*Marine Safety Investigation Unit*

Transport Malta

# MARINE SAFETY INVESTIGATION REPORT

**Safety investigation into the allision involving the Antigua & Barbuda registered heavy-lift**

***MARIA***

**and the consequent foundering of the Italian registered fishing vessel**

***ANGELA ARCELLA***

**in the Grand Harbour, Valletta**

**on 09 August 2016**

**201608/008**

**MARINE SAFETY INVESTIGATION REPORT NO. 18/2017**

**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 09 August 2016. 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.



***The cover page photo and photos in Figures 12, 14 15 and 16 are credited to the pilot on board MV Maria. These photos are being reproduced with his kind permission.***

MARINE SAFETY INVESTIGATION UNIT
Malta Transport Centre
Marsa MRS 1917
Malta

# CONTENTS

## LIST OF REFERENCES AND SOURCES OF INFORMATION

Master and crew members MV *Maria*

Pilot MV *Maria*

Transport Malta - Vessel Traffic Monitoring & Information Systems

Valletta Gateway Terminals

Voyage Data Recorder MV *Maria*

# GLOSSARY OF TERMS AND ABBREVIATIONS

| | |
|---|---|
| AIS | Automatic Identification System |
| CPP | Controllable pitch propeller |
| DF | Direction finder |
| DNV GL | Det Norske Veritas Germanischer Lloyd |
| E | East |
| ECR | Engine control room |
| FV | Fishing vessel |
| GT | Gross tonnage |
| IALA | International Association of Marine Aids to Navigation and Lighthouse Authorities |
| IMO | International Maritime Organization |
| kW | Kilowatt |
| m | Metre |
| MARIN | Marine Research Institute, The Netherlands |
| MMPC | Malta Maritime Pilots Cooperative |
| MSIU | Marine Safety Investigation Unit |
| MV | Motor vessel |
| N | North |
| Nm | Nautical mile |
| OTW | Outside territorial waters |
| PCU | Propulsion control unit |
| PortNet | Port Notification System |
| PV | Performance variability |
| RPM | Revolutions per minute |
| SMS | Safety management system |
| SOLAS | International Convention on the Safety of Life at Sea, 1974 as amended |
| VGT | Valletta Gateway Terminals |
| VHF | Very high frequency |
| VTS | Vessel Traffic Service |

## SUMMARY

At about 1206 on 09 August 2016, the Antigua & Barbuda registered motor vessel (MV) *Maria* made heavy contact with the Italian registered fishing vessel (FV) *Angela Arcella* and the Democratic Republic of Congo registered MV *Union* in the port of Valletta, Malta.

*Maria* was under pilotage and was preparing to berth at Laboratory Wharf. *Union* was safely moored alongside at Magazine Wharf, whereas FV *Angela Arcella* was also alongside at Ras Ħanzir.

On her final approach to the quay, *Maria* failed to stop in time and struck *Angela Arcella*. The bulbous bow penetrated the fishing vessel's hull below the water line. Soon after the allision, *Maria* gained considerable sternway and struck *Union* on her stern. Consequently, the mooring ropes parted and *Union* was set adrift in the harbour. *Maria* was finally brought under control and secured at Magazine Wharf. Meanwhile, another pilot boarded *Union* and with the assistance of a tug boat, berthed her at Laboratory Wharf.

Both *Maria* and *Union* sustained structural damage. *Angela Arcella* reported progressive flooding and consequently lost her reserve buoyancy and foundered at its berth. No injuries and pollution were reported as a result of this accident.

The Marine Safety Investigation Unit (MSIU) concluded that the immediate cause of the allision was the slow response of the controllable pitch propeller (CPP) system. Recommendations have been made to the managers of *Maria* and Transport Malta's Ports and Yachting Directorate with respect to the CPP system, vessel movement and pilot/master communication and interaction, and timely communication of berth plans.

**Cooperation**

The MSIU acknowledges the assistance and cooperation from ADOMS IID, Antigua & Barbuda Department of Marine Services and Merchant Shipping Inspection and Investigation Division, the Marine Casualty Investigation Central Board, Italy, and the Ports & Yachting Directorate of Transport Malta during the course of this safety investigation.

# 1 FACTUAL INFORMATION

## 1.1 Vessel, Voyage and Marine Casualty Particulars

| | | | |
|---|---|---|---|
| Name | *Maria* | *Union* | *Angela Arcella* |
| Flag | Antigua & Barbuda | Democratic Republic of Congo | Italy |
| Classification Society | DNV GL | Maritime Bureau of Shipping | Not Applicable |
| IMO Number | 9266566 | 8502133 | Not Applicable |
| Type | Heavy-lift | General Cargo | Purse Seiner |
| Registered Owner | SAL Heavy Lift GmbH | Outcoast Marine Corp. | *Private owner* |
| Managers | SAL Heavy Lift GmbH | Outcoast Marine Corp. | Not Applicable |
| Construction | Steel (Double bottom) | Steel (Double bottom) | Aluminium alloy |
| Length overall | 151.67 m | 87.66 m | 40.67 m |
| Registered Length | 143.32 m | *Not available* | Not Applicable |
| Gross Tonnage | 8383 | 1543 | 184 |
| Minimum Safe Manning | 14 | *Not available* | *Not available* |
| Authorised Cargo | Dry bulk | Dry bulk | Fish in bulk |
| Port of Departure | Hurds Bank (OTW Malta) | Porto Nogaro, Italy | Valletta, Malta |
| Port of Arrival | Valletta, Malta | Valletta, Malta | Valletta, Malta |
| Type of Voyage | Short international | Short International | Coastal |
| Cargo Information | Cable reels | *Not available* | Fish bait |
| Manning | 20 | *Not available* | *Not available* |

| Name | *Maria* | *Union* | *Angela Arcella* |
|---|---|---|---|
| Date and Time | | 09 August 2016 at 1206 (LT) | |
| Type of Marine Casualty or Incident | | Very Serious Marine Casualty | |
| | Less Serious Marine Casualty | Less Serious Marine Casualty | Very Serious Marine Casualty |
| Location of Occurrence | | Valletta, Malta | |
| Place on Board | Bulbous bow and poop deck | Poop deck / ballast tank / accommodation and galley | Overside / fish hold |
| Injuries/Fatalities | None | None | None |
| Damage/Environmental Impact | Minor indentation to the bulbous bow | Structural damages to the stern, aft peak tank and aft mast. One crew's cabin, galley and refrigerating room destroyed. | Progressive flooding into the cargo hold and subsequent foundering. |
| Ship Operation | Berthing / Manoeuvring | Alongside moored | Alongside moored |
| Voyage Segment | Arrival | Arrival | Arrival |
| External & Internal Environment | Fine and clear weather with a light to gentle Northwesterly breeze. Calm sea with an air temperature of 29 ˚C | | |
| Persons on Board | 20 | Not available | 8 |

## 1.2 Description of Vessels

### 1.2.1 *Maria*

The Antigua and Barbuda registered *Maria* (Figure 1) was a heavy-lift cargo vessel of 8,383 gt, owned and operated by SAL Heavy Lift GmbH. The vessel was built by J. J. Sietas KG Schiffswerft GmbH, Germany in 2004 and classed by DNV GL. *Maria* had a length overall of 151.67 m, a moulded breadth of 20.40 m and a moulded depth of 10.5 m. The vessel had a summer draught of 7.85 m, corresponding to a summer deadweight of 9,422 tonnes.

**Figure 1: MV *Maria***

Propulsive power was provided by a 9-cylinder MAN B&W Diesel AG – Augsburg 9L48/60, four-stroke, single acting, medium speed diesel engine, producing 9,450 kW at 500 rpm. This drove a left-handed controllable pitch propeller (CPP) at 132 rpm, through a reduction gearbox, reaching a service speed of about 18.0 knots.

### 1.2.2 *Union*

MV *Union* (Figure 2) was registered in the Democratic Republic of Congo. She was a 1,543 gt general cargo ship, owned and managed by Outcast Marine Corporation. The vessel was built by Barkmeijer Stroobos B.V., The Netherlands in 1985 and was classed by the Maritime Bureau of Shipping.

