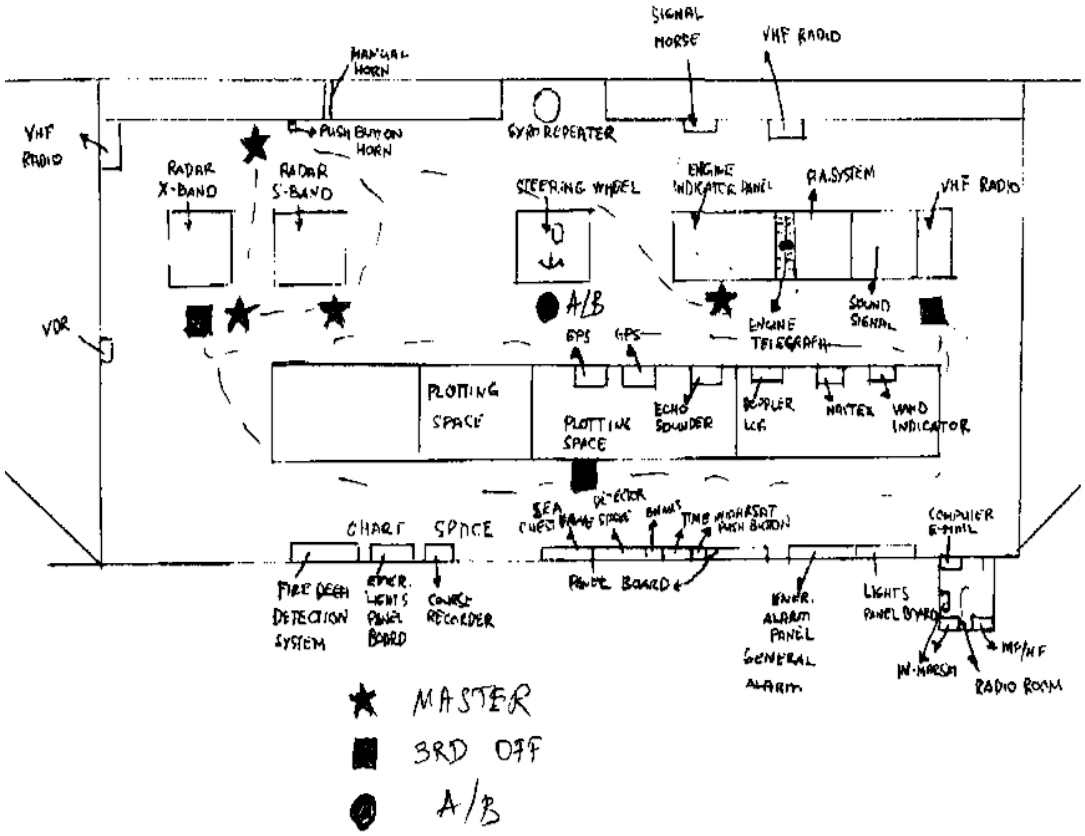

Figure 1: Sketch of the bridge equipment arrangement on *Evangelia Petrakis*

Propulsive power is provided by a 5-cylinder MAN-B&W 5S60MC-C, slow speed direct drive diesel engine producing 8990 kW at 92 rpm. This drives a single fixed pitch propeller, giving a service speed of 13.80 knots.

1.2.2 *Mayssan*

Mayssan is a fully cellular container ship, owned by United Arab Shipping Co. The vessel was built by Hyundai Heavy Industries Co. Ltd. in Ulsan, Korea in 2008 and is classed with Lloyd's Register (LR). She has seven cargo holds and is gearless. The vessel has eight cellular holds and can carry more than 6500 TEUs.

Mayssan has a length overall of 306.0 m, a moulded breadth of 40.0 m and a moulded depth of 24.50 m. It has a summer draught of 14.50 m and a summer deadweight of 85517 mt.

Propulsive power is provided by an 11-cylinder Wärtsilä, slow speed direct drive diesel engine producing 62920 kW at 102 rpm. This drives a single fixed pitch propeller, giving a service speed of 25.0 knots.

1.3 Bridge Manning on *Evangelia Petrakis*

Evangelia Petrakis was manned in accordance with her Minimum Safe Manning Certificate issued by the flag State Administration.

Prior to and at the time of the accident, the master, a 47 year old Russian national, had the con. The master's Certificate of Competency had been issued for over 14 years but had served as a master on various ships for eight years. He joined the present Company and boarded *Evangelia Petrakis* in July 2014.

The duty navigational OOW (third mate), who was with the master on the bridge at the time of the accident, was from the Philippines and was 30 year old. He had been on board for 11 months, *i.e.* since obtaining his Certificate of Competency.

An experienced and qualified AB, also from the Philippines, was the helmsman. At the time of the accident, he was manually steering the ship.

1.4 Environment

The wind was Northerly, 4 to 5 knots, the sea moderate and the visibility was very good. The outside air temperature was 25°C and the sea temperature was about 26°C. The current was running Northwest at about 2 knots. Visibility was reported to be good.

1.5 Ningbo VTS

Ningbo VTS provides traffic organisation service in accordance with the Maritime Traffic Safety Law of the People's Republic of China in the Ningbo VTS area, which include the water area along the coast of Daxie Island, the South Channel of Ningbo port, and the North and South Xiazhimen Anchorage. Traffic information and navigation assistance is provided on request by the Ningbo VTS on VHF working channels 6 and 8. The Ship Reporting System is mandatory and applicable to all foreign flagged ships. The format for reporting ship information is in accordance with the recommended text of IMO Resolution A.851(20).

1.6 Narrative

On 25 September 2014, *Evangelia Petrakis* departed Zhoushan port at around 1900 for Zhangjiagang, China. At 2228, she disembarked the pilot. She continued her voyage in the out-bound lane of the Xiazhimen Traffic Separation Scheme (TSS), maintaining a course between 130° and 135° and an average speed of 9.6 knots.

