



HELLENIC REPUBLIC
HELLENIC BUREAU FOR MARINE CASUALTIES INVESTIGATION
MARINE CASUALTY SAFETY INVESTIGATION REPORT
15/2013

Collision between
M/V BARU SATU & M/V KATHERINE
4.5 n.m. SE from Mantili Isl., Steno Kafirea, Greece



July 2018

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Foreword

The Hellenic Bureau for Marine Casualties Investigations was established by Law 4033/2011 (Government Gazette 264/12.22.2011), in the context of implementing EU Directive 2009/18/EC.

HBMCI conducts safety investigations into marine casualties or marine incidents with the sole objective to identify and ascertain the circumstances and contributing factors that caused it through analysis and to draw useful conclusions and lessons learned that may lead, if necessary, to safety recommendations addressed to parties involved or stakeholders interested in the marine casualty, aiming to prevent or avoid similar future marine accidents.

The conduct of safety investigations into marine casualties or incidents is independent from criminal, discipline, administrative or civil proceedings whose purpose is to apportion blame or determine liability.

This investigation report has been produced without taking under consideration any administrative, disciplinary, judicial (civil or criminal) proceedings and with no litigation in mind. It does not constitute legal advice in any way and should not be construed as such. It seeks to understand the sequence of events occurred on the 04th of July 2013 and resulted in the examined serious marine casualty.

Fragmentary or partial disposal of the contents of this report, for other purposes than those produced may lead to misleading conclusions.

The investigation report has been prepared in accordance with the format of Annex I of respective Law (Directive 2009/18/EC) and all times quoted are local time (UTC +3) unless otherwise stated.

Under the above framework HBMCI has been examining the collision between M/V BARU SATU and M/V KATHERINE occurred on the 04th of July 2013, in the sea area approximately 4,5 nm SE of Mandili Island, Steno Kafirea, Greece.

This report is mainly based on information and evidence that have been derived from the interview process, information collected from those individuals involved in the marine casualty, as well as BARU SATU's VDR data. KATHERINE's VDR data was not saved within 12 hours from the casualty and therefore only certain navigational and AIS data were available.

GLOSSARY OF ABBREVIATIONS AND ACRONYMS

1.	AB	Able seaman
2.	AIS	Automatic identification system
3.	ARPA	Automatic radar plotting aid
4.	BNWAS	Bridge Navigational Watch Alarm System
5.	CEC	Certificate of equivalent competency
6.	C/O	Chief Officer
7.	CoC	Certificate of Competency
8.	COLREGs	International regulations for preventing collisions at sea, 1972, as amended
9.	Conning position	The places of a ship's bridge with a view to the sea area when navigating, controlling, or maneuvering
10.	CPA	Closest point of approach
11.	°	degrees (of angle)
12.	'	minutes (of angle)
13.	DOC	Document of compliance
14.	EBL	Electronic Bearing Line
15.	GMDSS	Global maritime distress and safety system
16.	GOC	General Operators' Certificate for GMDSS
17.	GPS	Global positioning system
18.	gt	gross tonnage
19.	HCG	Hellenic Coast Guard
20.	Integrated Marine Data Environment (IMDatE)	a technical framework that collects and combines data from EMSA's maritime applications and other external sources
21.	IMO	International Maritime Organization
22.	ISM	International Management Code for the safe operation of ships and for pollution prevention
23.	JRCC	Joint Rescue Coordination Centre (Piraeus, Greece)
24.	kW	Kilowatt
25.	LT	local time
26.	Marine Traffic Service	Marine Traffic displays real time AIS ship positions and information about vessels' movements. Data is based on collecting transmissions of Automatic Identification System (AIS).
27.	MT	Metric Tons
28.	nm	nautical miles
29.	O(s)OW	Officer(s) on the watch
30.	Olympia Radio	National Coastal Station covering the maritime safety sector (GMDSS) for receiving and transmitting distress, urgency and safety signals and commercial maritime communications world widely.
31.	OS	Ordinary seaman (deck crew)
32.	rpm	revolutions per minute
33.	SAR	Search And Rescue
34.	SMC	Safety management certificate
35.	SMS	Safety management system
36.	SMM	Safety Management Manual
37.	SOLAS	Convention for the Safety of Life at Sea 1974, as amended
38.	STBY	Stand By mode

39.	STCW	International Convention on Standards of Training, Certification and Watchkeeping for seafarers
40.	S-VDR	Simplified Voyage Data Recorder
41.	TCPA	Time of Closest Point of Approach
42.	UMS	Unmanned Machinery Space
43.	UTC	Universal co-ordinated time
44.	VDR	Voyage data recorder
45.	VHF	Very high frequency (radio)
46.	VRM	Variable Range Marker: an electronic mark or ring that can be placed over any target on a vessel's radar display indicating the precise range, in nautical miles, between the target and the vessel.

1. Executive summary

M/V Baru Satu, had sailed from Paranangua Brazil on 10 June 2013 loaded with 15000 Metric Tons of sugar and was heading to port of Burgas, Bulgaria for unloading the cargo. Her voyage included a short stay in Piraeus anchorage for bunkering and stores supplies. BARU SATU arrived at Piraeus anchorage on 03 July 2013 at approximately 16:00. Following the completion of bunkering and stores supply operations vessel heaved up the anchor at 21:15 and continued her voyage towards Burgas. After sailing from Piraeus anchorage the Master remained on the bridge as OOW assisted by an AB. At 24:00 the Master and the AB were relieved by the 2nd Officer and another AB that took over the 00:00 – 04:00 navigational watch. Bridge watch handover was carried out without any remarks.

M/V KATHERINE had sailed from Novorossiysk, Russia on 30 June 2013 loaded with 26400 Metric Tons of Hot Briquetted Iron and was heading to port of Marchera, Italy. At 00:00 on 04 July 2013, 2nd Officer relieved the 3rd Officer and took over the navigational watch. Bridge watch handover was carried out according to normal procedures without any remarks. Both OOW were assisted on their watch by posted lookouts.

Prior to the collision, at 02:30 KATHERINE passed Steno Kafirea and was heading towards Steno Kythnou with a course of 198° and a speed of approximately 12,5 Knots. At that time BARU SATU was heading to Steno Kafirea with a course of 056° and a speed of approximately 11,5 Knots. The distance between the two vessels was 7.5 nm. At approximately 02:42 the distance between the two vessels was 2.5nm, BARU SATU was steaming with a course of 052° and KATHERINE's course was 204°. At that time KATHERINE started turning slightly to starboard. A little later, at approximately 02:44 BARU SATU started turning to port.

At 02:45, while the distance between the vessels was 1.25 nm, KATHERINE's 2nd Officer called BARU SATU on the VHF in order to acknowledge her OOW intentions and proceed for a clear port to port passage. However proper communication between the two vessels was not established and both vessels continued turning to the same direction as initially intended. Further actions to avoid the collision were not effective. At 02:48 BARU SATU hit with her stem post the starboard side of KATHERINE at No 5 cargo hold. Both vessels sustained major hull damages resulting in water ingress to impacted cargo hold and ballast tanks. No crew injuries were reported.

Following the casualty both vessels remained collided and afloat for almost three days as advised by salvors. On 07 July 2013, following the planned salvage operation, BARU SATU sailed under towage to Elefsina Gulf and KATHERINE was towed to Thoriko Bay North of Lavrio Port in order to unload their cargo and undergo temporary repairs.

2. Factual information

2.1 Involved ships particulars

2.1.1 Particulars of M/V Baru Satu

Name of Vessel	BARU SATU
Call Sign	H9AN
Company (ISM Code A 1.1.2)	BARU KAHA Inc.
Ownership	MONDEO MARINE Inc.
Flag State	Panama
Registry No	27832-01-CH
IMO Number	9233624
Type of Vessel	Bulk Carrier
Classification Society	Nippon Kaiji Kyokai
Year built	2000
Ship Yard	SHIN KOCHIYUKO Co LTD, Japan
Length over all	130.11m
Breadth	23.00m
Depth	11,40
Gross Tonnage	9978
Net Tonnage	5489
Main Engine	One, AKASAKA Diesel, Model 6UEC37LSII
Engine Power /Speed	6300PS/13,8 Knots
Document of Compliance	(Date of Issue) Piraeus, 09 April 2012 by GL
Safety Management Cert.	(Date of Issue) Piraeus, 22 May 2012 by GL
Minimum Safe Manning	13



Picture 2.1.1/1: M/V BARU SATU (Source: Marine Traffic)

2.1.2 Particulars of M/V Katherine

Name of Vessel	KATHERINE
Call Sign	9HSB9
Company (ISM Code A 1.1.2)	BLOSSOM MARITIME CORPORATION
Ownership	KATHERINE NAVIGATION LIMITED
Flag State	Malta
Port, No of Registry	Valleta,110 in 2009
IMO Number	9133290
Type of Vessel	Bulk Carrier
Classification Society	Nippon Kaiji Kyokai
Year built	1997
Ship Yard	KANASASHI Co. LTD, Japan
LOA (Length over all)	170,14 m
Breadth	26.00 m
Depth	13,60 m
Gross Tonnage	17255
Net Tonnage	10112
Main Engine	One Mitsubishi, 5UEC52/LA
Engine Power /Speed	8000 BHP / 14 knots
Document of Compliance	(Date of issue) Piraeus,13 May 2013 by ABS
Safety Management Certificate	(Date of issue) Auckland, 29 January 2013 by ABS
Minimum Safe Manning	16



Picture 2.1.2/1: M/V KATHERINE (Source: Marine Traffic)

2.2 Voyage Particulars

Vessel's name	Baru Satu	Katherine
Port of departure	Paranangua Brazil	Novorossiysk, Russia
Destination port	Burgas, Bulgaria (intermediate transit stay for bunkering and store supplies at Piraeus anchorage, Greece)	Marchera, Italy
Type of voyage	International	International
Cargo information	15000 MT Sugar	26400 MT of Hot Briquetted Iron
Crew on board	17 (including one technician from shore)	22 + one superintendent of the managing company

2.3 Marine casualty information

Vessel's name	Baru Satu	Katherine
Type of casualty	Serious	
Date and time	04 July 2013 at 02:48	
Position – location	lat: 037° 051',9 N - long: 024° 033',5 E 4,5 n.m. SE from Mantili Isl, Steno Kafirea, Greece	
External environment	Wind NE 4 Bf/ Sea state slight / Good visibility / Night time	
Ship operation	en route - loaded	en route - loaded
Consequences (to individuals, environment, property)	<ul style="list-style-type: none"> Extended structural damages to Bulbous, Fore Peak tank, Fore Collision Bulk-head, No 1 Port and Starboard Top Side Ballast tank, damages at shell plating Water ingress to No 1 Cargo Hold, damage of cargo 	<ul style="list-style-type: none"> Extended structural damages to No 5 Cargo hold and No 4,5 Port Top Side Ballast tanks Water ingress to No 5 Cargo Hold, damage of cargo

2.4 Emergency response

After the collision the Master of Katherine broadcasted a voice MAYDAY message through the VHF reporting the collision and requesting assistance. The message was received by a nearby vessel as well as Piraeus JRCC which called KATHERINE for further information. Subsequently Olympia Radio issued a MAYDAY RELAY message S&R operations were initiated by establishing communication with the two vessels and utilizing the available means.