*Union* had a length overall of 87.66 m, a moulded breadth of 11.02 m and a moulded depth of 5.21 m. She had a summer draught of 3.94 m, corresponding to a summer deadweight of 2,362 tonnes.


**Figure 2: MV *Union***

Propulsive power was provided by a 6-cylinder Kloeckner-Humboldt-Deutz four-stroke, single acting, medium speed engine producing 883 kW at 900 rpm. This drove a single, fixed pitch propeller, giving a service speed of about 10 knots.

### 1.2.3 *Angela Arcella*

*Angela Arcella* (Figure 3) was an Italian purse seiner of 184 gt. The hull was constructed of aluminium alloy at Cantiere Navale Ippolito, Italy, in 2005. She had an overall length of 40.56 m and a moulded breadth of 7.05 m. The vessel was powered by a Mitsubishi four-stroke, single acting diesel engine S12R-MTK producing 1,210 kW of shaft power. *Angela Arcella* arrived from Lampedusa, Italy on 08 July 2016. She was engaged as a feeder vessel, carrying fish-bait between the port of Valletta and offshore fish farms.


**Figure 3: FV *Angela Arcella***

## 1.3 Crew Members on Board *Maria*

At the time of the accident, there were 20 crew members on board *Maria*. The crew compliment was in excess of the Minimum Safe Manning Document issued by the flag State Administration of the vessel.

Both the master and the chief engineer were German nationals. The navigating officers, engineers, and crew were Filipino nationals. The working language on board was English.

The master was 59 years old. He had been serving on ships as master for over 33 years. He joined SAL Heavy Lift in 2005 and served as a master on *Wilma*, *Lena* and *Annegret*. The principal dimensions, machinery and navigational equipment of

these vessels were reportedly similar to *Maria*. The master signed on *Maria* on 13 July 2016.

The chief engineer was 55 years old. He had joined the Company in 1983 and eventually appointed chief engineer in 1991. Before joining *Maria* on 22 June 2016, he had served as chief engineer on a number of SAL managed ships, with machinery and propulsion systems similar to those fitted on *Maria*.

The 47 year old chief mate held a master's certificate of competence. He joined *Maria* on 05 June 2016. Prior to joining *Maria*, he had worked with the Company for over seven years.

### 1.4 Valletta Gateway Terminals

Valletta Gateway Terminals (VGT) was established in 2006 and awarded a 30-year concession agreement to operate and manage the Grand Harbour Terminals. A plan of the berths managed by VGT (marked in red) is shown in Figure 4.

VGT operates and manages logistics and warehouses in the port of Valletta. The chief activities include handling of conventional cargo, ro-ro and container operations. Ro-ro and containerised cargo is handled at Laboratory and Magazine wharfs. Laboratory Wharf is contiguous with Magazine Wharf and at right angle to Ras Ħanzir. Conventional cargo is handled at Deep Water Quay.

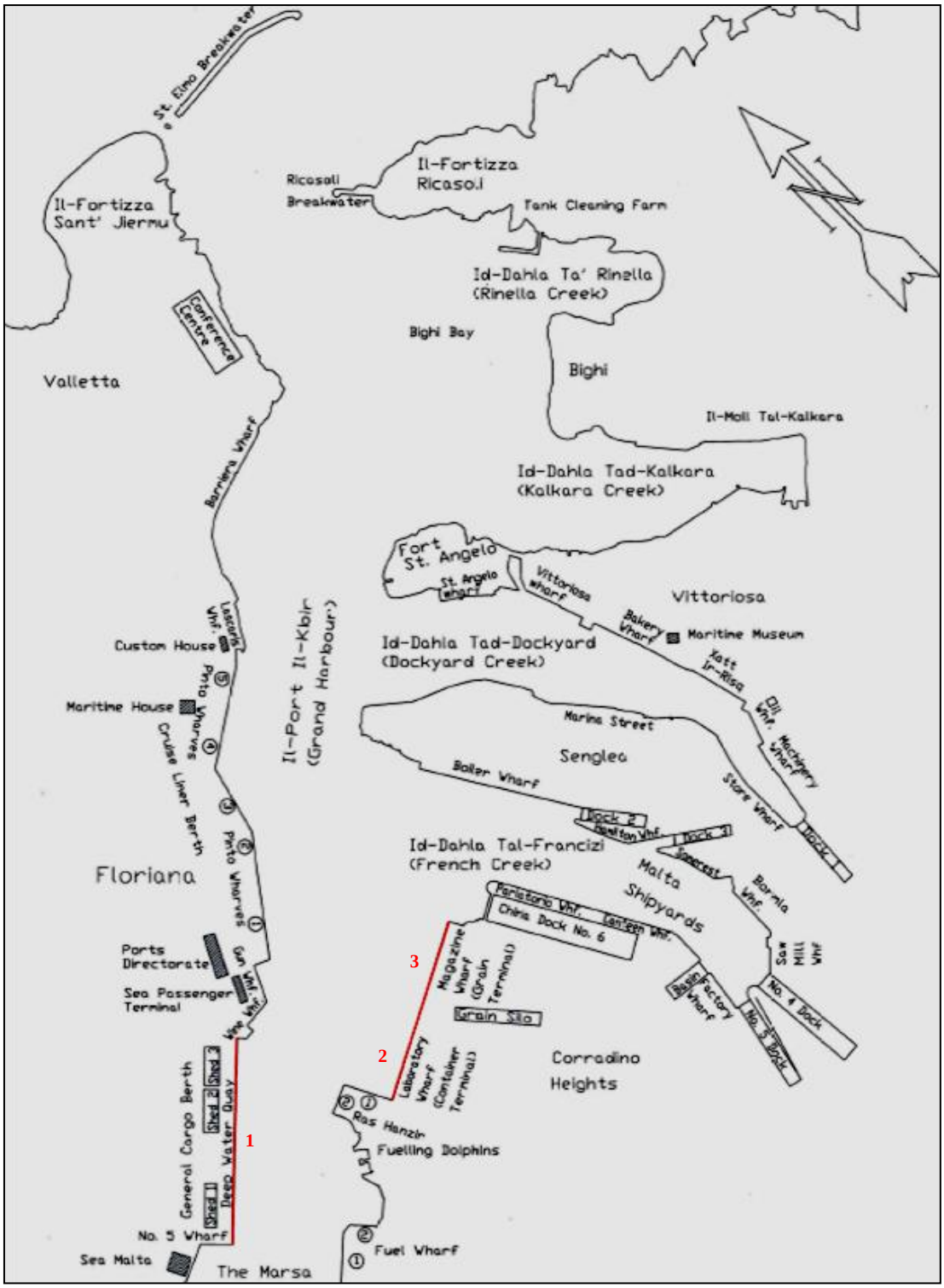


**Figure 4: Chartlet showing VGT berths in red (Deep Water Quay (1), Laboratory (2) and Magazine (3) wharfs)**

## 1.5 Valletta Ports Vessel Traffic Services

The Safety of Life at Sea, 1974 Convention, as amended (SOLAS), Chapter V sets out operational requirements on Safety of Navigation. Regulation V/12 refers to vessel traffic service which, *inter alia*, states:

1. *Vessel traffic services (VTS) contribute to safety of life at sea, safety and efficiency of navigation and protection of the marine environment, adjacent shore areas, work sites and offshore installations from possible adverse effects of maritime traffic.*
2. *Contracting Governments undertake to arrange for the establishment of VTS where, in their opinion, the volume of traffic or the degree of risk justifies such services.*

Detailed guidelines on VTS are given in IMO Resolution A.857(20) and International Association of Marine Aids to Navigation and Lighthouses Authorities (IALA) VTS Manual.

In 2007, Malta VTS and Valletta Ports VTS (Valletta VTS) were established in terms of the Vessel Traffic Monitoring and Reporting Requirements Regulations, 2004 and European Council Directive 2002/59/EC on Community Vessel Traffic Monitoring and Information System.

Malta VTS is responsible for the monitoring of ships in territorial waters whereas Valletta VTS regulates and controls the movement of ships. Valletta VTS is also reponsible for organising traffic and information service. A navigational assistance service is provided on request. The VTS areas and service level is promulgated in Volume 6 of the Admiralty List of Radio Signals.