At 2245, a target identified as *Mayssan* was sighted both visually and on the radar. The target was about one point on the port bow of *Evangelia Petrakis*, and at distance of 5.55 nautical miles (nm). *Mayssan* was exhibiting green side light and masthead lights. *Mayssan* was in-bound on a course of 287°, approaching Xiazhimen TSS at 17 knots to pick up the pilot for Ningbo port. Both vessels were in a crossing situation. The CPA and TCPA were reported 0.12 nm and 12.6 minutes respectively. Relative position of both vessels is shown on BA Chart 1126 and the VDR screen shot (Figure 2).

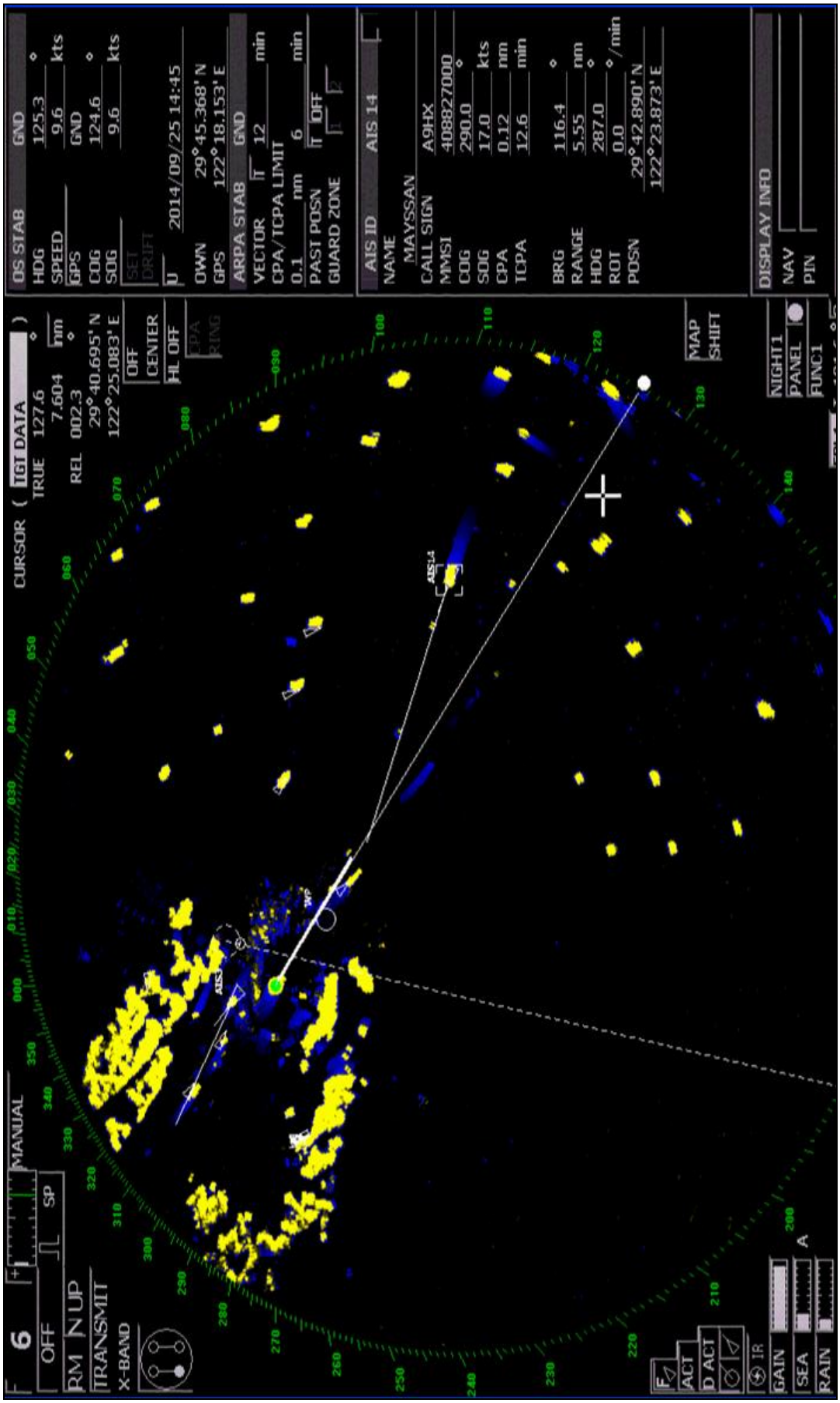

Figure 2: VDR screen shot showing CPA and TCPA

At 2247, *Evangelia Petrakis* reported her position to Ningbo VTS and reached waypoint no. 7 at 2251 (Figures 3 and 4). At the same time, she entered the precautionary area adjoining the Xiazhimen TSS. No course alteration was made for the next planned course 119°(T) at waypoint no. 7. Instead, she continued steering 130° and at which point, the third mate observed no change in *Mayssan's* green side light and masthead lights.