The Masters of BARU SATU and KATHERINE sounded the alarms and ordered the crew to muster at the muster stations and prepare the lifeboats for launching. Nonetheless, after assessing the condition of their vessels it was decided that the launching of the lifesaving equipment was not necessary.

After four hours from the collision nine crew members of KATHERINE evacuated the vessel and boarded on a HCG patrol boat. The rest of the crew remained on board for the salvage operations. None of the crew was injured and no pollution was reported.

S & R Units initially involved

State's Units	→ 02 HCG Search & Rescue Boats
	→ 04 HCG Patrol Boats
	→ 01 Fire Brigade vessel
	→ 01 S&R Helicopter
	→ 01 HCG Surveillance Aircraft
Nearby vessels	→ 02 Cargo vessels initially engaged
	→ 01 Passenger vessel
	→ 01 launch boat
	→ 01 fishing vessel

3. Narrative**3.1 M/V Baru Satu**

MV Baru Satu under Panama Flag was a cargo vessel engaged in international trading. Baru Satu had loaded at Paranangua Brazil 15000 MT of sugar and sailed on 10 June 2013 heading for the port of Burgas, Bulgaria. Her deck crew complement was consisted of three navigational Officers, including the Master, four ABs and one Bosun. The navigational watches were scheduled on a "4 on – 8 off" basis performed by the OsOW and one AB. More specifically, Master was performing the 0800-1200 / 2000-2400 navigational watches, the C/O was assigned the 0400-0800 / 1600-2000 watches and the 0000-0400 / 1200-1600 navigational watches were performed by the 2nd Officer.

The previous day of the casualty at approximately 0700 Baru Satu crossed Steno Elafonisu and proceeded towards Piraeus anchorage where she arrived at 1600 for bunkering, lubricants and stores supplies. By 2000 all bunker and provision operations were completed (see **table 3.1/1**) and the crew of Baru Satu started preparation to continue the voyage. At 2130 ST/BY operations for leaving Piraeus anchorage were completed and "Full Away" was recorded to the vessel's record books.

1610	Dropping of STBD anchor
1625	Fastening alongside of lubrication oil barge
1640	Fastening alongside of bunker barge
1650	Fastening alongside of store supply boat
1845	Sailing of lubrication oil barge
1900	Sailing of bunker barge
2000	Sailing of store supply boat
2115	Anchor at store position
2130	Full Away

Table 3.1/1: Operations at Piraeus anchorage as extracted from the vessel's record books

After the vessel had sailed from Piraeus anchorage the Master remained on the bridge as he was the OOW for the 2000-2400 navigational watch. He was relieved by the 2nd Officer at 2400 but he remained on the bridge until 0030 when the vessel's course was altered to 053° for crossing Steno Keas towards Steno Kafirea and the area was clear from any navigational danger (see

picture 3.1/1). The watch handover was performed without any remarks, speed was approximately 11.3 knots and one AB was posted as a look out. Both the radar and the ARPA were in operation as well as the rest of the navigational equipment. It was reported that the radars were operating on “HEAD UP” and “TRUE MOTION” mode at a range of 12 n.m.

After altering the course to 053° the Master went to his office for the ordinary correspondence with the vessel’s company however he visited the bridge at approximately 0120. At approximately 0200 he went to his cabin to rest and at the bridge remained the 2nd Officer, as the OOW, and the lookout AB. At that time Katherine was not spotted on the radars.



Picture 3.1/1: Photo of Baru Satu navigational chart

3.2 M/V Katherine

MV Katherine under Malta Flag was a cargo vessel engaged in international trading. Katherine had sailed on 30 June 2013 from Novorossiysk, Russia loaded with 26400 Metric Tons of Hot Briquetted Iron and she was heading to port of Marchera, Italy. Her deck crew complement was consisted of four navigational Officers, including the Master, three ABs and one Bosun. The navigational watches were performed on a “4 on – 8 off” basis and the bridge teams were formed by one OOW and one AB as a lookout. The OOW duties were performed by the C/O, the 2nd Officer and the 3rd Officer. More specifically, the C/O was assigned the 0400-0800 / 1600-2000 watches, the 0000-0400 / 1200-1600 watches were performed by the 2nd Officer and the 3rd Officer was assigned the 0800-1200 / 2000-2400 navigational watches.

The previous day of the casualty Katherine exited Dardanelles Strait and headed SSW towards Steno Kaireas. Her planned passage provided a 208° course for crossing the Steno Kaireas followed by a 197° course towards the Steno Kythnou (see **picture 3.2/1**). At 0000 on the day of the casualty the 2nd Officer took over the navigational watch from the 3rd Officer without any remarks. All navigational equipment was in operation including the radar and the ARPA, speed was approximately 12 Knots and one AB was posted as a lookout. At approximately 0125 the Master came on the bridge and stayed for almost 15 minutes. He left the bridge at approximately 0140 and went to his cabin to rest. During that time Baru Satu was not spotted as it was not in

the 12 nm range that was set on the radars. Katherine was following a course of 197° and at approximately 0230 the course was altered to 200° as the position fixing was slightly port from the planned course.



Picture 3.2/1: Photo of Katherine navigational chart

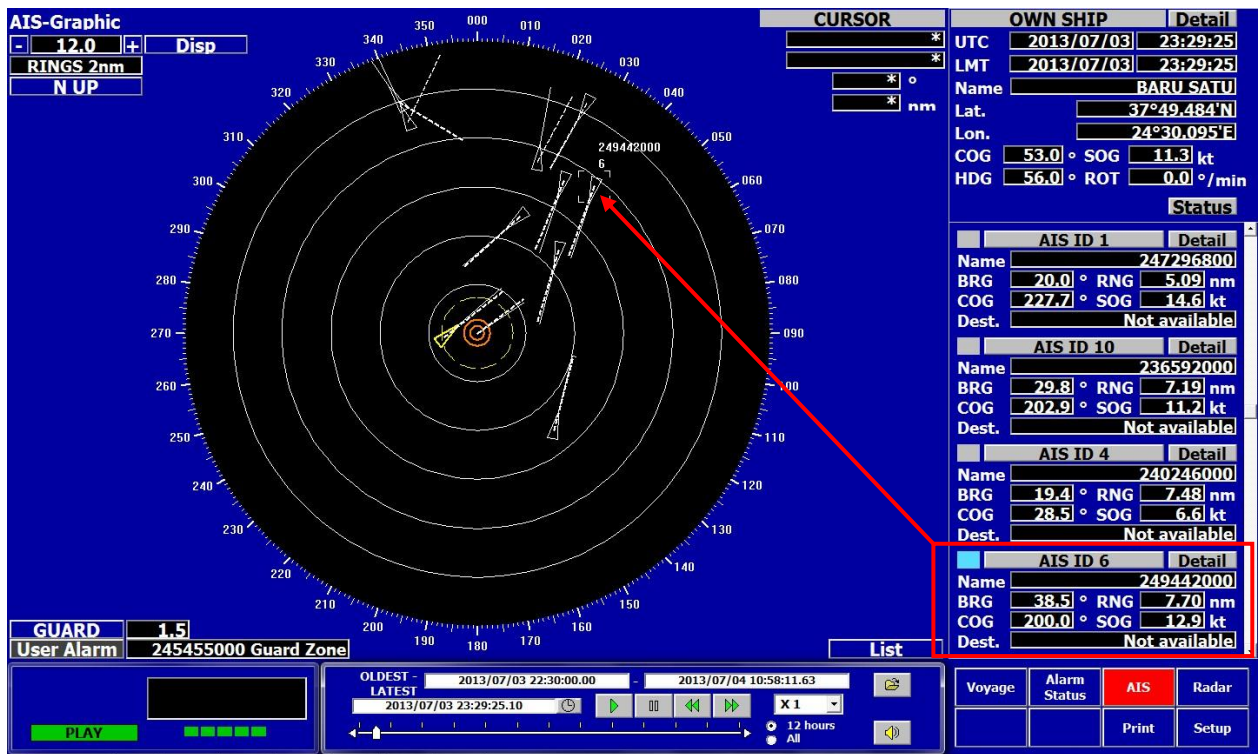
3.3 The collision

Note: The following sequence of events and facts are based on data extracted from vessels' S-VDRs. It is noted that Katherine's VDR data were not saved after the casualty, therefore audio data from the bridge was not available.

At 02:29:25 on the day of the casualty Baru Satu and Katherine were crossing the sea area SW from Steno Kafirea with NE and SW courses respectively. More specifically Baru Satu was steaming with a speed of 11,3 Knots, a heading of 056° and COG was 053° . At that time Katherine was steaming with a speed of 12,9 Knots, heading 198° , her COG was 200° and she was 7,7 nm distance from Baru Satu with a bearing¹ of $017,5^{\circ}$ to the port.

¹ It is noted that the bearing value as extracted from the AIS feature of the VDRs replay software was $38,5^{\circ}$ and it referred to the angle of the bearing line in relation to the North and not the vessel's bow.