The competent Authority responsible for the port and Valletta VTS is Transport Malta's (TM) Ports and Yachting Directorate. All VTS personnel are trained to IALA V-103 standard. They are responsible to regulate the movement of ships. The VTS supervisor is responsible for VTS operations under his watch. Before granting permission to a ship to enter the port, the VTS operators take into account the vessel's berth, tugs and mooring, status of ship's hull and machinery, weather and traffic conditions.

Valletta VTS has three work-stations, equipped with NorControl VOC 5060 and a network of radars, automatic identification system (AIS), VHF communications, a DF and weather stations. The VTS station is managed 24/7 by a supervisor and two operators. The duties of VTS personnel are defined in the VTS Standard Operating Procedures Manual.

The work of Valletta VTS is complemented by the office of Traffic Management. A ship's notice of arrival is electronically submitted over the port notification system (PortNet). The Traffic Management office manages PortNet access notifications and authorises vessels' entries into Malta. The berth plans prepared by the Terminal operators are checked and sent to the pilots and Valletta VTS in advance of the ship's arrival. However, in the case of vessels operating in local waters, no advance notification is needed other than a call to the VTS operator to enter or leave port[1].

## 1.6 Pilotage Service

Pilots possess extensive nautical knowledge and handle all types of ships. They enhance safe navigation within the confines of the port, which are otherwise unfamiliar to the master. Pilotage service in the port of Valletta is provided by the Malta Maritime Pilots Co-operative (MMPC). The MMPC, in collaboration with the Marine Research Institute, The Netherlands (MARIN), also conduct training courses on an advanced, full mission pilot simulator. The MMPC has 16 pilots, licensed by the port authorities. The pilot who boarded *Maria* was a very experienced mariner. He had joined MMPC in 1988, rising to senior pilot position in 1996. At the time of the accident, he held an unrestricted pilot licence for all types and size of vessels.

## 1.7 Environmental Conditions

The weather was fine and clear. There was light to gentle breeze from the Northwest. The sea was calm and the air temperature was registered at 29 °C.

[1] VGT has clarified that berth plans are sent on a daily basis (excluding Sundays and Public Holidays when the information is sent one day before) at around mid-day to show the berthing of the following day (two days in the case of Sunday). However, VGT also said that very relevant changes to a berth plan throughout the day are updated accordingly with a revised plan.

## 1.8 Narrative[2]

Prior to the accident, *Maria* was on anchor, about 16 nautical miles East of Malta at Hurds Bank in position 35° 58.78´ N 014° 52.68´ E. At 0942 on 09 August 2016, she started weighing her anchor. The master stated that he had checked the bow thruster and the propeller's pitch, and all was noted to be operating satisfactory. At 1006, *Maria* was underway heading towards the port of Valletta. She was scheduled to berth port side alongside at Laboratory Wharf. The draughts were recorded at 5.5 m forward and 6.0 m. aft. At the time, the far end of the quay, close to Ras Ħanzir, was occupied by fishing vessels *Angela Arcella* (Figure 3) and *Maria SS di Constantinopoli* (Figure 5).


**Figure 5: FV Maria SS di Constantinopoli**

*Maria's* ETA and berth were communicated to the pilot assigned for *Maria*. The berth plan (Figure 6), which was also provided to the pilot, indicated that *Maria* was to berth at Laboratory Wharf. The fishing vessels' positions, however, was marked as Deep Water Quay on the berth plan and therefore, he called Valletta VTS to request that the fishing vessels shift and clear the berth.

[2] Unless otherwise stated, all times are ship's time (UTC +2).

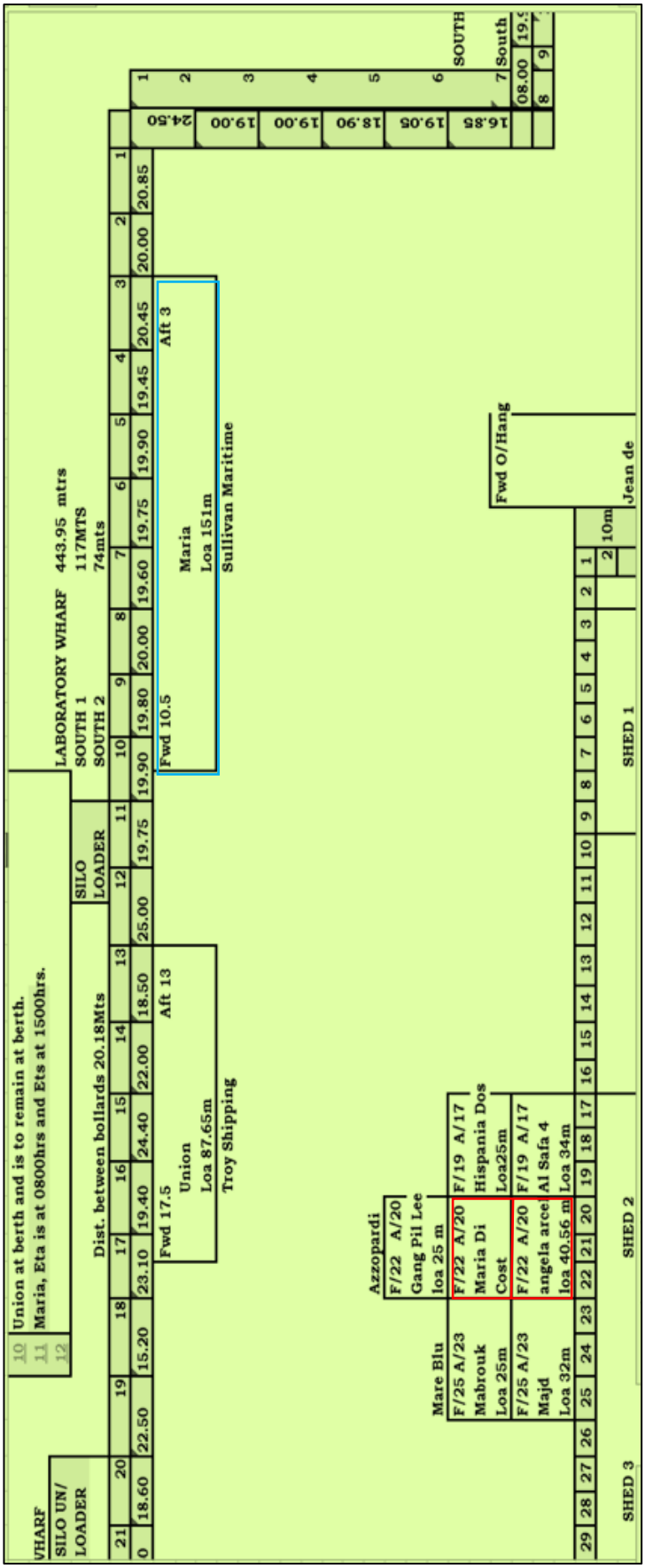


**Figure 6: Berth plan issued by VGT on 08 August 2016. *Maria* is outlined in blue whereas the fishing vessels are outlined in red at Deep Water Quay**

Upon boarding *Maria* at 1142, the pilot pointed out the berth on the chart to the master. The master was navigating the vessel from the centre console inside the wheelhouse (Figure 7). At about 1145, the chief mate joined the master on the bridge and relieved the second and the third mates so that they could proceed to their respective mooring stations.

**Figure 7: Wheelhouse central console**

In the meantime, following the discussion with the pilot, Valletta VTS instructed VGT on the shifting of the two fishing vessels. Eventually, *Angela Arcella*[3] shifted to Ras Ħanzir but *Maria SS di Constantinopoli* remained on the quay, moored between bollard nos. 1 and 3.

*Maria* was on her way and already inside the Harbour. As soon as she cleared Senglea Point, *Maria SS di Constantinopoli* came into view. The pilot stated that he called VGT on the VHF radio and mobile phone but received no reply[4]. He therefore

[3] Although, *Angela Arcella* overlapped the berth assigned for *Maria*, the remaining berth space for *Maria* was adequate.