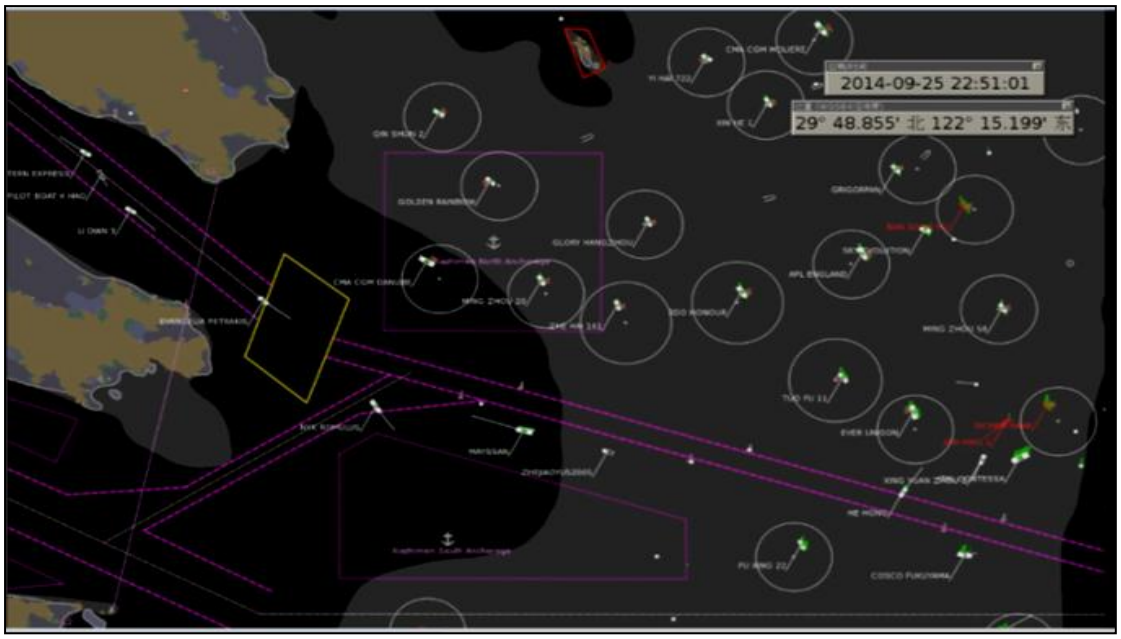

Figure 3: Screen shot from Ningbo VTS video at 2251

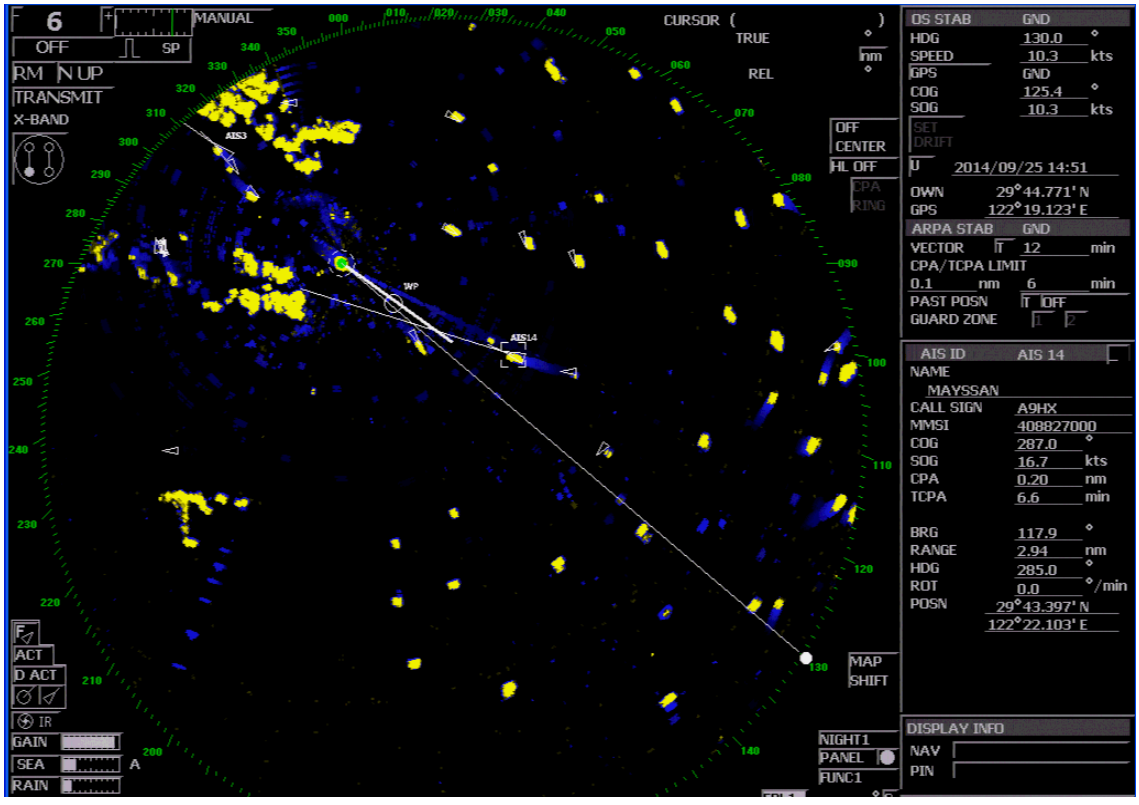

Figure 4: Screen shot from *Evangelia Petrakis* VDR at 2251

At 2254, with TCPA reading 3.4 minutes, the ARPA activated visual and audible alarms and *Evangelia Petrakis* altered course to 145º. At 2255/33s, Ningbo VTS called *Mayssan* on VHF channel 8 to enquire as to how she intended to pass *Evangelia Petrakis*. *Mayssan* acknowledged Ningbo VTS but did not indicate what action she intended to take. At 2256, *Evangelia Petrakis* called *Mayssan* and proposed to pass port to port. There was no reply from *Mayssan*.

When it became apparent that no action was being taken by *Mayssan*, the master of *Evangelia Petrakis* ordered the wheel hard-over-to starboard while the third mate called *Mayssan*, "motor vessel *Mayssan* starboard to starboard." As the two vessels advanced towards each other, Ningbo VTS called *Mayssan* to control her speed. The situation at 2257, just before the collision, is shown in Figures 5 and 6.