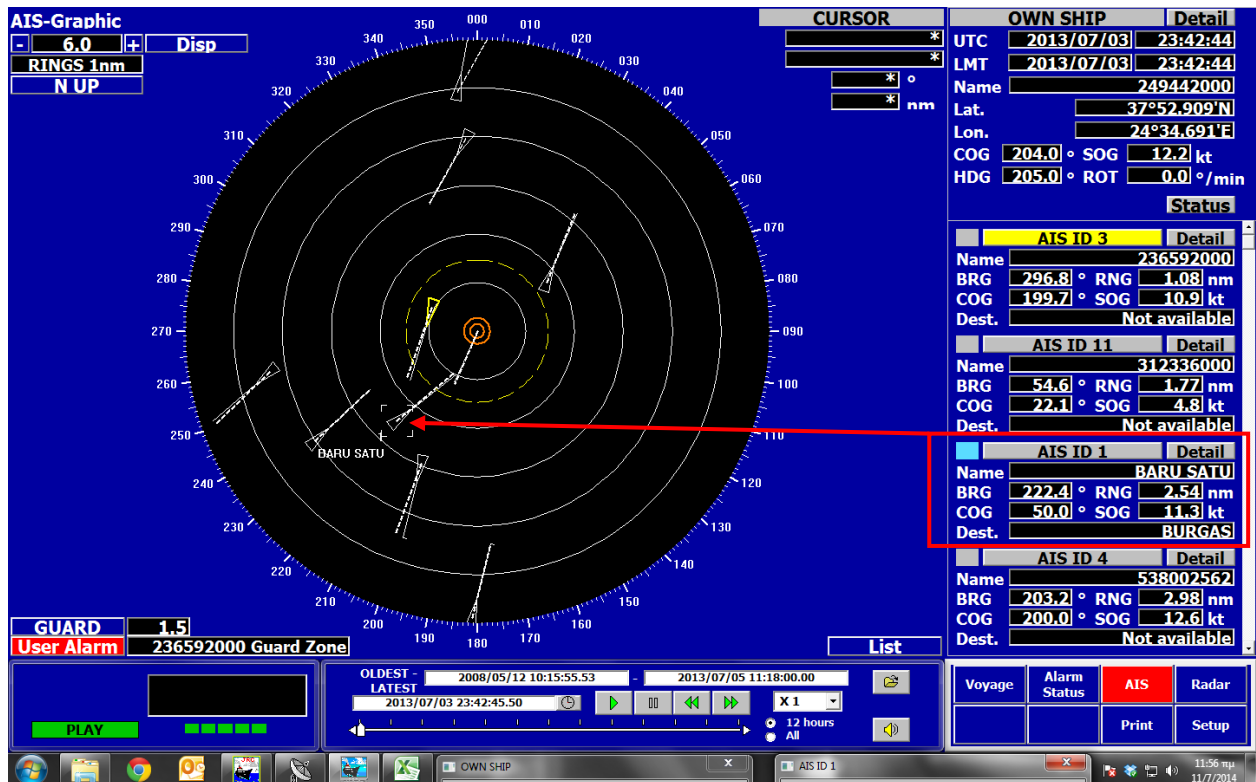
Baru Satu had overcome a vessel at her port side which was approximately at a distance of 2nm to her port stern. Katherine was overcoming a vessel at approximately 1 nm distance to her starboard side which was steaming with a speed of approximately 11 knots and with a COG of 203° while one more vessel was at 3 nm ahead steaming at a speed of 12,9 knots and with a COG of 198° (see **picture 3.3/1**).



Picture 3.3/1: Depiction of AIS feature from Baru Satu VDR data at a range of 12 nm. Katherine target and navigational data are marked with red.

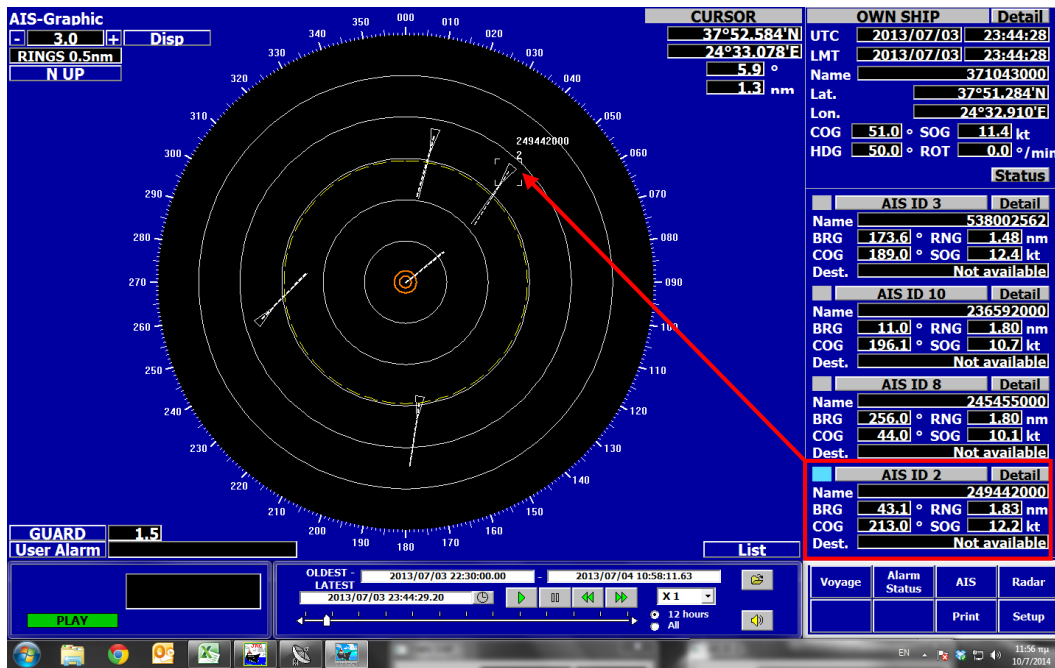
At 02:38 the distance between the two vessels was 4,3 nm. At that time the heading of Baru Satu was recorded at 053° and Katherine heading was 204°. The speed of the two vessels was the same as stated above and the bearing of Katherine as extracted from Baru Satu's VDR was approximately 013° to the port. It was reported that at that time the OOW of Katherine was seeing Baru Satu's red and the white navigational lights and that he checked the target on the ARPA and it was indicating a CPA of three cables.

The two vessels proceeded with the same course and speed until 02:42:45 when Katherine started altering her course to Starboard. At that time the vessel that was ahead of Katherine was cleared from Baru Satu's course and the distance between Katherine and Baru Satu was approximately 2.5 nm (see **picture 3.3/2**).

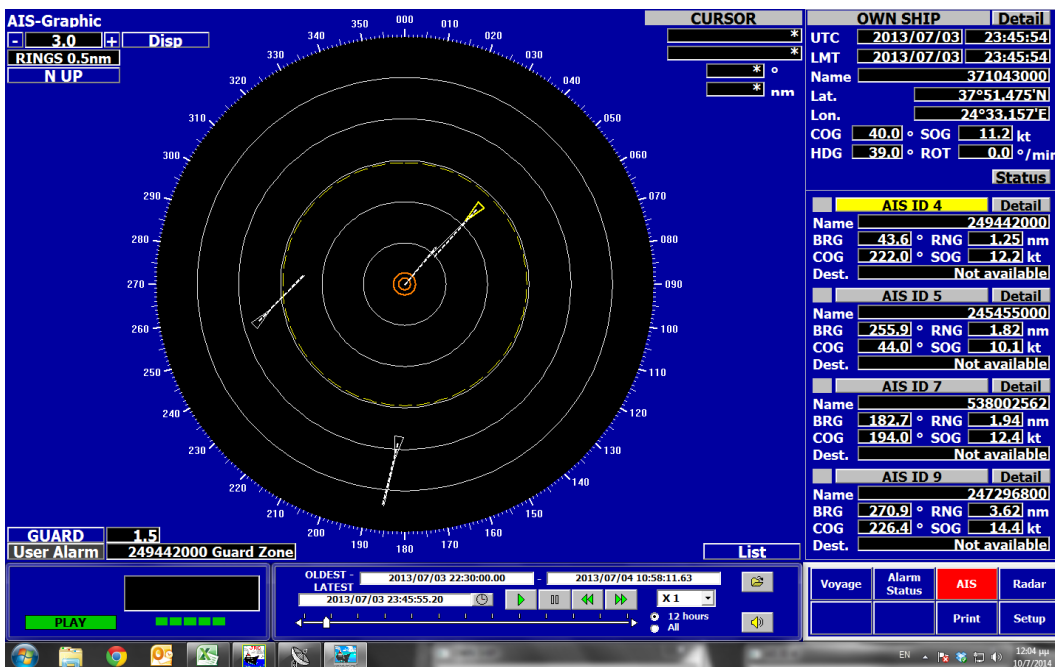


Picture 3.3/2: Depiction of AIS feature from Katherine VDR data at a range of 6 nm. Baru Satu target and navigational data are marked with red.

Shortly after, at 02:44, and while the vessel was keeping a course of 050°, the OOW of Baru Satu ordered the AB to put the rudder 5° port. At that time Katherine was still turning to starboard and she was at 1,8 nm distance with a bearing of 007° to the port, that means that she was almost at the bow of Baru Satu. More specifically, Katherine's heading was 216°, and her COG was 213° (see **picture 3.3/3**). It was reported that the OOW of Baru Satu attempted to turn the vessel to port in order to increase the distance between the two vessel's as he assessed that Katherine would cross Baru Satu's starboard bow. For said assessment of the situation he used only the vector feature of the radar and he didn't check other parameters such as the CPA and TCPA. Baru Satu continued turning to port until 02:45:45 when the OOW ordered the helmsman to maintain a course of 040°. At that time Katherine's heading was 224° and she was at a distance of 1,3 nm (see **picture 3.3/4**).



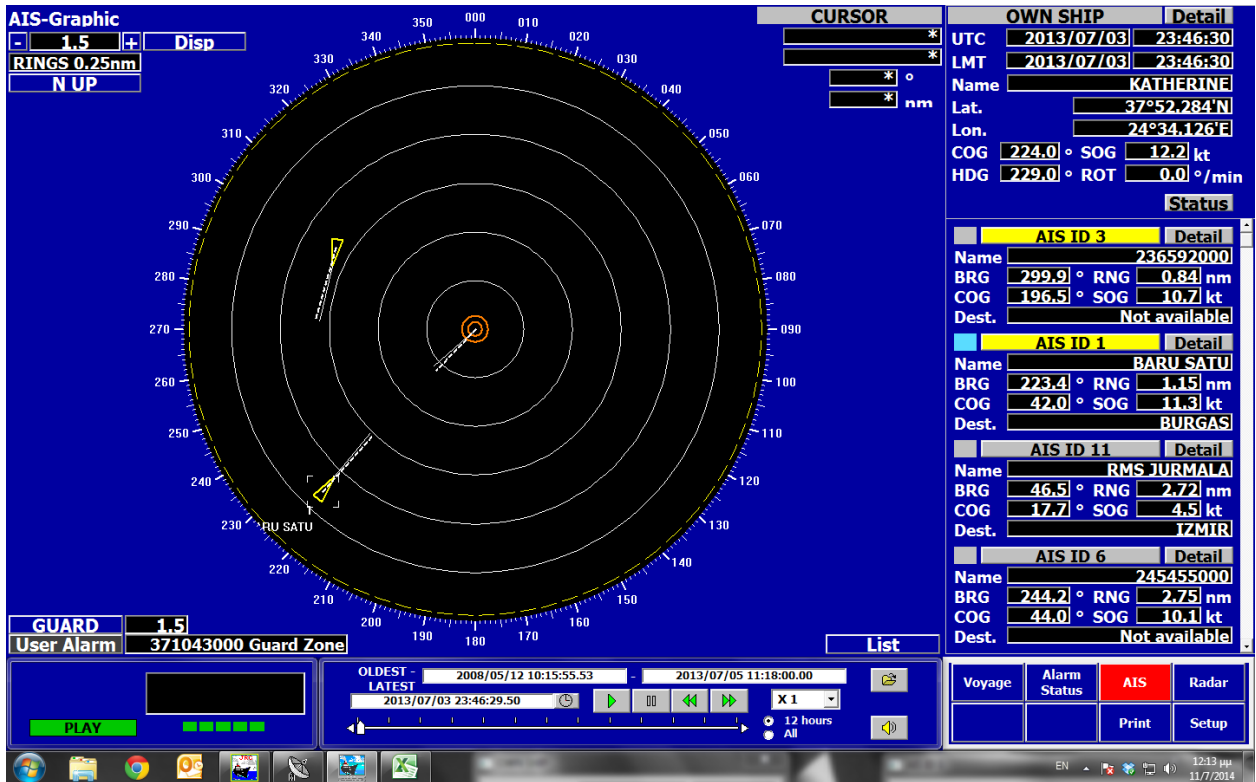
Picture 3.3/3: Picture of AIS feature from Baru Satu VDR data at a range of 3 nm indicating the position of the two vessels when Baru Satu started turning to port. Katherine target and navigational data are marked with red.