[4] During the consultation process, VGT submitted that there was no VHF radio communication between VGT and the pilots. VGT stated that verbal communication is done on mobile phone. Although VGT acknowledged that its official had a number of missed calls on his mobile phone,

requested Valletta VTS to make arrangements to shift *Maria SS di Constantinopoli* from her present position[5]. At this time, the master reduced the speed to about five knots and positioned *Maria* in the direction of her berth. At about 1204, *Maria SS di Constantinopoli* shifted to the outer part of Ras Ħanzir.

The master, who had the con, further reduced the speed to three knots. As *Maria* passed *Union* on her port side, he set the pitch control lever to zero and moved out of the wheelhouse to conduct the berthing operations from the port bridge wing console (Figures 8 and 9).

**Figure 8: Port bridge wing console**

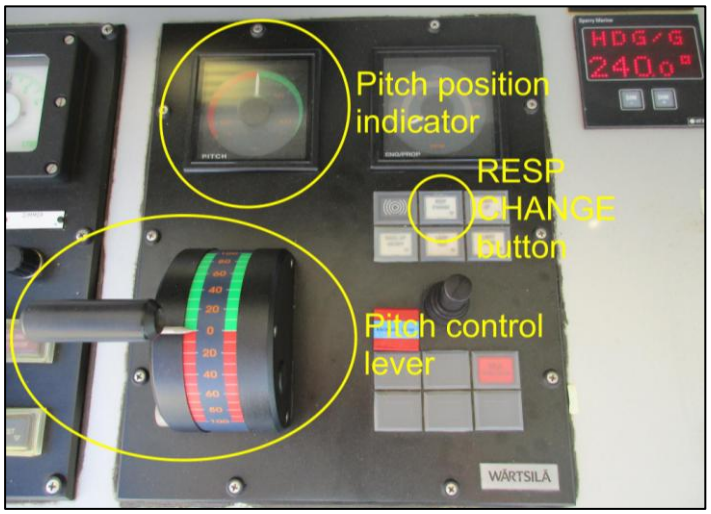


**Figure 9: Close view of the port bridge wing console**

---

the calling numbers were listed as 'Private' and therefore he could not return the calls. Therefore, the VGT official called the Traffic Management office to verify whether the calls originated from there, but the office replied in the negative.

[5] The pilot, guided by the (previous) berthing plan and directions received from the VTS, felt more comfortable to have the berth clear prior to *Maria*'s berthing.

The pilot reported that at the time her stern was roughly in line between bollards 10 and 11. The master pressed the CPP transfer button and set the pitch control lever astern. He stated that at the time, he could feel[6] the controls not responding to the astern command and the vessel kept going forward. He rushed back inside the bridge to regain control from the main console (Figure 10). He set the pitch control lever astern with no reponse. Seeing this, he pushed the emergency back-up button and on the emergency back-up he gave the command to go astern. Notwithstanding this, the vessel kept making headway.

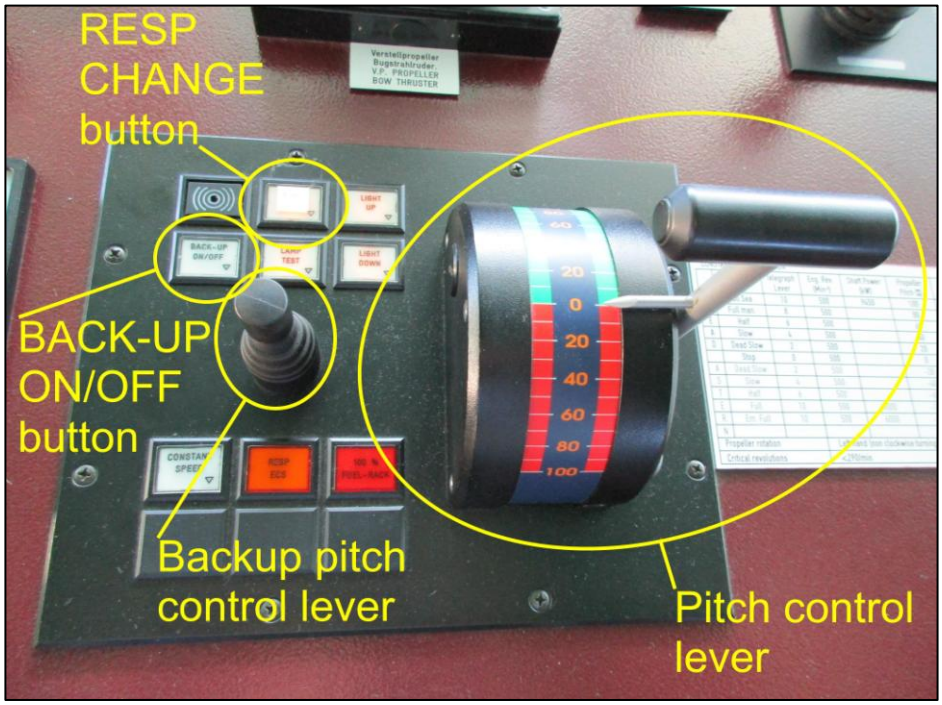


**Figure 10: Wheelhouse console showing CPP controls**

The pilot, observing the master pushing several buttons and moving the pitch control levers back and forth to try and control the vessel, was concerned of a possible malfunction of the propulsion power. He therefore instructed the chief mate to let go the starboard anchor, and requested bow thruster 'full' to port. He also alerted the crew members of *Angela Arcella* from the bridge wing of the impending allision.

At 1205, an engine control air alarm alerted the chief engineer. He noticed the emergency control of the CPP system activated on the bridge but the pitch indication in the engine control room (ECR) console remained in the '0' position (Figure 11).

[6] CPP lever setting and propulsion feedback was not reported by the master.

He called the bridge but received no answer. He then rushed out on deck and saw *Maria* slowly moving towards *Angela Arcella*. He hurried back to the engine-room and observed the pitch still in the zero position. The chief engineer then rushed out to check the CPP on the bridge[7]. On his way up, he felt a slight impact. At 1206/14s, *Maria*'s bulbous bow struck *Angela Arcella* (Figure 12).

**Figure 11: CPP console in the ECR**


**Figure 12: Allision with the fishing boat**

[7] The chief engineer reported that the ECR console does not display CPP command given on the bridge.

On impact, *Maria* gathered astern momentum. The anchor chain held on to three shackles, became taut, and the vessel veered towards the quay and *Union*. At 1207/55s, *Maria* running astern at about 3.94 knots (Figure 13), struck *Union* and her hull scraped against the quay deck. The mooring ropes parted and *Union* was adrift in the Harbour.

When the chief engineer arrived on the bridge, he saw the vessel moving backwards, the pitch control lever on astern position, and the master trying to stop the vessel. He called the master to push the emergency stop button. The activation of the engine emergency stop was logged at 1211. The chief engineer restarted the main engine and at 1225, *Maria* was manoeuvred alongside and moored at Magazine Wharf.