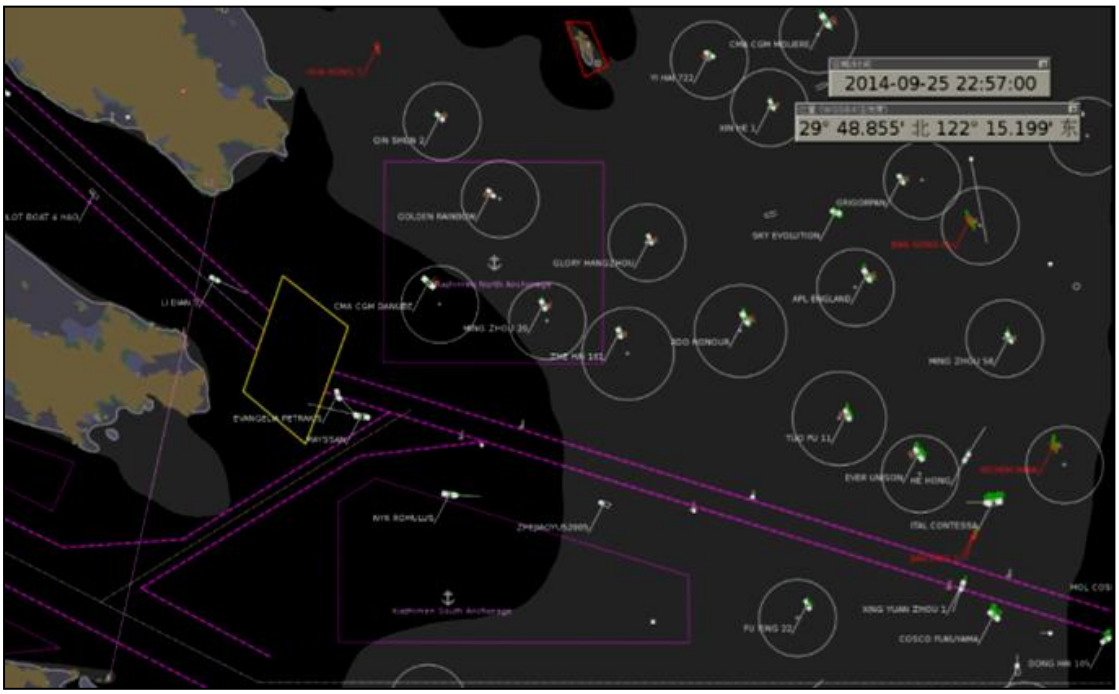

Figure 5: Screen shot from Ningbo VTS video display at 2257

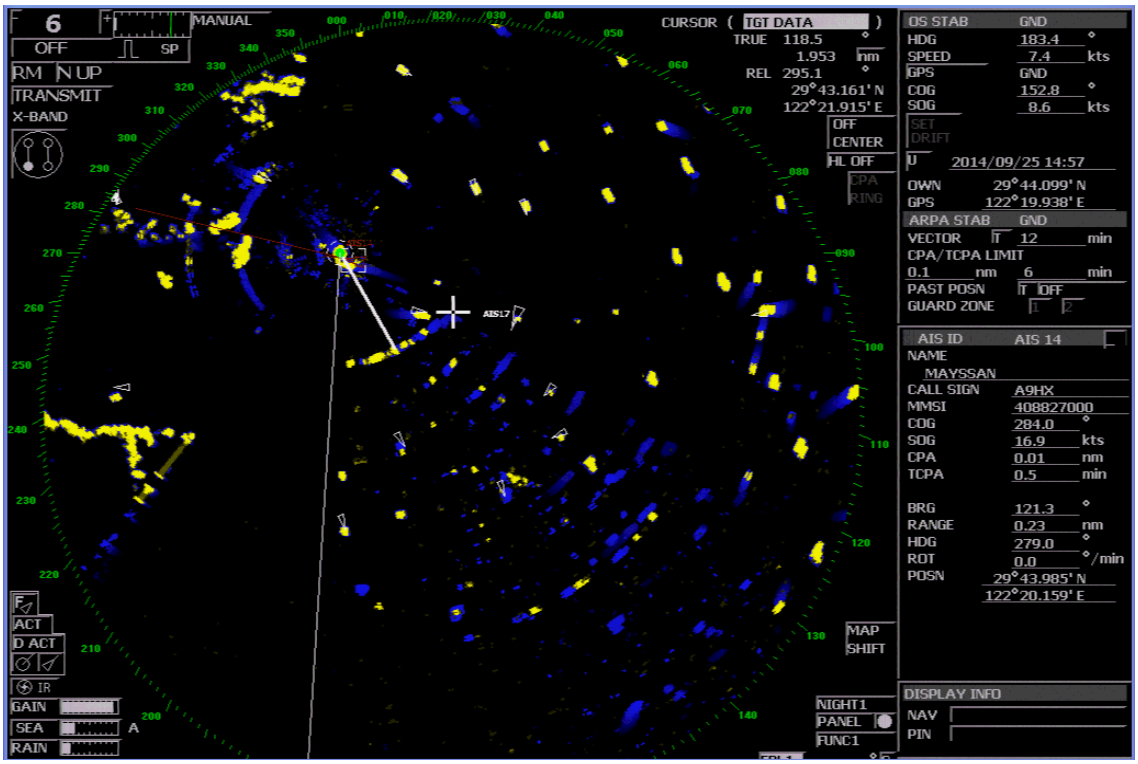

Figure 6: Screen shot from *Evangelia Petrakis* VDR at 2257

At 2257/30s, the bow of *Evangelia Petrakis* collided with *Mayssan*'s starboard side in way of cargo hold nos. 2 and 3 (Figure 7) just outside the precautionary area in position latitude 22° 44.10´N and longitude 122° 19.70´E.

Figure 7: Side shell plating damage on *Mayssan*

Since the damage on *Evangelia Petrakis* was mostly sustained on the stem and starboard bow relative to the port side, the collision angle was estimated about 40° between the two vessels (Figure 8).