Picture 3.3/4: Picture from AIS feature of Baru Satu VDR data at a range of 3 nm shortly after the OOW ordered a 040° course.

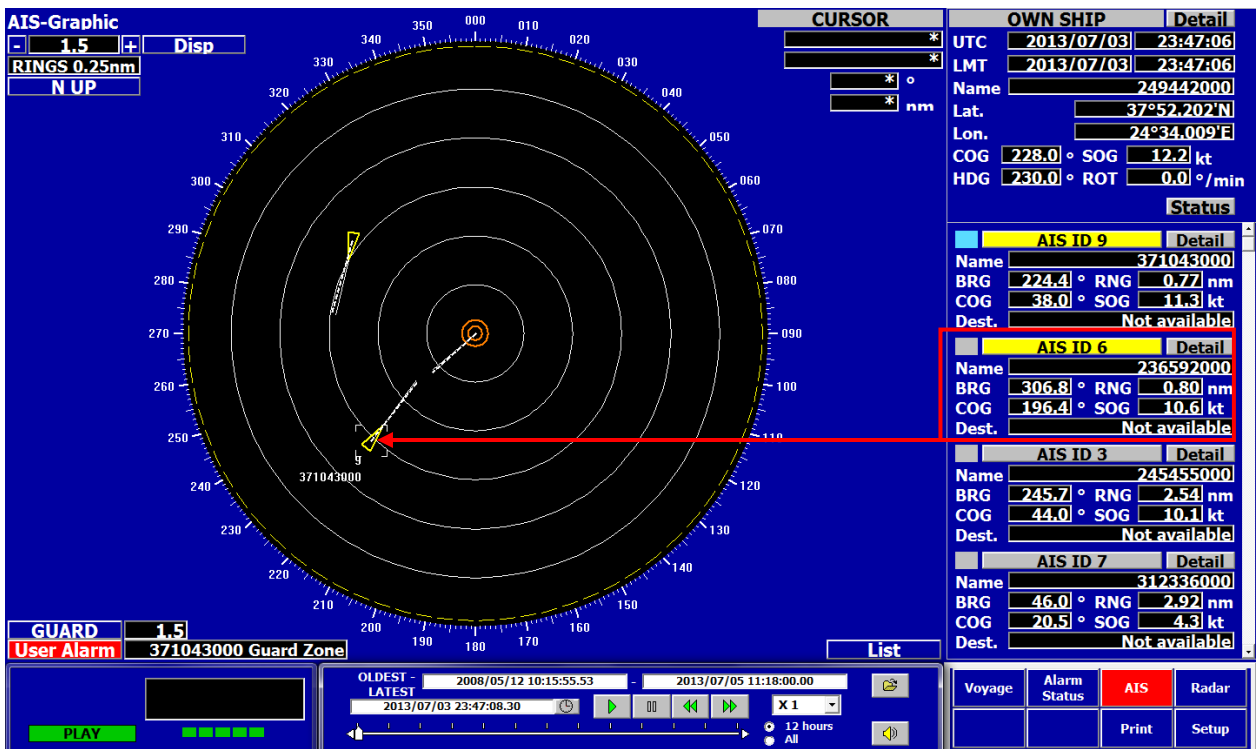
At 02:45:55, while Katherine was still turning to starboard and the two vessels were at a distance of 1.25 nm, the OOW of Katherine asked for a port to port passage through the VHF. However, during that call he did not state any of the vessels' names and so he was not understood by Baru Satu OOW.

At 02:46:30 Baru Satu OOW ordered the AB to put the rudder 5° to the Port, while at the same time Katherine had stopped turning to Starboard. At that time the two vessels were steaming at almost opposite courses and the distance between them was 1.15 nm (see **picture 3.3/5**).



Picture 3.3/5: Picture from AIS feature of Katherine VDR data, at 23:46:30.

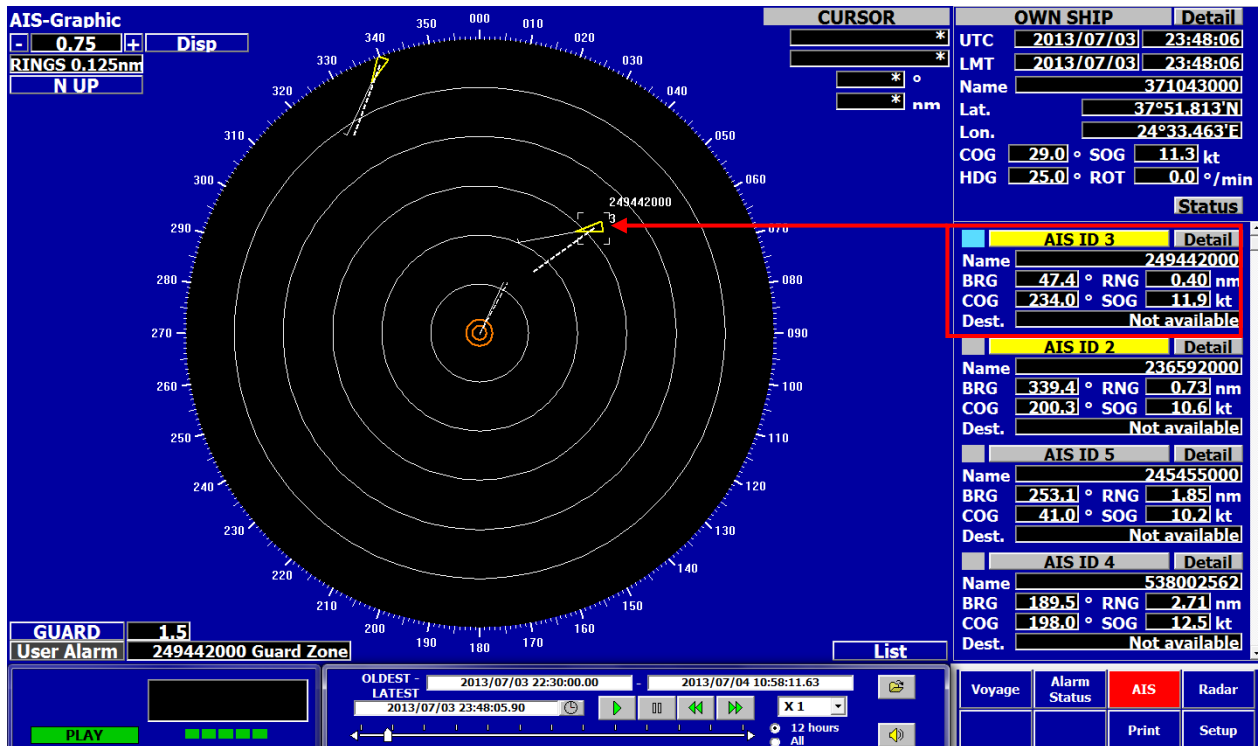
Shortly after, Katherine OOW called again on the VHF stating the name of his vessel and asking again for a Port to Port passage. At 02:47:00 Baru Satu OOW responded on the VHF and informed Katherine that he was already turning to port. At that time the distance of the two vessels was 0,82 nm, Baru Satu was turning to port with her rudder at 5° Port, and Katherine started turning heavily to Starboard, most probable following a hard to Starboard order of her OOW (see picture 3.3/6).



Picture 3.3/6: Picture from AIS feature of Katherine VDR data, at 23:47:06.

The following minutes and until 02:48:05 the two Officers were communicating through the VHF by which Katherine OOW was requesting a “port to port” or “red to red” passage and Baru Satu was responding that he was unable to turn to starboard because he was already turning to port. During that time Baru Satu was turning with a rudder angle of 5° to the port and Katherine was performing a hard turn to starboard. It is noted that from 02:47:00 until 02:48:05 Baru Satu heading altered from 038° to 025° while Katherine heading altered from 229° to 260°.

At 02:48:05 Baru Satu AB reported to the OOW that the vessel’s course was 025° and the OOW ordered him to keep it steady. The distance of the two vessels at that time was 0,4 nm and Katherine was still turning hard to starboard (see **picture 3.3/7**).



Picture 3.3/7: Picture from AIS feature of Baru Satu VDR data, at 23:48:06.

The OOW of Katherine requested again through VHF a port to port passage and at 02:48:25 Baru Satu OOW ordered a hard to starboard turn. However the vessels were already very close and at 02:48:56, at position lat: 37° 52,036 N, long: 24° 33,639 E, Baru Satu hit with her stem post the starboard side of KATHERINE at No 5 cargo hold. At the time of the collision Baru Satu and Katherine heading were 030° and 278° respectively and both vessels were steaming at a speed of approximately 11 kts.



Pictures 3.3/8 & 3.3/9: Photos of the collided vessels and the point of contact.



3.4 Emergency response actions

3.4.1 Katherine

After the collision the OOW stopped the engine and called the Master to report the accident. The Master ordered him to sound the General Alarm and then he went on the bridge and through the Public Address system ordered the crew to prepare the vessel's rescue means for abandonment. At 03:03:00 the Master broadcasted a distress signal through the VHF.

Approximately after half an hour from the collision the Master noticed that the vessel's condition had been stabilized and ordered the crew to begin an inspection to the vessel's compartments and tanks to fully assess the damages and the overall situation. The inspection revealed that the

vessel suffered damages around the collision area and that No 5 cargo hold and three water ballast tanks had flooded.

At approximately 06:55 nine crew members embarked on a HCG patrol vessel and were transferred ashore, leaving on the vessel the Master, the company's superintendent and 12 crew members.