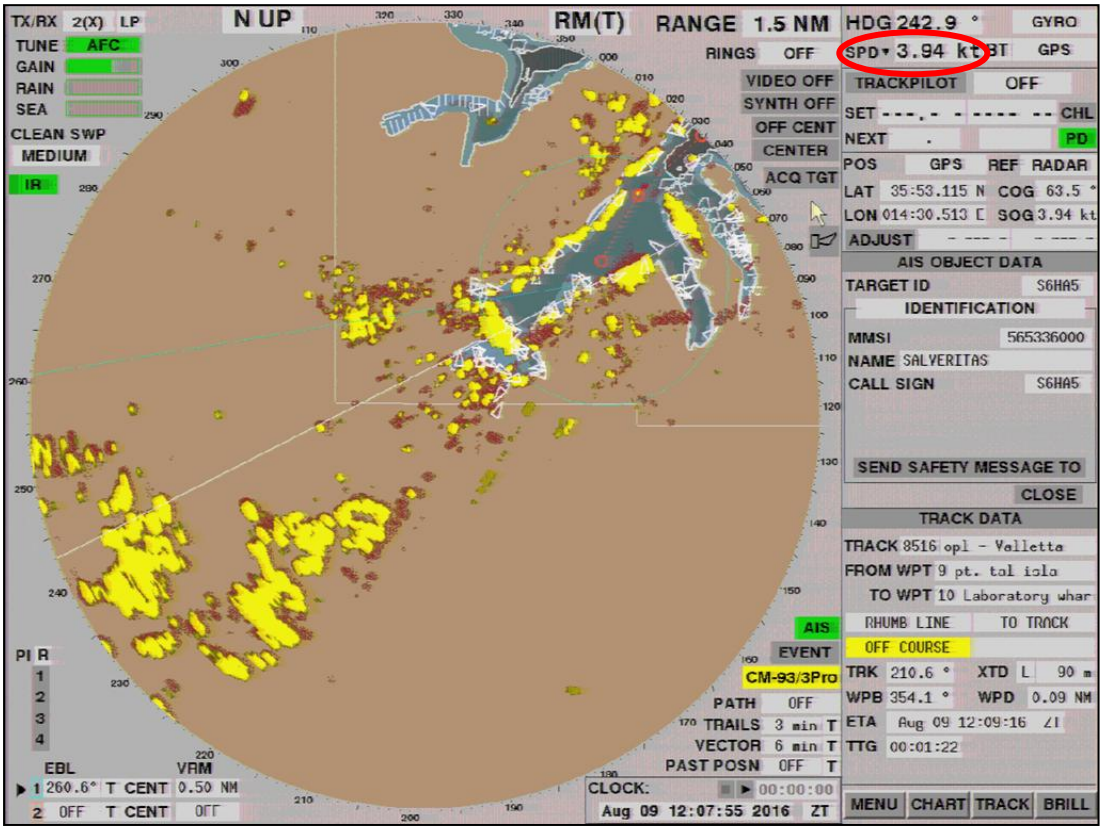


**Figure 13: VDR image showing astern speed at 1207/55s**

## 1.9 Post Allision Events

The pilot reported the allision with *Angela Arcella* and *Union* to the port authorities. He instructed *Union* to drop anchor and requested the assistance of another pilot.

Eventually, a second pilot boarded *Union* and with the assistance of a harbour tug, berthed her at Laboratory Wharf (Figure 14).


**Figure 14: *Union* being pushed back alongside following the allision**

The hull of *Angela Arcella* was pierced below the water line, with consequent massive flooding and loss of reserve buoyancy (Figure 15).


**Figure 15: *Angela Arcella*'s massive flooding and loss of reserve buoyancy**

The fishing vessel eventually went down first by her stern and then capsized on her starboard side (Figure 16). Traffic in the port was temporarily suspended.


**Figure 16: FV *Angela Arcella* foundered within minutes of the allision**

## 1.10 Technical Report on the Controllable Pitch Propeller

On 12 August 2016, a technician from Wärtsilä boarded *Maria*. He checked the propulsion system, examined the cables, terminals and connections and the propulsion control unit. The hydraulic system pressure was also checked. The technician reported that transfer between the CPP consoles in normal operation was possible without any malfunction. In the case of CPP back-up operation, the technician reported that power supply dropped from 23.54 V DC to zero. However, if the push button was pressed again (off), the pitch control lever could then be used for normal CPP operation.

## 1.11 Structural Damages[8]

The damage sustained by *Maria* was assessed by the crew. There was no water ingress and initial reports indicated minor indentation on the bulbous bow, scratch marks and slight indentation on her stern and ship side where she struck *Union* and

[8] A copy of the damage survey report for *Angela Arcella* was not available at the time of the safety investigation.

grazed against the quay structure (Figures 17 and 18). There was also damage to the quay (Figure 19).

**Figure 17: Damage to the bulbous bow**

**Figure 18: Ship side damage caused by contact with the quay**

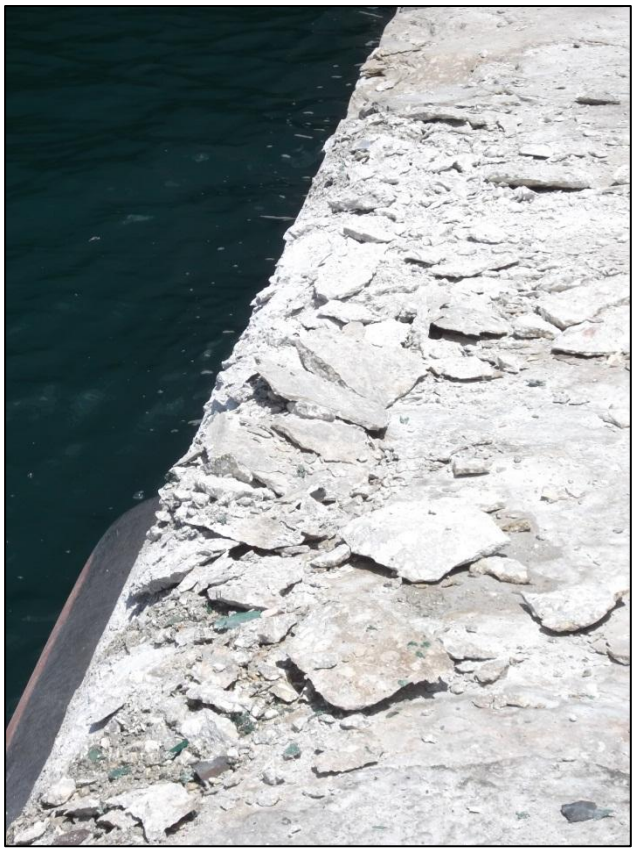

**Figure 19: Damages to the quay**

*Union*'s master reported fracture and indentation on the vessel's stern (Figure 20), water ingress in the aft peak tank, and a sheared aft mast which fell into the sea. The chief officer's cabin (Figure 21), galley and refrigeration room were reportedly destroyed.


**Figure 20: External structural damage on *Union***

**Figure 21: Internal damages on *Union* (chief mate's cabin)**

# 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 Reconstruction of Events

Events leading to the allisions with *Angela Arcella* and *Union* were reconstructed from electronic and documentary evidence submitted to the MSIU. VTS traffic image of *Maria*'s navigation was provided by Transport Malta. VGT made available to the safety investigation the CCTV footage of *Maria* approaching Laboratory Wharf. A copy of *Maria*'s VDR data was also made available for analysis. VHF radio and bridge conversations, however, were found defective and inaudible.

Navigational information and sequence of events collated from the above data is reproduced in Table 1.

**Table 1: Navigational information and sequence of events**

| **Local time hh mm/ss** | ***Maria*'s heading and speed in knots** | **Event** |
|---|---|---|
| 0930 | | *Maria* on anchor at Hurds Bank (OTW) in position 35° 58.78´ N 014° 52. 68´ E |
| 09 11/40 | | FV *Angela Arcella* entering Valletta |
| | | FV *Maria SS di Constantinopoli* entering Valletta |
| 09 42 – 10 06 | | *Maria* weighing anchor |
| 10 43 | | Valletta VTS informed pilot of *Maria*'s berth (Laboratory Wharf bollard 3 to 10.5). Mooring men informed |
| 10 58 | | VGT issued revised berth plan (indicating *Maria*'s berth between bollards 4.5 to 12) |
| 11 18 | | Pilot leaving port for *Maria* |
| | | Pilot requested VTS to clear FVs from Laboratory Wharf |
| 11 21 | | VTS instructed VGT to shift FVs |
| 11 42 | | Pilot on board *Maria* |
| 1145 | | *Angela Arcella* shifted to South 1 (Ras Ħanzir) |
| 11 50 | Various 8 | *Maria* passing the breakwater |