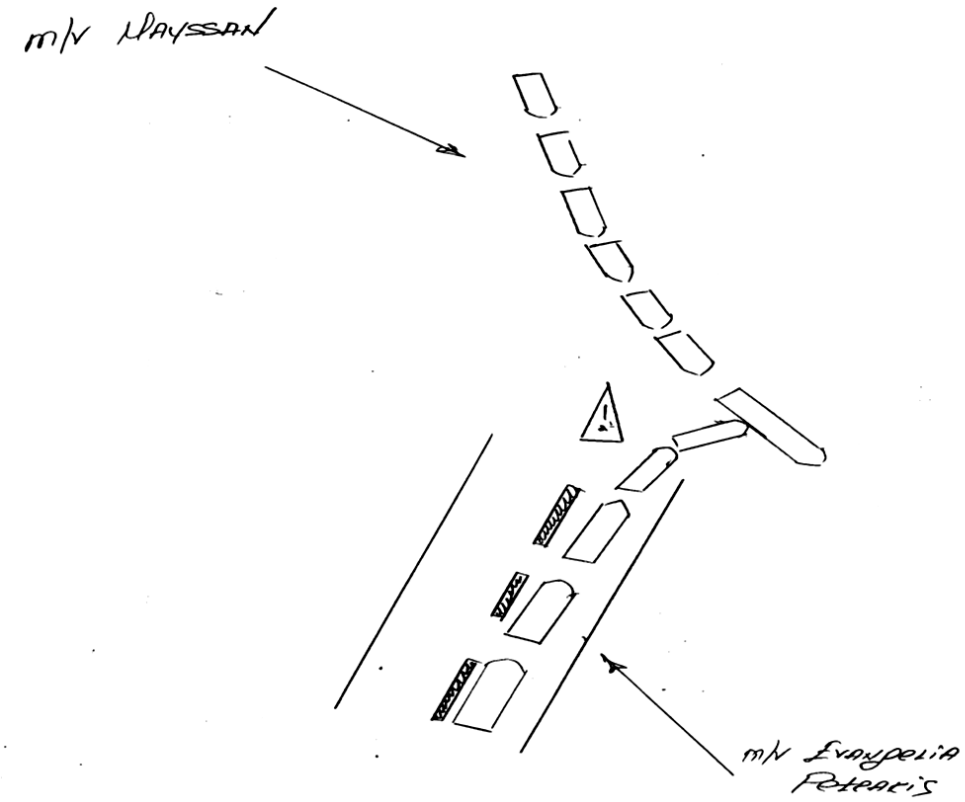

Figure 8: Sketch by *Evangelia Petrakis* showing angle of contact

1.7 Post Accident Events

Following the initial impact of the collision, both vessels slowed down and moved apart at an angle of 30°. *Evangelia Petrakis* sounded the general alarm and prepared an emergency response team. The crew led by the chief mate checked the structural damage and heavy fuel oil tanks for any leakages. There were no injuries and no oil pollution. At 2259, Ningbo VTS was informed of the accident. Shortly afterwards, the vessel proceeded to Xiazhimen North Anchorage where she dropped anchor at 0035 on 26 September 2014.

At 2308, *Mayssan* entered the in-bound lane of the Xiazhimen TSS at slow speed, where she arrived safely at her destination.

1.8 Inspection of Structural Damage on Board *Evangelia Petrakis*

On 27 September 2014, NKK Class surveyor carried out a damage survey on board *Evangelia Petrakis*.

The following damages were identified (Figures 9 and 10):

- Forecastle deck including fairleads, bollards, bulwark, air pipe, port anchor hawse pipe, bosun store *etc.* damaged or deformed;
- Port anchor and anchor chain lost;
- Shell plating with internals in way of forecastle deck were found damaged or deformed; and
- Forward section of bulbous bow severely deformed.

Figure 9: Bulwark and deck plating damage on the forecastle deck

Figure 10: Damages to the bow, anchor and anchor chain

2 ANALYSIS

2.1 Purpose

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

2.2 Fatigue

The Hours of Rest Form recorded the work schedule in the days leading up to the accident as required in the STCW requirements on hours of work and rest. There was no evidence to suggest that the bridge team involved in the collision were experiencing fatigue. Therefore, fatigue on board *Evangelia Petrakis* was not considered to be a contributing factor to this accident.

2.3 Drugs and Alcohol

There is no evidence to suggest that the crew members on board *Evangelia Petrakis* were intoxicated. The master of *Evangelia Petrakis* reported to the MSA at Ningbo that the crew members were neither intoxicated nor had imbibed alcohol or under the effect of drugs prior to the departure from the port of Zhoushan.

2.4 International Regulations for Preventing Collisions at Sea (COLREGs)

The following COLREGs were particularly relevant to this accident and taken into consideration by the MSIU during the course of the safety investigation:

- Rule 2 – Responsibility. This rule allows a departure from the collision prevention regulations when following the rules, will not avoid immediate danger. An action that ensures safety of the vessels may be taken that are different from the rules.
- Rule 5 – Lookout. This rule states that a lookout should be kept by all available means, sight, hearing and navigational equipment, to assess the risk

of collision. Where radar is used for detecting vessels, the range scale selection should be appropriate.

- Rule 7 – Risk of Collision. This rule requires that all means possible should be used to assess if a risk of collision exists as early as possible. Risk of collision is primarily determined by frequently checking the compass bearing of an approaching vessel. Such risk is deemed to exist if the compass bearing of an approaching vessel does not appreciably change.
- Rule 8 – Action to Avoid Collision. This rule requires that any action taken to avoid a collision is positive, clear and made in ample time. Such action, however, should not result in another close quarter situation.
- Rule 15 – Crossing Situation. When two power-driven vessels are crossing each other and there is risk of collision, the vessel which has the other on its own starboard side shall keep out of the way of the other and if possible, avoid crossing ahead of the other vessel.
- Rule 16 – Action by the give-way vessel. Every vessel required to give way must take early and substantial action to keep well clear.
- Rule 17 – Action by the stand-on vessel. Where one of two vessels is to keep out of the way, the other vessel should maintain its course and speed. The stand-on vessel may take action to avoid collision as soon as it is apparent that the give-way vessel is not taking the required actions. When taking such action, a stand-on vessel, if the circumstances of the case admit, should try to avoid altering course to port for a vessel on its own port side.
- Rule 34 – Manoeuvring and warning signals. Vessels in sight of one another are to warn other vessels by the use of sound and light signals of their intended manoeuvre or if in doubt whether sufficient action is being taken by the other vessel to avoid collision.