3.4.2 Baru Satu

After the collision the OOW stopped the engine and called the Master. When the Master got on the bridge he sounded the General Alarm and ordered the crew through the Public Address system to proceed to the Muster Stations and prepare the life saving equipment. During the first minutes after the casualty Baru Satu was called through the VHF by other vessels which were sailing at the proximate area and noticed the collision and asked if assistance was needed. At 03:06:00 the Master of Baru Satu called Katherine through the VHF and the two vessels communicated the situation.

The Master ordered the C/O to go to the bow and inspect the damages and sound the tanks and cargo hold bilges. The inspection revealed that sea water had entered into the Fore Peak Tank as well as to No 1 Cargo Hold. It is noted the cargo of sugar that was in No 1 cargo hold prevented the water from reaching at the bottom level and therefore the sounding of the hold's bilges did not indicate any water level. Nonetheless the water ingress to No 1 cargo hold was visible from the deck through the openings on the hold's cover caused by the denting of the shell plating.

3.4.3 Hellenic Coast Guard SAR operations

The Piraeus JRCC of the HCG received the DSC Distress Emergency call broadcasted by Katherine and immediately called the vessel and received information about the area of the collision and the condition of the vessel. Also they ordered Olympia Radio to broadcast a Mayday Relay and engaged the nearby vessels to remain in the area and provide assistance if needed.

A SAR Operation was immediately launched and the close Coastguard Authorities were ordered to activate the Local Emergency Plan and engage the available means. A summarized list of means that were engaged is provided in [par. 2.4](#).

During the rescue operations Katherine Company reported that the cargo could be flammable in certain conditions, that is if wet and under the presence of external source of ignition. Consequently special precaution measures were taken during the rescue operations.

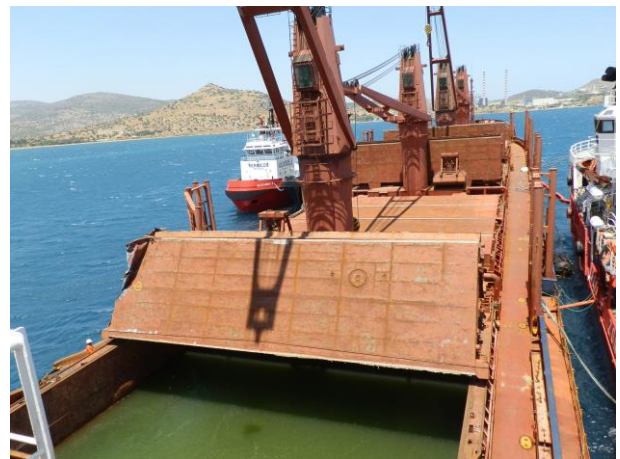
3.5 Sustained damages – Salvage operations

After the casualty the managing companies of the two vessels assigned salvage operations to local salvage companies. Following advice from the salvors, the two ships remained attached and drifted to the sea area of the Southeast coast of Kea Island. They were detached almost three days after the collision and they were towed to safe areas for necessary temporary repairs. Katherine was towed to Thoriko bay whereas Baru Satu was towed to the Gulf of Elefsis. Due to the water ingress in cargo hold No5 as well as to the adjacent water ballast tanks the aft draught of Katherine increased extensively and the sea water line was reaching almost to her aft deck.

It should be noted that if the point of contact and the sustained damages on Katherine were not localized to the area of No 5 cargo hold and were expanded also to one of the adjacent compartments (engine room or No 4 cargo hold) the vessel might not have remained afloat.



Picture 3.5/1: Photo of Katherine collision area showing the proximity of No 4 cargo hold.



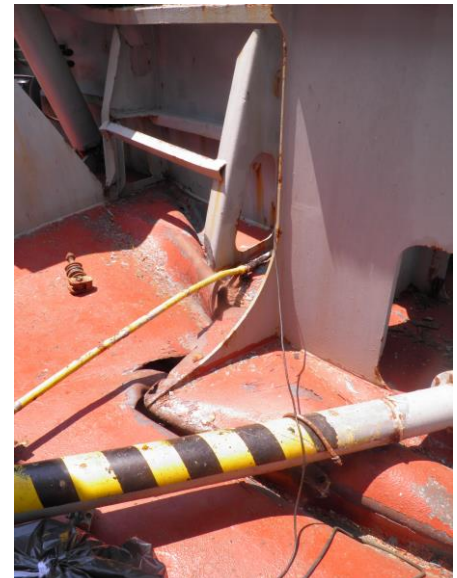
Pictures 3.5/2 & 3: Photos of Katherine at Thoriko bay and the flooded No 5 cargo hold.

Baru Satu fore part was severely damaged. The bow area over the bulbous was completely destroyed, and the area of the fore collision bulkhead including the side shell plating of No 1 Top Side Ballast tanks suffered heavy deformations and cracks which allowed the sea water to enter into the No 1 cargo hold.



Picture 3.5/4:

Photo of Baru Satu bow at Elefsis Gulf indicating the side shell plating deformations.



Pictures 3.5/5 & 6: Photos of Baru Satu indicating the deck plating deformations at the area between No 1 cargo hold and the forecastle.

4. Analysis

The analysis of the examined marine casualty aims to identify and determine the factors and causes that contributed to the occurrence, taking into account the sequence of events and the collection of investigation information and data focusing both on specific points of the temporal evolution of these, as well as to the root causes in order to draw useful conclusions leading to safety recommendations.

4.1 Navigational equipment – bridge arrangements

4.1.1 Baru Satu

Baru Satu was equipped with the necessary navigational equipment; that is two radars (one with automatic radar plotting aid -ARPA feature), AIS, BWNAS, GPS, Navtex, VHF, Gyro compass etc. The positions of the equipment on the bridge were according to the common arrangement of this type of vessels. The steering console was situated in the center of the bridge, the main control console was next to it to the port side and the two radars were positioned one on each side of the bridge.

The vessel was using nautical paper charts of British Admiralty as primary means of navigation, and the chart room as well as the GMDSS equipment were located at the aft part of the bridge.

The wheelhouse arrangement offered a good field of vision to the navigated sea area apart from the straight ahead view sector which was obstructed by the vessel's deck cranes. Said blind sector is common to this type of vessels with deck cranes and can be administered by the continuous movement of the navigational watch crew.

It was reported that during the time of the casualty both radars were in operation.



Pictures 4.1.1/1 & 2:
The two radars of Baru Satu.



Picture 4.1.1/3:
View from Baru Satu conning position

4.1.2 Katherine

Katherine was also equipped with the necessary navigational equipment; that is two radars (one S-Band /3 GHz with automatic radar plotting aid (ARPA) feature and one X-Band /9 GHz), AIS, BWNAS, GPS, Navtex, VHF, Gyro compass etc. Both radars were situated at the starboard side of the wheelhouse, whereas the steering console was situated at the center. The engine control lever was located in front of the steering control station and the main operation panel was on the back of it.

Katherine was also using nautical paper charts as primary means of navigation, and the chart room as well as the GMDSS equipment were located at the aft part of the bridge.

The wheelhouse arrangement offered a good field of vision to the navigated sea area; however a blind sector was created by the vessel's deck cranes.

It was reported that during the time of the casualty both radars were in operation and set at a range of 12nm.



Pictures 4.1.2/1 & 2:
The two radars of Katherine.



Picture 4.1.2/3:
Photo of the view from the conning position

4.2 COLREGs – Actions of the two OsOW

4.2.1 Katherine

Based on the AIS data from the vessels' VDR, as described in par. 3.3 and depicted in pictures 3.3./3,4, and 5, the two vessels were proceeding to a "crossing situation", until shortly before 23:45:34 when the OOW of Baru Satu ordered the AB to stop turning to port and follow 040° course, as by that time the courses of the two vessels had become reciprocal. While the two vessels were steaming in a "crossing situation" Baru Satu would see Katherine to her port bow signaling the green navigational light, and Katherine would see Baru Satu to her starboard bow signaling the red navigational light. In this situation COLREGs Rule 15 (Crossing situation) applies which states:

"When two power-driven vessels are crossing so as to involve risk of collision, the vessel which has the other on her own starboard side shall keep out of the way and shall, if the circumstances of the case admit, avoid crossing ahead of the other vessel."

That said, it derives that Katherine was the "give-way" vessel and the OOW should have taken action in order to avoid crossing ahead of Baru Satu and to keep clear from her passage.

The proper actions to avoid collisions are regulated by Rule 8 of the COLREGs and mainly by par. (a) and (b), as well as Rule 16 where it is stated:

"Rule 8 Action to avoid collision"

(a). Any action to avoid collision shall be taken in accordance with the Rules of this Part and shall, if the circumstances of the case admit, be positive, made in ample time and with due regard to the observance of good seamanship.

(b). Any alteration of course and/or speed to avoid collision shall, if the circumstances of the case admit, be large enough to be readily apparent to another vessel observing visually or by radar; a succession of small alterations of course and/or speed should be avoided.

(...)

"Rule 16 Action by give-way vessel"

Every vessel which is directed to keep out of the way of another vessel shall, so far as possible, take early and substantial action to keep well clear. "

When Katherine started turning to starboard at 02:42:45, the distance of the two vessels was almost 2.5 nm and based on the time of the collision, they were almost 6 minutes from the CPA. Moreover, considering that the heading alteration of Katherine from the aforementioned time until 02:44:36, when Baru Satu started altering her course to port, was 14° it derives that she turned to starboard with an approximate rate of turn of 8°/min. At the same time the COG of Katherine, as it derives from Baru Satu AIS data extracted from the VDR, had altered from 204° to 213°.

In light of the above and taking into account that the OOW of Baru Satu had not noticed the course alteration when he decided to put the rudder 05° to Port, it is inferred that Katherine's alteration of course was not large enough to be readily apparent to Baru Satu. Nonetheless it should be noted that a larger alteration of Katherine's course might have been restricted by the presence of another vessel at her starboard side which was at a distance of 1 nm and was following almost a same course (**Picture 3.3/2**). Moreover, an earlier action by the OOW of Katherine would have provided more time to the OOW of Baru Satu to assess Katherine's course and identify her starboard turning.

4.2.2 Baru Satu

Prior to the collision and while the two vessels were navigating with courses that were forming a “crossing situation” Baru Satu was the “stand-on” vessel as Katherine was at her port bow and was signaling here green navigational light. During that time, and based on the relevant regulation of COLREGs, par. (a) (i) of Rule 17², Baru Satu as the “stand-on” vessel, should have kept her course and speed.

Nonetheless the same Rule at par. (a) (ii) gives the right to the “stand-on” vessel to take action when it becomes clear that the “give-way” vessel is not taking appropriate action. This could justify the intention of the OOW of Baru Satu to alter her course, however his action to alter the course to port at 02:44:36 was not in accordance to par. (c) of Rule 17 of the COLREGs as Katherine was already altering her course to starboard for almost two minutes and her heading and COG, as indicated by AIS feature of the VDRs, were 218° and 213° respectively.