| **Local Time hh mm/ss** | ***Maria*'s Heading & Speed in knots** | | **Event** |
|---|---|---|---|
| 12 00 | 213° | 6 | *Maria* passing Senglea Point |
| | | | Pilot sighted *Maria SS di Constantinopoli* at Laboratory Wharf |
| | | | Pilot calling VGT and VTS |
| 12 01/11 | 207° | 5 | *Maria* off Crucifix Wharf |
| 12 02/11 | 205° | 4 | *Maria* off Magazine Wharf |
| | | | *Maria* approaching Laboratory Wharf |
| 12 04 to 12 05 | 204° to | 3.22 | Master shifted to port bridge wing console |
| | 220° | | *Maria SS di Constantinopoli* shifted to Ras Ħanzir |
| | | | Master back in the bridge house to regain control of CPP |
| | | | Emergency CPP system activated. Control air alarm sounded in the ECR |
| | | | *Maria* dropped starboard anchor |
| 12 05/50 | | | Astern propeller wash captured on CCTV (Figure 22) |
| 12 06/14 | 232° | 2.16 | Allision with *Angela Arcella* |
| 12 06/26 | 233° | 0.09 | Pilot reported allision to Valletta VTS |
| | | ahead | Image of astern wash captured on CCTV (Figure 23) |
| 12 06/40 | 234° | 0.83 Astern | *Maria* gaining astern speed |
| 12 07/40 | 241° | 3.07 k Astern | Starboard anchor on three shackles |
| 12 07/55 to 12 08 | 243° | 3.94 Astern | Allision with *Union*. Mooring ropes parted |
| 12 08/10 | 243° | 3.24 Astern | Pilot reported allision to Valletta VTS |
| 12 09/10 | | | *Union* adrift off no. 6 dock |
| 12 10/10 | | | Pilot and tug *Lieni* on site to assist *Union* |
| | | | Chief engineer on the bridge reported pitch in astern position |
| 12 11 | | | Engine emergency stop activated |
| 12 16 | | | Emergency stop button reset |
| 12 18 | | | Main engine re-started |
| | | | Main engine and CPP transferred to the bridge |
| 1225 | | | *Maria* all fast port side alongside Magazine Wharf |
| 12 50 | | | Pilot disembarked from *Maria* |
| | | | *Union* made fast at Laboratory Wharf |

## 2.3 Evolving Situation and CPP Performance

It would appear from the evidence collected by the MSIU that interaction between the pilot and the master was minimal during the pilotage. It would also appear that when the dynamics of the event were developing rather rapidly, just before the allision, the assessment of the perceived situation was neither being communicated nor shared.

On sighting *Maria SS di Constantinopoli* at Laboratory Wharf, the pilot became preoccupied. His instructions had not been complied with and his calls to VGT had gone unanswered. He was uncomfortable with the developing situation because the document in hand (the berth plan) did not reflect the actual situation in the port and the clarifications requested were not being provided[9].

The master appeared unperturbed, possibly because he had worked on a number of ships similar in type and size to *Maria* and was quite familiar with the machinery and navigational equipment. Although he had recently joined the vessel, the developing situation and the late shifting of *Maria SS di Constantinopoli* had no effect on the master, at least initially. He did not foresee any safety concerns and the risk of contact with the quay or the vessel was not anticipated. Then, there were no cues which would have alerted him of a potential allision within the next few minutes.

Approaching at three knots and with *Angela Arcella* close on her starboard bow, the master shifted berthing manoeuvres to the port wing console, pressed the activation button and set the pitch control lever astern. He reported that at this point in time, he felt that the controls were not responding. He did not advise the pilot of this and rushed inside the wheelhouse to take control from the bridge console, and set the pitch control lever astern. Yet, he sensed no discernible astern movement.

During the course of the safety investigation, the MSIU was not provided with records of tests, if any, carried out on the CPP system. However, on the basis of the wheelhouse poster, it was evidently clear that the astern propulsion was about 60% of the ahead power and it would take about 27 seconds from a stop-to-full astern engine order to be completed. It is neither known when these values were last tested nor if

[9] During the consultation period, VGT submitted that eventually the pilot managed to contact the Berthing Manager, who confirmed with the pilot that the fishing vessel had been shifted and *Maria* could berth.

the values were still valid. The master was expecting a rapid ship response to his astern command. The headway of the vessel and her approach towards the berth and the fishing vessel ahead, may have amplified the perceived delay. While the feedback signal on the pitch indicator was not monitored by the bridge team, the slow but progressive astern running of the propeller was not readily apparent to him. The master quickly activated the back-up system, inadvertently leaving the pitch control lever in the astern position. At the crucial moment, however, the back-up supply power dropped to zero, resulting in zero pitch feedback, which the chief engineer observed on the ECR console.

It was very likely that during the brief but critical moments on the bridge, the master, in his efforts to control the ship's headway, pushed the back-up button (off) again and the CPP system reverted back to normal operation. Indeed, the CCTV image (Figure 22) captured at 1205/50s shows a well-defined propeller wash running ahead of the vessel as she passed *Union*, an indication of an astern propulsion in progress, which was more pronounced by 1206/31s (Figure 23).

The safety investigation noted that no system failure alarms (audible or visual) were detected or reported by the bridge team. During the course of the safety investigation, the MSIU was informed that post allision examination and tests, carried out when the vessel was safely moored alongside, no malfunctioning of the normal operation of the CPP system was identified by the crew.