2.5 Traffic Situation in the Vicinity of *Evangelia Petrakis*

After dropping the pilot at 2228, *Evangelia Petrakis* proceeded on a course of 130° and entered the precautionary area at 2251. There were three vessels in close vicinity of *Evangelia Petrakis* (Figures 3 and 4). A review of the VDR data suggested that the

vessel identification, radio conversation and individual vessel action influenced the development of events leading to the collision.
Li Dian 3, which was about two nautical miles astern of *Evangelia Petrakis* was out-bound, with *Mayssan* showing on her port bow. *NYK Romulus*, out-bound and ahead of *Evangelia Petrakis* also had *Mayssan* on her port bow. *Mayssan* was slightly South of the Xiazhimen Kou Outside Deep Water Channel, about three nautical miles on *Evangelia Petrakis'* port bow.

Mayssan, which was on a course of 287° and making a speed of 17 knots was in a crossing situation with the three vessels. As explained in sub-section 2.4, Rule 16 of the COLREGs requires that in a risk of collision or close quarter situation, the vessel which has the other on its own starboard side shall keep out of the way of the other and if possible, avoid crossing ahead of the other vessel. Thus, *Mayssan* was required to take early and substantial action to keep well clear.

2.6 Additional Lookout

A proper look-out is a requirement prescribed in Rule 5 of the COLREGs. Moreover, the STCW Convention requires that the OOW may be the sole lookout in daylight provided that,

> *the situation has been carefully assessed and it has been established without doubt that it is safe to do so, full account has been taken of all relevant factors… and assistance is immediately available to be summoned to the bridge when any change in the situation so requires*.

This means that when a vessel is underway at night, a separate dedicated look-out is required in addition to the OOW as part of the navigational watch. The evidence submitted to the MSIU showed that there was no dedicated look-out posted on *Evangelia Petrakis* who could have assisted the master / OOW to maintain accurate situational awareness in the confined and congested waters of the Xiazhimen TSS.

2.7 Collision Dynamics - Extract of Audio Recordings from Ningbo VTS Data

Time (local) hh.mm.ss	*Station initiating call*	*Communication/Transcript*	*Observations*
22.46.00 to 22.46.54	*Ningbo Pilot (NP)*	*NP - "Ningbo pilot calling Mayssan. Ningbo pilot waiting for you...OK OK full speed. Full harbour speed inside. Pilot ladder port side! Is that correct?"*	*Mayssan reply inaudible.*
22.46.54 to 22.47.23	*Evangelia Petrakis (EP)*	*EP – "Ningbo VTS Ningbo VTS Evangelia Petrakis calling 9HSA8 please come in sir."* *NVTS – "Yes Ningbo VTS come in."* *EP – "Yes Sir. This is Evangelia Petrakis 9HSA8 Crossing reporting line. Outbound."* *NVTS.-"OK. Copy on that. See you."* *EP - "OK Sir thank you very much."*	*Evangelia Petrakis reporting to Ningbo VTS on crossing VTS boundary line.*
22.47.23 to 22.47.54	*Mayssan (M) to motor vessel NYK Romulus (NYKR)*	*M – "NYK Romulus NYK Romulus. This is motor vessel Mayssan inbound. How do you read me over?"* *NYKR – "Mayssan this is NYK Romulus will pass port to port."* *M – "Yes correct will pass port to port."* *NYKR – "Yes that's correct. I am giving more room so I will alter my course to port after few minutes."* *M – "OK OK thank you for your cooperation."* *NYKR – "No problem. Thank you."*	*NYK Romulus alters course to starboard.* *Mayssan maintaining course and speed.*
22.51.37 to 22.51.59	*Li Dian 3 (LD3)*	*Ld3 – "Mayssan Mayssan. Outbound vessel Li Dian 3 calling."* *M –"This is Mayssan replying please."* *LD3 – "Yes Mayssan. This is outbound vessel Li Dian 3. My next port Shanghai. We are passing starboard to starboard."* *M – "OK we go out starboard to starboard."*	*Mayssan approaching Evangelia Petrakis.* *Li Dian 3 astern of Evangelia Petrakis.*

22.53.57 to 22.54.53	*Mayssan (M)*	*M – "Li Dian 3 Li Dian 3 Mayssan calling over. Li Dian 3 Mayssan calling."* *LD3 – "Mayssan Li Dian 3 go ahead please. Over."* *M – "Yes please go more to port side. Go more to port side."* *Ld3 – "Mayssan Li Dian 3."* *M – "Yes Li Dian 3 please go more to port side over. Yes Li Dian 3 more to port side Li Dian 3 yes more port side."* *Ld3 – "OK OK starboard to starboard."*	*Evangelia Petrakis altered course to starboard.* *Mayssan misidentified Evangelia Petrakis for Li Dian 3 and repeatedly called her to move more to the port side.*
22.55.33 to 22.55.59	*Ningbo VTS (NVTS)*	*NVTS – "Mayssan Mayssan Ningbo VTS calling. Mayssan Ningbo VTS calling."* *M – "Mayssan replying speaking."* *NVTS – "How do you pass vessel ahead of you Evangelia Petrakis?"* *NVTS – "Outbound vessel Evangelia Petrakis Ningbo VTS..."*	*No reply from Mayssan.* *Ningbo VTS then called Evangelia Petrakis.*
22.56.00 to 22.56.20	*Evangelia Petrakis (EP)*	*EP – "Mayssan Mayssan we are passing port to port."* *NVTS – "Evangelia Petrakis pay attention to inbound vessel Mayssan. Pay attention to inbound vessel Mayssan over."* *EP – "(audible over the radio, 'hard-a-starboard'). Motor vessel Mayssan starboard to starboard."*	*No reply from Mayssan.* *No reply from Evangelia Petrakis.*
22.56.27 to 22.56.55	*Ningbo VTS (NVTS)*	*NVTS – "Mayssan Mayssan..."* *"Outbound vessel... Evangelia Petrakis how do you pass with Mayssan..."*	
22.56.56 to 22.57.08	*Evangelia Petrakis (EP)*	*EP – "Yes sir we are moving to starboard hard-a-starboard. We are turning the vessel. We go starboard Sir."*	