Moreover, during the period between 02:45:41 and 02:46:30, when Baru Satu maintained a steady course of 040° and before started turning again to port, Katherine was still turning to starboard and both her heading and COG had altered by 3°.

Considering the aforementioned it can be inferred that the OOW of Baru Satu was not monitoring effectively the course of Katherine in order to notice her course alteration.

Apart from the above, from the relevant pictures of the AIS feature of the VDRs (pictures 7,20) when the OOW of Baru Satu gave the order to the AB to put the rudder 05° port at 02:44:36, Katherine was almost at her bow and the situation of the two vessels had changed from “crossing” to “head-on”. Apart from the above, from the relevant pictures of AIS feature of the VDRs (pictures 3.3/3,4,5) when the OOW of Baru Satu gave the order to the AB to keep a steady course of 040°, at 02:45:34 as well as when he gave the order to put the rudder 5° to port at 02:46:30, the vessels had reciprocal or nearly reciprocal courses and the situation had changed from “crossing” to “head on”.

² Rule 17 Action by stand-on vessel

(a).

(i). Where one of two vessels is to keep out of the way the other shall keep her course and speed.

(ii). The latter vessel may however take action to avoid collision by her manoeuvre alone, as soon as it becomes apparent to her that the vessel required to keep out of the way is not taking appropriate action in compliance with these Rules.

(b). When, from any cause, the vessel required to keep her course and speed finds herself so close that collision cannot be avoided by the action of the give-way vessel alone, she shall take such action as will best aid to avoid collision.

(c). A power-driven vessel which takes action in a crossing situation in accordance with subparagraph (a)(ii) of this Rule to avoid collision with another power-driven vessel shall, if the circumstances of the case admit, not alter course to port for a vessel on her own port side.

(d). This Rule does not relieve the give-way vessel of her obligation to keep out of the way.



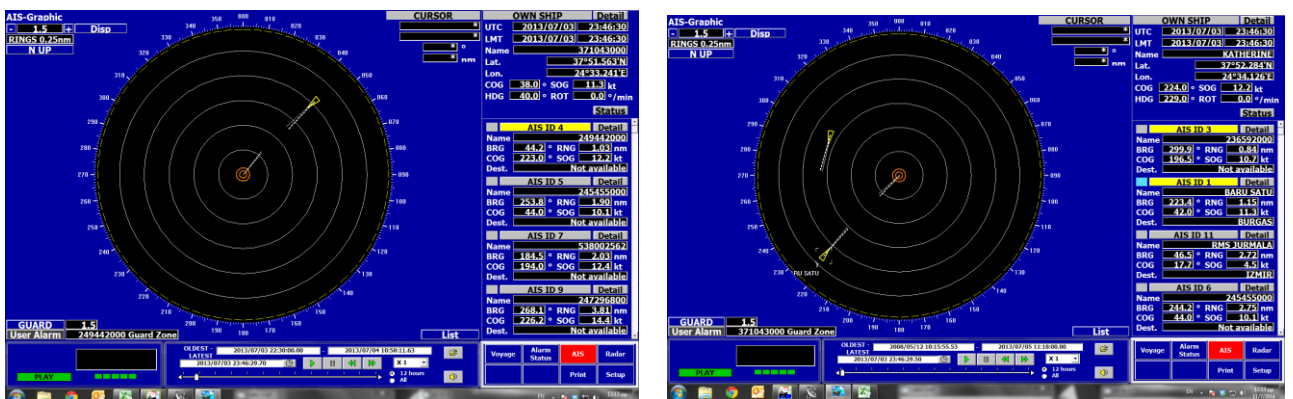
Pictures 4.2.2/1&2: Depiction of AIS feature of VDRs at the time when Baru Satu altered her course to port at 02:44:36.

“Head-on” situations are regulated by Rule 14 of COLREGs where it is stated:

“Rule 14 Head-on situation

- (a) When two power-driven vessels are meeting on reciprocal or nearly reciprocal courses so as to involve risk of collision each shall alter her course to starboard so that each shall pass on the port side of the other.
- (b) Such a situation shall be deemed to exist when a vessel sees the other ahead or nearly ahead and by night she would see the mast head lights of the other in a line or nearly in a line and or both sidelights and by day she observes the corresponding aspect of the other vessel.
- (c) When a vessel is in any doubt as to whether such a situation exists she shall assume that it does exist and act accordingly.

Based on the above it derives that the decision of Baru Satu OOW to alter the vessel’s course to port during a “head-on” situation was in total disregard to the applicable Rule of the COLREGs. It is noted that the same stands also for the decision to turn again to port at 02:46:30 as according to AIS feature of the VDRs, Katherine was still at Baru Satu bow, although she could have passed slightly to her starboard (pictures 4.2.2/3 & 4).



Pictures 4.2.2/3 & 4: Depiction of AIS feature of VDRs at the time when Baru Satu altered her course to port at 02:46:30.

4.3 Bridge Resource management

BRM is the effective management and integration of all resources, human and technical, available to the bridge team, to navigate the vessel in a safe and efficient manner. Optimized

bridge resource management shields safe navigation by fully utilizing all the technical advantages of bridge navigational equipment in order OsOW to maintain an effective awareness at any navigational situation.

More specifically, under STCW Code/Part A/Chapter VIII/Part 3 “Watch keeping Principles In general” the Bridge Resource Management principals have been introduced, while Chapter VIII/Part 4-1 have laid down a set of mandatory “principals to be observed in keeping a navigational watch”. Said provisions, amongst other, require that OsOW shall understand the functions and operation of the installed equipment and maintain a proper watch, making the most effective use of the resources available, such as information, installations/equipment and other personnel.

Under the aforementioned provisions, the OsOW of the two vessels should have utilized the available capabilities of the available equipment and more importantly the data of the ARPA systems. However during the investigation process it emerged that the OOW of Baru Satu assessed the situation by checking the vectors of the two vessels and he had not acquired the target of Katherine to check the navigational information of CPA, TCPA as well as her COG.

In light of the above and taking into consideration the previous paragraph it can be inferred that the failure of the OOW to utilize the available features of the ARPA resulted to the poor monitoring of Katherine navigation and consequently he missed to identify the alteration of her course to starboard.

4.4 Communication

The establishment of a proper communication between the navigational watch crew of two vessels that are navigating in the same area is commonly followed by OsOW as an additional measure in order to ensure the intentions of the other vessel and proceed accordingly. When the OsOW have taken early actions to keep a safe distance from other vessels and there is no doubt about the followed courses such communication is not deemed necessary and is avoided. However, when two vessels attempt to establish VHF communication in order to report their intentions and agree to a clear passage this should be done clearly, stating the name of the vessels, the followed and the intended course as well as any other important information.

At the examined marine casualty, the first attempt to establish VHF communication was from Katherine OOW at 02:45:55, asking for a port to port passage after he noticed that Baru Satu had altered her course to port. However, he did not state the name of his vessel neither of Baru Satu, so he was not understood immediately by the other OOW. Moreover he did not state that he was already altering the course to starboard. It is noted that when the OOW of Katherine called the first time on the VHF at 02:45:55, Baru Satu was keeping a steady course of 040°. Baru Satu acknowledged that Katherine was calling at the VHF at 02:47:00, and by that time the vessel was already turning to port for the second time.

Considering the above it is suggested that had the OOW of Katherine communicated properly the names of the vessels as well as the course alteration to starboard Baru Satu might not have proceeded to alter her course to port for the second time at 02:46:30.

An abstract from the communication of the two OsOW, as extracted from Baru Satu VDR audio data, is provided at the following table:

Time LT	Facts - Actions		Heading Rudder position		Distance of vessels (nm)
	Baru Satu	Katherine	Baru Satu	Katherine	
02:42:45		Starts turning to starboard	052° Midship	204° turning to starboard	2,6
02:44:36	Rudder at Port 05°		049° Port 05°	218° turning to starboard	1,7
02:45:41	Order to keep course 040°.		040° Port 05°	224° turning to starboard	1,32
02:45:55		OOW through VHF: "Vessel in my (inconceivable) port to port please, port to port".	039° midship	225° turning to starboard	1,25
02:46:30	Rudder at Port 05°	Stops turning to starboard	040° Port 05°	229° midship	0,95
02:46:40 to 02:46:57		VHF: "port to port please port to port. vessel in my(inconceivable) this is Katherine" VHF: "port to port"	Port 05°	hard to starboard	
02:47:00	VHF: "This is Baru Satu I turn "ah..." ³ now port"	Start turning hard to starboard	038° Port 05°	229° hard to starboard	0,80
02:47:01		VHF: "Baru Satu please alter your course to starboard. Port to port"	Port 05°	hard to starboard	
02:47:08	VHF: "this not possible now port to port because "i..." ⁴ zero three five "i..." ⁵ change my course"		Port 05°	hard to starboard	
02:47:17		VHF: "..... (inconceivable) course to starboard, port to port"	035° Port 05°	232° hard to starboard	0,76
02:47:20	VHF: "sir no possible turn to port you see when i port this no have time i turn"		Port 05°	hard to starboard	
02:47:29	VHF: "This Baru Satu your bow"		Port 05°	hard to starboard	

³ 1 sec vocalized pause

⁴ 1 sec vocalized pause

⁵ 1 sec vocalized pause

02:47:31		VHF: "port to port please"	032° Port 05°	238° hard to starboard	0,62
02:47:34		VHF: "red to red red to red"	Port 05°	hard to starboard	
02:47:37	VHF: "sir no possible, now I turn port"		030° Port 05°	241° hard to starboard	
02:47:41	VHF: "you passing my starboard, my starboard side, no problem"		Port 05°	hard to starboard	
02:47:47		VHF: "I'm already altering to starboard"	029° Port 05°	247° hard to starboard	0,52
02:47:51	VHF: "ok go please to starboard I go port"		Port 05°	hard to starboard	
02:47:56		VHF: "please port to port"	Port 05°		
02:47:59	VHF: "no possible port to port now, is very close distance"		Port 05°	hard to starboard	
02:48:05	AB reports that the course is 025° and OOW orders to keep it steady.		025° Port 05°	260° hard to starboard	0,39
02:48:16		VHF: "port to port please"		hard to starboard	
02:48:25	OOW orders hard to starboard		021° hard to starboard	265° hard to starboard	0,29
02:48:56		COLLISION	030°	278°	0,12

Table 4.4/1: Abstract of VHF communications in relation to the navigational data of the vessels

Based on the provided description of the VHF communication it derives that the OOW of Baru Satu was also not clear for his intentions. Moreover it can be deduced that even when he acknowledged Katherine request for a port to port passage at 02:47:00, he responded that it was not possible as he was already turning to port. Nonetheless at that time the distance of the two vessels was approximately 0,8 nm and Baru Satu was turning with the rudder at 5° to the port and so an alteration of her course to starboard in compliance to the applicable Rules of COLREGs could have been achievable.