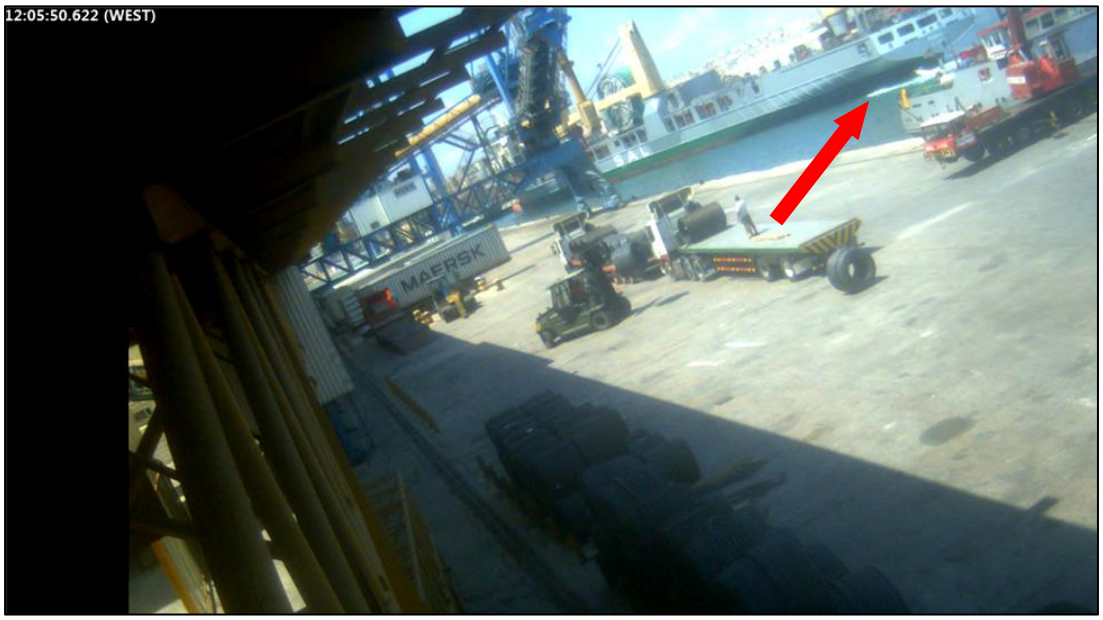


**Figure 22: Image showing astern wash at 1205/50s captured by CCTV**

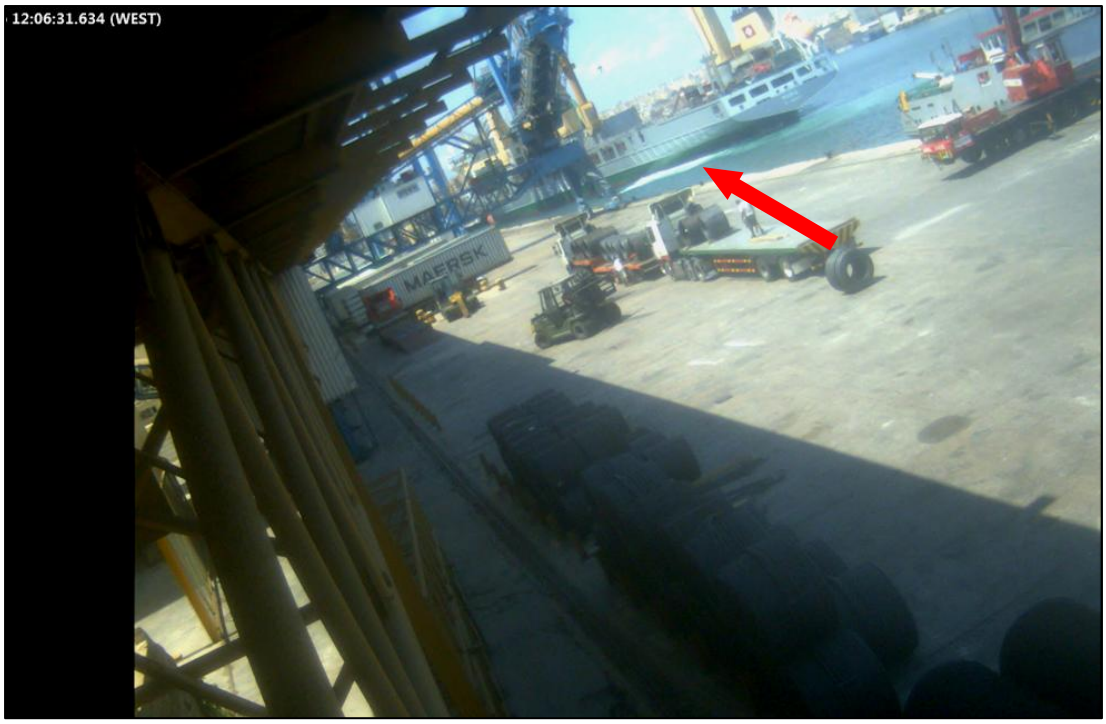


**Figure 23: Image of astern wash captured by CCTV at 1206/31s.**

### 2.3.1 Cause of the allision

The allision with *Angela Arcella* was primarily caused by *Maria* not instantly responding to the master's astern command. The CPP did not develop sufficient power in time to counter the vessel's headway and prevent the bulbous bow from striking the fishing vessel. The controlling effect of dropping anchor, with the bow thruster full to port on the vessel's advance or direction was difficult to estimate.

It is believed that as a result of the uncertainty of the astern propulsion and the unanticipated developments on the bridge at a critical time, the pitch control lever was inadvertently left in the astern position. After the allision with *Angela Arcella*, *Maria* came to a sudden stop, retreated and the astern propulsion gathered momentum. The master attempted, without success, to stop the vessel's sternway, which reached a speed of almost four knots (Figure 13). The anchor chain became taut and the light wind veered the vessel towards the quay, making contact with *Union* and the quay structure.

## 2.4 Exchange of Information and Arrival Procedures

Annex 2 of the IMO Assembly Resolution A.960 (23) recommends exchange of information between the pilot and the master. In particular, section 5.1 states that the master and the pilot should either exchange information or a pilot card on navigational procedures and local conditions. The pilot card contains information on navigational instruments, engine power and manoeuvring characteristics of the vessel. The Assembly Resolution further recommends that the information exchange should be a continuous process during pilotage.

*Maria*'s SMS procedures required that prior to arrival in a port, all navigational equipment should be checked and ready for use. The SMS and Arrival Checklist Form made specific reference to the proper functioning of bridge/engine telegraph, pitch indicator, ampere meter and load indicator. After the checks would have been completed, the master had to be informed and the results entered in the bridge bell-book. With respect to the VTS procedure, the master, together with the pilot, was required to conduct astern manoeuvre trials and report to the VTS operator.

On arrival at the pilot station, the pilot boarded the vessel and the Arrival Checklist Form was completed by the third mate. Accordingly, the engine's telegraph and bow thruster, ampere meter, RPM, pitch and load indicator were checked and verified that they were ready for use[10]. However, the MSIU had no evidence of astern trials and was not aware as to whether anything had been reported to the VTS in this respect. The pilot card was presented to the pilot and the latter advised the master of *Maria*'s allocated berth. However, it did not transpire that mention was made of the pilot's request to the VTS with respect to the requested shift of the fishing vessels from Laboratory Wharf in time for *Maria*'s arrival.

The MSIU was also unable to determine the reason behind the propulsion system's slow response to the master's astern command. It may be subjective to claim that this would have had a bearing on the way the accident dynamics developed once the vessel was in port. It may be submitted that there existed the possibility that an astern check measured against time would have indicated to the master that the stop-to-full manoeuvre would have taken longer than the 27 seconds indicated in the wheelhouse

[10] The MSIU did not have access to the vessel's bell book records.

poster. That information, then, could have been relayed to the pilot for his consideration during the approaches to the berth.

That said, however, it has to be acknowledged that in all probability, a check while weighing anchor would have had a different objective and possibly only limited to a check of the pitch to ensure that the astern order at the telegraph on the bridge is actually transmitted to the propeller blades without allowing the revolutions to reach the full astern.

### 2.4.1 VTS operations

The audio recordings made available to the MSIU revealed limited communications between the pilot and Valletta VTS. The recordings of the onboard communication were very unclear. Hence, the safety investigation was unable to verify engine performance, in particular the requirement of the astern movement.

With respect to the fishing vessels, the VTS supervisor explained that the berth at Deep Water Quay is customarily planned as a lay-by berth for *Angela Arcella* and *Maria SS di Constantinopoli*. In the event of loading fish-bait, however, the fishing vessels would berth alongside Laboratory Wharf. The supervisor further explained that this arrangement has been in practice for some time, expedites movement to the fish farm, served well the fish farm operators and raised no objections from the Terminal operator. Thus, on the morning of 09 August, so as not to interfere with the loading of fish-bait, VGT adjusted *Maria*'s berth[11] and issued a new berth plan (Figure 24). At the time, however, the pilot had already set out to board *Maria* and the changes made to the berth plan were neither directly communicated to the pilot nor to the VTS operator[12].

[11] VGT modified *Maria's* berth - bollards 4.5 and 12.

[12] Revised berth plan was not found in the VTS log book.