22.57.09 to 22.58.16	*Ningbo VTS (NVTS)*	*NVTS – "Mayssan control your speed! Control your speed!"*	
	Ningbo Pilot	*"Mayssan Mayssan Ningbo pilot calling."*	
	Ningbo VTS (NVTS)	*"Mayssan Mayssan Ningbo VTS calling."*	
		"Evangelia Petrakis Ningbo VTS calling." Evangelia Petrakis Ningbo VTS calling."	*No reply from Mayssan and Evangelia Petrakis*
		"Mayssan Mayssan Ningbo VTS. Mayssan Mayssan Ningbo VTS have you cleared?"	
		"Mayssan Mayssan have you cleared over?"	*VTS display show both radar targets merge (collision / contact) at 22h 57m 30s*

2.7.1 Action by *NYK Romulus*

At 2247, *Mayssan* and *NYK Romulus* agreed over the VHF radio to pass port to port (red to red). However, it was *NYK Romulus* that altered course to starboard and crossed ahead of *Mayssan*, the give-way vessel. Though both vessels passed clear of each other and there was no untoward event, clearly the action taken contravened COLREG Rules 15 and 16 where the stand-on vessel *NYK Romulus* became a give-way vessel while *Mayssan* maintained her course and speed.

2.7.2 Action by *Li Dian 3* / vessel identification error

At 2251, *Li Dian 3,* which was five nautical miles from *Mayssan* and about two nautical miles astern of *Evangelia Petrakis* was transiting the out-bound lane of the TSS. There was no immediate threat of close quarters situation; yet at 2252, *Li Dian 3* established radio contact with *Mayssan* and agreed to pass starboard to starboard (green to green), and altered course to port to allow safe passing distance.

Meanwhile, *Mayssan* was fast approaching *Evangelia Petrakis*. No radio communication had been established and collision avoidance action required by Rules 15 and 16 had not yet been taken by *Mayssan*. As soon as it became apparent that *Mayssan* had not taken any collision avoidance action, *Evangelia Petrakis* altered her course to starboard. Alarmed by the unexpected manoeuvre, *Mayssan* anxiously and repeatedly called on the VHF radio for the vessel to turn to port. Notwithstanding the fact that both *Evangelia Petrakis* and *Mayssan* were fitted with AIS, *Mayssan*

misidentified *Evangelia Petrakis* and addressed her urgent calls (intended for *Evangelia Petrakis*) to *Li Dian 3*. Meanwhile, *Li Dian 3* acknowledged *Mayssan*, altered course to port, and crossed into the in-bound lane of the Xiazhimen TSS.

2.7.3 Action by *Evangelia Petrakis*

At 2251, *Evangelia Petrakis* reached waypoint no. 7 but continued making a course of 130°. The main engine was on bridge control and the rpm was gradually raised to manoeuvring full speed. *Mayssan* was sighted one point on the port bow, range about three nautical miles, showing green side light and masthead lights. The ARPA indicated a CPA and TCPA of 0.2 nm and 6.6 minutes respectively with *Mayssan* crossing ahead of *Evangelia Petrakis*. *Mayssan* had not yet taken any collision avoidance action. Uncertainty and doubt concerning *Mayssan's* inaction was not addressed by sounding five short and rapid blasts on the ship's whistle nor the speed pulled back to gain more time to assess the situation.

Instead, at 2254, the master of *Evangelia Petrakis* altered course from 130° to 145°. In so doing, he exacerbated the already fast developing close quarters situation. The master claimed that he acted in accordance with the COLREGs. However, it appeared that not much consideration was given to the consequences of this action nor to Rule 2 of the COLREGs. *Mayssan* anxiously and repeatedly called the vessel to turn to port. However, *Mayssan's* calls, as noted above, were mistakenly addressed to *Li Dian 3* with whom she had agreed on a starboard to starboard passing. *Evangelia Petrakis,* meanwhile, continued with her starboard manoeuvre to pass on the port side of *Mayssan.*

Ningbo VTS was aware of the developing situation and hence called *Mayssan* to enquire as to how she intended to pass *Evangelia Petrakis.* On receiving no reply, Ningbo VTS immediately alerted *Evangelia Petrakis* to watch out for *Mayssan.* At 2256, the third mate called *Mayssan* on the radio, "*Mayssan Mayssan we are passing port to port"*; immediately followed by another message "*motor vessel Mayssan starboard to starboard"* as the master ordered the wheel hard to starboard. Ningbo VTS, which was monitoring the situation, called M*ayssan* to control her speed. It remained unclear as to how the conflicting radio message by *Evangelia Petrakis* was interpreted since *Mayssan* responded neither to Ningbo VTS nor to *Evangelia*

Petrakis. In any case, it was past 2257 and the collision avoiding action, if any, taken by *Mayssan* would have made no material change in the situation.

The result of this inaccurate situation awareness was that at 2257/30s, *Evangelia Petrakis* rammed into the starboard side of *Mayssan* at 10 knots. The order to stop the main engine and then full astern were given two minutes after the collision at 1459/32s.

2.8 Sound signals

COLREG Rule 34(d) requires that vessels in sight of one another and which are approaching each other and for any reason either vessel fails to understand the intentions or actions of the other, or is in doubt whether sufficient action is being taken by the other to avoid collision, the vessel in doubt shall immediately indicate such doubt by giving at least five short and rapid blasts on the whistle.

Such signal may be supplemented by a light signal of at least five short and rapid flashes. In this respect, given the uncertainty and doubt surrounding the conduct of *Mayssan*, *Evangelia Petrakis* did not comply with Rule 34(d) by not sounding the appropriate sound signals and Rule 34(a) - one short blast - when executing the starboard turn.