In light of the above, the lack of a establishing a proper communication between the two vessels, stating clearly the names of the vessels and the intended courses is considered to have contributed to the examined marine casualty.

4.5 Standing/night orders

The Standing Orders are a set of Master's instructions to ensure safe ship navigation and operations whether at sea or at port. They encompass a wide list of aspects of navigation and rules for the crew and are to be followed at all times by the Officer on duty.

The Night Orders are a supplement to the Standing Orders that come into force as the Master proceeds to take rest during the night and they add specific points to the withstanding Standing Orders. The Master writes the Night Orders every night, with specific regard pertaining to the existing state of the weather, sea and traffic. These are generally handwritten and duly signed by every OOW. One should read these orders carefully because the Master uses his experience and expertise to determine safe navigation in his absence and therefore lays down instructions as to the plotting intervals, temperature/pressure reading intervals and so forth.

4.5.1 Baru Satu

The standing orders of Baru Satu Master concerning navigation were prepared according to the vessel's SMM, they were posted on the bridge and they were signed by the Master, the C/O and the 2nd Officer. They comprised specific orders for maintaining a proper look out, checking and utilizing the navigational equipment, checking frequently the vessel's position, checking the weather conditions, calling the Master when in doubt, as well as other orders commonly used by Masters of this type of vessels for the safe of navigation. Nonetheless, an order for the proper safe distance from other vessels during navigation was not included to the Master's Standing Orders. Moreover, no specific instructions were provided for the proper utilization of ARPA features, such as CPA, TCPA, and acquisition of the close targets in order to efficiently monitor their navigation and possible alteration of their courses.

The lack of a specific order to the Master's Standing Orders, concerning the proper utilization of ARPA features is considered as a contributing factor to the examined marine casualty.

The Night Orders of the Master at the night of the casualty were more specific taking into account the intended navigating area and they comprised the following:

- Follow Master's Standing orders,
- Check hourly the Gyro/Magnetic compasses,
- Keep a safe distance from other vessels not less than 1 nm,
- Call the master when in doubt,
- Follow Check List "OPE 12/02".

The aforementioned Check List referred to navigation in coastal/restricted waters and traffic separation schemes and it was posted on the bridge as well. Amongst others, the check list provided a guideline to consider the traffic that was likely to be encountered during the preparation phase of the passage plan. It is noted that although the passage plan for the intended voyage, which was prepared by the 2nd Officer and was signed by the C/O and the Master, did not include any specific reference to the expected traffic at the South Evoikos area and the Steno Kafirea, the Master took it into account when he prepared the night orders and gave the specific instruction to keep a safe distance of 1 nm from other vessels.

In relation to the above, and considering the actions of the 2nd Officer, as described in [par. 4.2.2](#), it derives that Master's night orders were disregarded. Moreover the OOW intention to turn to port would lead to Baru Satu passing between Katherine and the other vessels that was 1 nm abeam of Katherine at her starboard, that is approximately 0,5 nm from each vessel.

The disregard to the Master's night orders by Baru Satu OOW is considered to have contributed to the examined marine casualty.

4.5.2 Katherine

Katherine Standing Orders concerning navigation were also formed by the Master, according to her SMM, and they were signed by the OOW before assuming their first navigational watch. Amongst others the Standing Orders provided the following:

- To correctly appraise the situation and the risk of collisions,
- To take prompt actions to avoid other vessels, sound signal or call by VHF, notifying to them course and speed etc.,
- To report to the Master on several occasions which inter alia comprised situations when the movements of another vessel could create a dangerous situation.

The night order book for the night of the casualty was filled appropriately by the Master and it was signed by the 2nd Officer and the 3rd Officer when they assumed watch duties, as per the relevant instructions of the vessel's SMM. Amongst others, the night orders provided a specific instruction to give wide berth when crossing or passing other vessels and to avoid close quarter situations. Moreover the OsOW were prompted not to hesitate calling the Master when in doubt.

Taking into account the aforementioned orders it derives that the Master had not provided any specific instruction concerning the minimum distance of the other vessels. Consequently it was up to the decision of the OsOW to assess every situation and proceed accordingly. However it was reported that he was encouraging them to keep other vessels at a safe distance of 1 nm from the sides and that in "crossing" situations to alter their course to the starboard and not to the port.

Considering the actions of the OOW, as described in [par. 4.2.1](#), and taking into account that the course alteration would lead to Katherine passing in between of Baru Satu and the other vessel that was at Katherine's starboard side, at a distance less than 1 nm from each vessel, it could be suggested that a specific instruction by the Master either as a standing order or as a night order, concerning the keeping of the minimum safe distance from other vessels at 1 nm, might have stimulated the OOW to call the Master or take proper action and alter the course earlier.

4.6 Passage plan

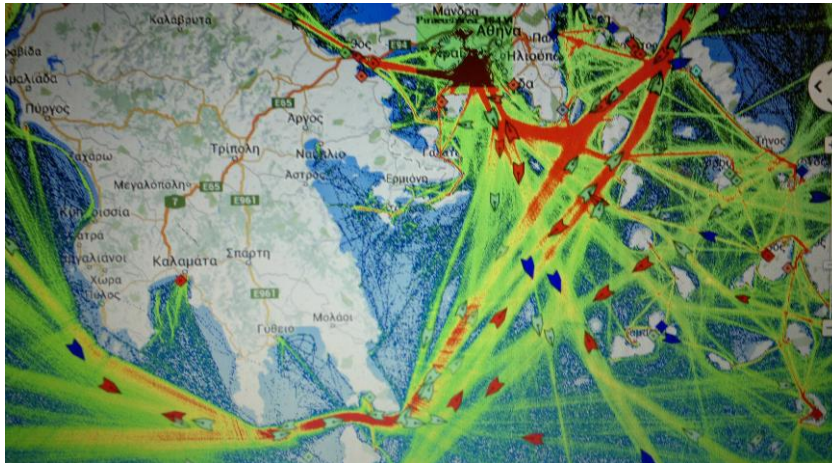
The passage planning is considered one of the principal operations for a safe navigation and has been established by the respective regulations of SOLAS and STCW. Moreover, the IMO has adopted specific Guidelines for the voyage plan by means of the Assembly Resolution A.893(21), adopted on 25 November 1999 "GUIDELINES FOR VOYAGE PLANNING".

The aforementioned Resolution separates the overall voyage plan operation into the following four processes:

- The appraisal, which includes the gathering of all information relevant to the contemplated voyage or passage,
- The planning, which comprises a detailed plan of the whole voyage or passage from berth to berth, including those areas necessitating the presence of a pilot,
- The execution of the plan and
- The monitoring of the progress of the vessel in the implementation of the plan.

The appraisal phase of the aforementioned Resolution provides inter alia, that relevant up-to-date additional information for the intended voyage area, including the volume of traffic likely to be encountered throughout the voyage or passage, should be taken into account.

In relation to the above, it is noted that the South Evoikos area and the Steno Kafireas are included to the ordinary routes of vessels that are trading between ports of Mediterranean Sea, Marmaras Sea and Black Sea and therefore an increased vessel traffic should be anticipated. Indicatively **picture 4.6/1** provides a statistical depiction of said navigational area for the last semester of 2013.



Picture 4.6/1:

Depiction of vessel traffic at South Evoikos and Steno Kafireas.

Red colored areas indicate increased marine traffic, whereas green colored areas indicate low marine traffic (source: marine traffic)

On the above grounds it could be expected that during the appraisal phase of the passage plan of Baru Satu and Katherine the aforementioned information would have been taken into account in order to identify the related risks of navigation to sea area with increased vessel traffic.

Nonetheless, the passage plan of Baru Satu had no specific reference regarding vessel traffic or other pertinent navigational information for any navigating area. Similarly, the passage plan of Katherine had no specific remarks for the area of the casualty apart from a general notice that a group of fishing vessels could be met during the voyage. Moreover, Katherine voyage plan described the passage of Steno Kafireas and South Evoikos as “deep sea navigation”, whereas other segments were described as “coastal navigation”. According to the vessel’s SMM, “deep sea navigation” under clear weather conditions and little or moderate traffic required the presence of one navigational Officer on the bridge (“Watch condition 1”)⁶, whereas for sailing in restricted waters under clear weather conditions and little or moderate traffic a “watch condition 2” could have been applied, meaning that the Master or the delegated C/O might have been on the bridge as well when crossing the Steno Kafireas.

In light of the above it can be derived that the risks of the navigated sea areas of Steno Kafireas and South Evoikos due to the increased traffic, had not been properly identified during the appraisal phase of the passage plan, and consequently the two vessels proceeded with the 2nd Officer as the only OOW on the bridge and no additional measures had been established when the vessels crossed the casualty area. It can be suggested that by the presence of the Master or other Officer on the bridge of the two vessels the actions to avoid the close quarter situation and the collision might have been more effective and according to the respective provisions of the

⁶ Katherine SMM provided three navigational watch conditions. “Watch condition 1” required the presence of one Officer on the bridge; “watch condition 2” required the presence of two Officers and “watch condition 3” required the presence of three Officers. In watch conditions 2 and 3 the Master would normally be on the bridge and would have the conn but he could delegate the post to the C/O.

COLREGs. The failure to identify the risks due to the increased traffic at the area is considered a contributing factor to the examined marine casualty.

4.7 Crew complement

The crew complement of the vessels was provided by their Minimum Safe Manning Document issued by the competent Authority of the Flag State, under the respective provisions of SOLAS.

The provisions of the MSMDs of the two vessels are indicated to the following table:

Baru Satu		Katherine	
Capacity	No of persons	Capacity	No of persons
Master	1	Master	1
Chief Officer	1	Chief Mate	1
Deck Officer	1	OOW Navigational	2
AB Seamen	3	Chief Engineer	1
Ord. Seamen	1	Second Engineer	1
Chief Engineer	1	OOW Engineer	1
Second Engineer	1	Deck rating (II/4)	4
Engine Officer	1	Deck rating (VI/1)	2
Oilers/motormen	3	Engine rating	3
Total	13	Total	16

Table 4.7/1: Abstract of the vessels' MSMDs.

At the time of the casualty the crew of both vessels exceeded the provisions of their MSMDs, however the supernumerary crew involved ratings and other capacities with no watch duties.

Based on the above crew complement Katherine navigational watches were performed by the C/O, the 2nd Officer and the 3rd Officer. Consequently the Master was available to step on the bridge at any time and whenever it was deemed necessary.