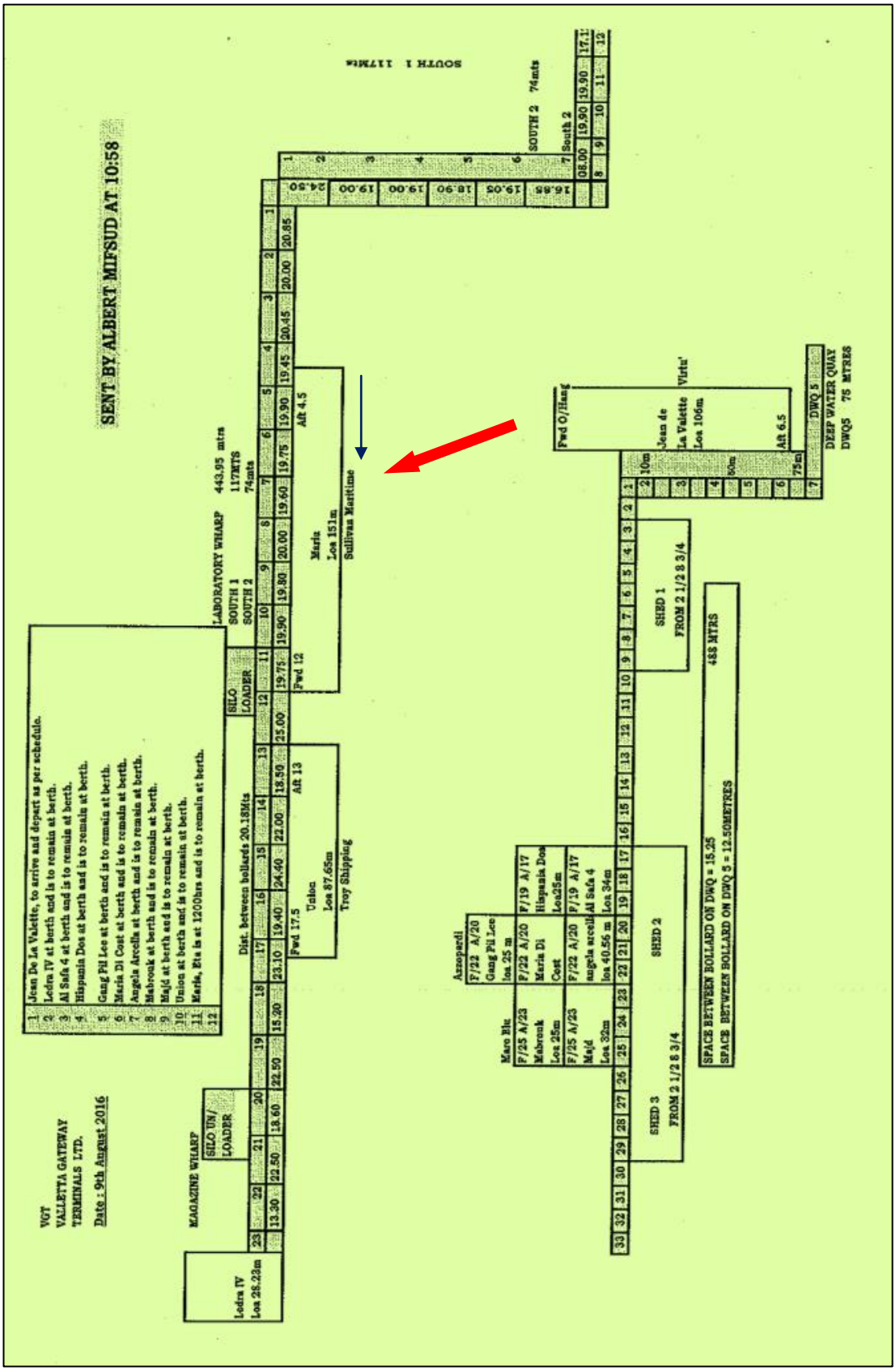


**Figure 24: Revised berthing plan issued on 09 August 2016**

The MSIU is not of the view that the initial berthing positions of the fishing vessels had a direct bearing on how the accident dynamics evolved. It has already been explained elsewhere that there was enough berthing space for *Maria*, even before the Terminal operator amended the berth plan on 09 August 2016. Moreover, the outcome of the events as they unfolded on *Maria* was independent from the berthing position of the fishing vessels and in all probability, *Maria* would have made contact with the jetty instead.

It may be submitted, however, that the issue raised two main concerns during the course of the safety investigation, and which the MSIU would like to report on:

1. The evolving situation was an additional (cognitive) burden on the pilot who had to make a number of calls to the VTS and the Terminal operator at a crucial time during the approaches to the berth. It is expected that the closer a vessel approaches the berth, the more data is received, which would need to be interpreted and eventually a (mental) plan of action is made and action is finally taken. The situation became even more complex when fresh variability, which had not been expected, was introduced in the system. Moreover, although the allocated berthing space was just across the Harbour and opposite the VTS building, the VTS operators cannot see the bollards' numbers and therefore any feedback in this respect to the pilot is limited, if at all possible;

2. It appeared that communication, at least between a number of parties (pilots, Terminal operator, and VTS) was not necessarily straight forward. This is being stated in the light of:

    a. an updated berth plan which was not communicated to the pilot and hence it had never reached him; and

    b. the difficulties of the pilot and the VTS supervisor to establish contact with the Terminal operator, when the vessel was approaching the berth and it became evident that the fishing boats were still occupying a berth which should have been cleared.

It was also clear that the pilot had not been informed that the fishing boats were still alongside. In fact, according to the pilot, it was only after clearing Senglea point that he made visual contact with the fishing boats and observed that one of them was still moored alongside.

The MSIU was also informed that there were other (previous) occasions when not all pilots had received updated berth plans.

Performance variability (PV)[13] is very common in safety critical systems. The inconsistency in the communication of the updated berth plan may be considered as such. These informal practices potentially went unnoticed because schedules and targets had always been met. However, this positive outcome (*i.e.*, the fact that vessels berth safely every single day) is what actually blurred the situation. This means that what used to be normal and what was now varying from that previous normality, became unclear.

The point which the MSIU is trying to make is that albeit not directly related to the events surrounding the accident, it is evident that full communication loops between the major entities involved in the day-to-day running of the port and its berths are severed. For instance, once a berth plan is transmitted by email, there are no requirements for a receipt acknowledgement to be sent to the Terminal operator. Even more, there is no effective system in place which would perhaps confirm that the changes in berth plans were well received and the receipt of same is acknowledged by persons directly involved in berthing operations.

The dangerous component of this less than ideal communication system is validated by the lack of accidents, which may be seen as an endorsement that the current practices and strategies being implemented are working fine (otherwise accidents would happen). In actual fact, this may be far from the case, given that, as a rule of thumb, past success cannot be considered as a guarantee of future safety.

Usually, adaptations are the result of workloads and goal conflicts which the people at the sharp end need to mitigate and work around. PV is one such strategy but considering that people are only locally rational, PV may be dangerous if not monitored adequately. Considering that the application of this communication system is not a one-off event, the MSIU does not believe that this issue is being monitored and mitigated well.

[13] A shift from established procedures, which is not due to imprudence.

**THE FOLLOWING CONCLUSIONS AND SAFETY ACTIONS SHALL IN NO CASE CREATE A PRESUMPTION OF BLAME OR LIABILITY. NEITHER ARE THEY 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

The CPP did not develop sufficient power in time to counter the vessel's headway and prevent the bulbous bow from striking the fishing vessel.

## 3.2 Latent Conditions and other Safety Factors

.1 The pilot had already set out to board *Maria* and the changes made to the berth plan were neither directly communicated to him nor the VTS operator.

.2 VTS operators cannot see the bollards' numbers and therefore any feedback in this respect to the pilot is limited, if at all possible.

.3 Communication, at least between a number of parties (pilots, Terminal operator, and VTS) was not necessarily straight forward.

.4 The evolving situation was an additional (cognitive) burden on the pilot who had to make a number of calls to the VTS and the Terminal operator at a crucial time during the approaches to the berth.

.5 The master was expecting a rapid ship response to his astern command and the headway of the vessel and her approach to the berth and the fishing vessel may have amplified the perceived delay.

.6 The slow but progressive astern running of the propeller was not readily apparent to the master.

.7 The back-up supply power dropped to zero, resulting in zero pitch feedback which the chief engineer observed in the ECR console.

.8 As a result of the uncertainty of the prevailing situation and the unanticipated developments on the bridge at a critical time, the pitch control lever was inadvertently left in the astern position. Consequently, the vessel developed a sternway and eventually made contact with another vessel when the anchor chain became taut.

.9 The performance variability in the communication system was not a one-off event because it is not being monitored and mitigated well.

### 3.3 Other Findings

.1 When the dynamics of the event were developing rather rapidly, just before the allision, the assessment of the perceived situation was neither being communicated nor shared.

.2 No system failure alarms (audible or visual) were detected or reported by the bridge team.

.3 Neither astern manoeuvres nor the outcome of the checklist was reported to the VTS.

.4 There were other (previous) occasions when not all pilots had received updated berth plans.

.5 Full communication loops between the major entities involved in the day-to-day running of the port and its berths are severed.

.6 There is no effective system in place which would perhaps confirm that the changes in berth plans are well received and the receipt of same is acknowledged by persons directly involved in berthing operations.

.7 The dangerous component of this less than ideal communication system is validated by the lack of accidents.

# 4 RECOMMENDATIONS

In view of the conclusions reached and taking into consideration the safety actions taken during the course of the safety investigation,

**SAL Heavy Lift GmbH Ltd. is recommended to:**

***18/2017_R1*** Include in its safety management system a requirement for regular tests of the CPP back-up system;

**Ports & Yachting Directorate of Transport Malta is recommended to:**

***18/2017_R2*** take the initiative to organise meetings for the main stakeholders involved, not least the Malta Maritime Pilots Co-operative and the Terminal operator, in order to address the identified shortcomings with respect to adequate and effective communication channels and timely berth allocations / changes.