2.9 Communication and Use of VHF Radio in Collision Avoidance

It is recognised that the use of VHF makes an important contribution to navigational safety. However, its use to prevent a collision is not always helpful. In fact, valuable time is lost trying to establish identity or trying to make one's intentions understood rather than applying collision regulations. In certain circumstances, it may even lead to close quarters situation and / or a collision. Even where positive identification has been established, there is still the possibility of a misunderstanding due to language difficulties encountered by different crew nationalities on board.

Poorly constructed, incomplete or ambiguous message make their meaning difficult to comprehend. Moreover, by the time both vessels would have agreed on an action, they may come so close that the avoiding action taken by one or both ships may not

be sufficient to prevent a collision. Where there are several vessels in sight particularly at night, confusion may arise over the vessel's identification, as was the case which this safety investigation revealed in the case of *Li Dian 3*, *Evangelia Petrakis* and *Mayssan*.

Communication is considered to be a key in the co-ordination of manoeuvres in collision avoidance. It was clear for the MSIU that the vessels involved had experienced difficulties in communicating their mental models. It would seem that situational awareness was not shared accurately amongst the parties involved. Moreover, it would also seem that the OOWs involved had difficulties to articulate their understanding of the situation. It is unclear to the MSIU, however, whether the difficulty was also being experienced on board (internally), rather than between the ships only.

Information exchange is a key factor for decision-making and situational awareness (and accuracy). Although the available evidence suggested that there was two-way communication between the vessels involved, this mode of communication is not free from possible errors leading to (or arising from) confusion. For instance, following the misidentification of *Evangelia Petrakis* for *Li Dian 3*, and the feedback which the latter ship provided to *Mayssan*, it was evident that there was two-way communication. However, the response by *Li Dian 3* was reinforcing in the sense that rather than analysing why *Mayssan* was calling her, the request for course alteration was acknowledged.

The dangers related to VHF communication under such circumstances are clear. Being remote from one another, both vessels lacked the capacity for direct communication. *Per se*, this spatial barrier led to a lack of shared identity and lack of mutual awareness of the contextual aspects of one another.

2.10 Standard Marine Communication Phrases (SMCP)

Recognising the wide use of the English language for navigational communications, the IMO adopted Resolution A.918(22) on Standard Marine Communication Phrases. Its main purpose is to enhance navigational safety by standardisation of the terminology used in marine communications and recommended maritime education

institutions to support SMCP for qualifications and certification required by the STCW Code.

An important feature of the SMCP is the application of message markers that start at the beginning of a message. It is a single word used by the operator to indicate to the vessel what the content of the message to follow will be and avoid any doubt, misunderstanding or misinterpretation. There are eight message markers: Answer, Intention, Question, Warning, Advice, Information, Instruction, and Request.

An analysis of the VHF radio communications revealed that both SMCP and message markers were absent in the marine conversations referred to above.

2.11 Situation Awareness

Given that researchers such as Endsley consider situation *awareness* as a state of knowledge, one has to take into consideration the situation *assessment* – which will eventually lead to situation awareness. In both assessment and awareness, communication is crucial. This is so because in cases where there are different actors involved, as soon as they engage in their tasks, the specific situation will evolve and hence change; thereby creating the need to communicate the (collective) understanding of the newly developed specific situation.

The accident is a typical illustration of how a collision can occur as a consequence of inaccurate representation. For instance, the issue identified in sub-section 2.9 that *Li Dian 3* did not query a request to alter her course, may be due to a limited attention span. The OOW on the bridge was receiving significant amount of information in a brief period of time as a result of the developing situation outside his ship and within a brief period of time.

Tell-tales of an accurately shared mental understanding of a situation at hand are expectations and explanations (which must be shared). Absence of these suggest potential issues which would have been missed (lack of mutual expectations), leading to an inability to implement effective preventive and / or corrective strategies.

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

3 CONCLUSIONS

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

3.1 Immediate Safety Factor

.1 Both vessels had an inaccurate awareness of a situation, which was dynamic and evolving during a critical period of time.

3.2 Latent Conditions and other Safety Factors

.1 *Mayssan*, as the give-way vessel in accordance with COLREGs Rule 15 and Rule 16, did not take an early and substantial action to keep well clear of *Evangelia Petrakis*;

.2 *Evangelia Petrakis*, as the stand-on vessel found herself so close to *Mayssan* that collision could not be avoided by her action alone;

.3 The master of *Evangelia Petrakis* did not take into consideration the provisions of Rule 2 of the COLREGs or the consequences of executing a starboard turn as a collision avoidance action;

.4 *Mayssan* did not use the AIS to its full potential and misidentified *Li Dian 3* for *Evangelia Petrakis* with whom she had agreed a starboard to starboard passing;

.5 Both vessels did not maintain a proper look-out by sight and hearing as well as by all available means appropriate to the prevailing circumstances and conditions;

.6 *Evangelia Petrakis* did not sound the appropriate manoeuvring and warning sound / light signals when approaching *Mayssan* and when alteration of courses were carried out;

.7 The dangers related to VHF communication under such circumstances were not analysed by both vessels. Being remote from one another, both vessels lacked the capacity for direct communication. This spatial barrier led to a lack of shared identity and lack of mutual awareness of the contextual aspects of one another.

3.3 Other Findings

.1 *Evangelia Petrakis*' SMS manual on 'operational guidance for officers in charge of navigational watch' provided no specific instructions on the use of VHF radio for collision avoidance;

.2 *Evangelia Petrakis* did not slacken her speed, stop or reverse her engines to allow more time and space to assess the situation and then move cautiously;

.3 There was no use of the SMCP and message markers in the VHF radio communications.

4 ACTIONS TAKEN

4.1 Safety Actions Taken During the Course of the Safety Investigation

The Company has ensured that the findings of the safety investigation are communicated to all the vessels under its management. Standard marine communication phrases have been provided to all vessels and instructions issued for their use. A special Fleet circular was issued to this effect, highlighting also the use of VHF radio and the risk of misidentifications.

Serving masters were also reminded of their obligation to ensure an adequate composition of the navigational watch. A poster on appropriate collision avoidance actions has been prepared and displayed on all vessels' wheelhouses.