Contrariwise, as Baru Satu was manned with three navigational Officers her Master was participating to the navigational watches and he was the OOW for the 0800-1200 / 2000-2400 watches. So the previous day he had been awake from 0600 and at 0800 he took over the navigational watch. When the vessel arrived at Piraeus anchorage he had not time to rest as he was supervising the bunkering and the store/lubricant supplies and had to sign all the relevant documents. After the completion of the supplies and the departure of the vessel from Piraeus anchorage he remained on the bridge for his navigational watch until 2400 when he handed over OOW duties to the 2nd Officer. He remained on the bridge until the next waypoint at Steno Keas. Then he went to his cabin for the relevant correspondence with the managing company and at approximately 0130 went to sleep after visiting the bridge to check that everything was normal and there were no navigational dangers.

During the investigation process it was reported that the Master of Baru Satu was familiar with the navigating area and the expected traffic of the South Evoikos and the Steno Kafiareas. However, due to his consecutive activities of the previous day, including the navigational watches, he wasn't able to remain on the bridge until clearing the Steno Kafiareas, as he was feeling tired and had to rest in order to be able to perform his duties during the forthcoming navigational watch at 0800-12000 and the ST/BY operations for crossing Dardanelles Straight and Marmara Sea.

It is noted that if the Master of Baru Satu had been on the bridge before the casualty he could have taken the conn or provided clear directions to the OOW on how to avoid the close quarter

situation with Katherine, according to the respective Regulations of COLREGs as described in [par. 4.2.2](#).

Considering the above, it is inferred that the performance of Master was affected by fatigue as he was not able to perform supervising duties for the safe navigation of the vessel while crossing the South Evoikos and Steno Kafireas area where increased traffic was expected, as he had been overburdened by his participation to the navigational watches and his supervising duties during the supply operations in the anchorage the previous day.

4.8 Involved crew Members

4.8.1 Baru Satu

.1 Master

The Master of Baru Satu was 59 years old and had graduated from a Maritime College in 1972. He served for 2 years as an AB at a shipping company in Georgia and after getting the CoC he served as a 3rd Officer for 7 years. Then he acquired the 2nd Officers CoC and served in tanker vessels. He started serving on Bulk Carriers on 1982 as a 2nd Officer and continued for the rest of his career. He acquired the Master CoC on 1996 and on 1997 he served for the first time as a Master.

From 2002 until 2007 he served as a Master on vessels of Baru Satu managing company. Then he had contracts with other shipping companies until he had his contract as a Master on Baru Satu which he joined on November 2012.

He was performing also the 0800-1200/2000-2400 navigational watch as the vessel's crew complement, according to her Minimum Safe Manning Document comprised only three navigational Officers, including the Master.

Having regard to his seagoing career and years of service it is suggested that he was an experienced seafarer and Master.

.2 Second Officer

The 49 years of age Second Officer had a 25 year of sea service and joined Baru Satu on June 2013, that is approximately 2 months before the casualty. He acquired his CoC as a navigational Officer in 2010 and this was his second contract as 2nd Officer. The previous contract was on a B/C vessel of 7000 deadweight in which he served for 8 months. Before that he had served on a 30000 deadweight B/C as an AB and previously he had served as an AB for almost 10 years in Container Vessels.

When he joined the vessel he followed the familiarization process with the vessel's equipment, provided by the relieving 2nd Officer, and the respective Check List according to Baru Satu SMM was signed by the C/O and the Master. Said Check List included specific items for familiarization with the radars and associated plotting aids.

Considering that this was his second contract as a 2nd Officer, having a total of 10 months service as a navigational Officer, and taking into account his actions as described in par. 4.2.2 and 4.3 it derives that his experience was not at an appropriate level. This was not taken duly into account by the Master and the C/O as it was reported that his performance on navigational duties in different situations had not been assessed.

It is suggested that a proper assessment of 2nd Officer's performance on navigational duties could have highlighted the lack of experience and might have led to additional training or additional controls to mitigate the risk of increased traffic while crossing Steno Kafirea.

It is noted that specific guidelines for assessing the navigational performance of inexperienced OsOW were not included to the vessel's SMM and this is considered as a contributing factor.

4.8.2 Katherine

.1 Master

The Master of Katherine was 46 years old and started his maritime care in 1990. He acquired the Master's CoC on 2008 and had his 1st contract as a Master on 2009. During said contract he passed several times from Steno Kafirea and so he was aware of the expected traffic.

He joined Katherine on March 2013, and it was his 1st contract with the vessel's managing company. Before the time of the casualty he visited the bridge and left at approximately 0140 to go to his cabin to rest. During the time that he remained on the bridge Baru Satu was not at the range of the radars.

He didn't give any specific orders to the OOW before he left the bridge other than what was already recorded to the night order book, as he was confident that the Officers had the required knowledge.

.2 Second Officer

The 54 years of age Second Officer started his maritime career at the age of 23. Initially he served as a deck cadet in passenger vessels in Philippines for 8 years and then he joined ocean going vessel. He served on container vessels and bulk carriers of Norwegian, Japan, German and Greek maritime companies.

He served as a 2nd Officer for seven years before the casualty and the last vessel was a 43000 deadweight bulk carrier. He joined Katherine on 13 May 2013 and he was familiarized by the signing off 2nd Officer according to the vessel's SMM.

4.9 Fatigue

In the course of the investigation process no evidence emerged that could lead to a conclusion that fatigue affected the performance of the two OsOW and the watch ABs, or other personnel, apart from Baru Satu Master who due to the overburdened schedule by the navigational watches, the operations at Piraeus anchorage and the forthcoming ST/BY for crossing the Dardanelles Strait and Marmara Sea, was not able to supervise the safe passage of South Evoikos and Steno Kafirea despite his awareness of the risks due to the increased traffic.

4.10 Environmental conditions

According to the available data and information the prevailing weather conditions cannot be considered to have been a contributing factor on examined marine casualty.

5. Conclusions

The following conclusions, safety issues and safety recommendations should not be taken as a presumption of blame or liability under any circumstances. The juxtaposition of these should not be considered with any order of priority or importance.

1. At the time of the casualty both radars of the vessels were in operation ([§4.1.1](#), [§4.1.2](#)).
2. As the vessels proceeded to their planned courses the initial CPA was at three cables ([§3.3](#)).
3. Before any action was taken by the OsOW, Katherine was the “give-way” vessel and should have taken action in order to avoid crossing ahead of Baru Satu and to keep clear from her passage ([§4.2.1](#)).
4. Katherine started to turn to starboard when the two vessels were at a distance almost 2.5 nm and almost 6 minutes from the CPA. The initial alteration of course to starboard of Katherine was not large enough to be readily apparent to Baru Satu ([§4.2.1](#)).
5. An earlier action by the OOW of Katherine would have provided more time to the OOW of Baru Satu to assess Katherine’s course and identify her starboard turning ([§4.2.1](#)).
6. Baru Satu was not monitoring effectively the course of Katherine in order to notice her course alteration ([§4.2.2](#)).
7. When Baru Satu turned port with the rudder 05° port at 02:44:36, Katherine was almost at her bow and the situation of the two vessels had changed from “crossing” to “head-on” ([§4.2.2](#)).
8. The decision of Baru Satu OOW to alter the vessel’s course to port during a “head-on” situation was in total disregard to the applicable Rule 14 of the COLREGs ([§4.2.2](#)).
9. The failure of Baru Satu OOW to utilize the available features of the ARPA resulted to the poor monitoring of Katherine navigation and consequently he missed to identify the alteration of her course to starboard ([§4.3](#)).
10. The lack of a establishing a proper communication between the two vessels, stating clearly the names of the vessels and the intended courses is considered to have contributed to the examined marine casualty ([§4.4](#)).
11. The lack of a specific order to the Master’s Standing Orders, concerning the proper utilization of ARPA features is considered as a contributed factor to the examined marine casualty ([§4.5.1](#)).
12. Baru Satu OOW action to turn to port that would lead to crossing between Katherine and the other vessels that was 1 nm abeam of Katherine at her starboard, disregarded Master’s night order to keep safe distance of 1nm from other vessels ([§4.5.1](#)).
13. It is suggested that a specific instruction by Katherine Master either as a standing order or as a night order, concerning the keeping of the minimum safe distance from other vessels at 1 nm, might have stimulated the OOW to call the Master or take proper action and alter the course earlier ([§4.5.2](#)).
14. The risks of the navigated sea areas of Steno Kafirea and South Evoikos due to the increased traffic, have not been properly identified during the appraisal phase of the passage plans, and consequently the two vessels proceeded with the 2nd Officer as the only OOW on the

bridge and no additional measures has been taken when the vessels crossed the casualty area. The failure to identify the risks due to the increased traffic at the area is considered a contributing factor to the examined marine casualty ([§4.6](#)).

15. The performance of Baru Satu Master was affected by fatigue as he was not able to perform supervising duties for the safe navigation of the vessel while crossing the South Evoikos and Steno Kafireas area where increased traffic was expected, as he had been overburdened by his participation to the navigational watches and his supervising duties during the supply operations in the anchorage the previous day ([§4.7](#)).
16. Baru Satu 2nd Officer had a total of 10 months service as a navigational Officer, and his experience was not at an appropriate level ([§4.8.1.2](#)).
17. The lack of experience of Baru Satu 2nd Officer was not taken duly into account by the Master and the C/O and his performance on navigational duties in different situations had not been assessed ([§4.8.1.2](#)).
18. Baru Satu SMM did not provide specific guidelines for assessing the navigational performance of inexperienced OsOW ([§4.8.1.2](#)).

6. Actions taken

The following safety recommendations concerning the Managing Company of M/V KATHERINE had been prepared while editing the present investigation report:

“The Managers of M/V Katherine are recommended to:

- Establish Guidelines for the OsOW concerning the establishment of effective communication with other vessels in order to avoid close quarter situations.
- Provide clear instructions to the crew for the preparation of the voyage plan in order to categorize each voyage segment according to the respective provisions of the SMM and to decide the appropriate “watch condition” for navigation.”

However, the Managing Company of M/V Katherine changed at 15th December 2015. The Company managing the vessel during the investigated casualty, no longer existed when the present report was produced, as derived during its consultation procedure. Therefore, the above mentioned safety recommendations concerning the Managing Company of M/V KATHERINE were not published.

7. Safety recommendations

Taking into consideration the analysis and the conclusions derived from the safety investigation conducted the following recommendations are issued:

7.1 The Managers of Baru Satu are recommended to:

86/2013: Develop its Safety Management System specific guidelines or take such measures as are necessary to ensure that watchkeeping officers are fully compliant with the International Regulations for Preventing Collisions at Sea.

Published by the Hellenic Bureau for Marine Casualties Investigation (HBMCI), under the provisions of the article 16 of Law 4033/2011 (Government Gazette A' 264), as applied.

This report was written solely for the purposes of the investigation and is uploaded on the website of HBMCI (see below)

Accident Investigation Report **15/2013**

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