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Survey Report No. : I-XXI-01001
Date : 01st of March 2021
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THIS IS TO CERTIFY that, following instructions from Palau Flag for and on behalf of the vessel's Flag Society, we carried out survey in the city of Bartın, Turkey for the vessel:

"ARVIN"
(IMO No.: 8874316)

of the port of Malakal Harbour, Palau flag, 2516 gross tons register, after she split in half and sank in the vicinity of Bartın Anchorage Area Turkey, for the purpose of carrying out a:

Marine Casualty Investigation

and to report on findings as appropriate.



Photo 1: *The "ARVIN" at the moment of incident (extract from video recording from the Bridge)*

Offices in:

Piraeus / Greece (info@mentormarine.com)
Istanbul / Turkey (istanbul@mentormarine.com)

25/01/2021

On this date, we proceeded by car from Istanbul to Bartin, Turkey and carried out investigation with respect to the subject incident. We remained overnight and on 26/01/2021 continued our investigation before returning back to base. We now wish to briefly advise the following:

1.0 ATTENDING

Also attending the survey at various times were:

- Mehmet Akif Arslansoy, Bartin Harbour Master
- Hicret Kurtoğlu, Marine Casualty Investigator
(Republic of Turkey Ministry of
Transport and Infrastructure)
- Capt. Turan Özcan, P&I Surveyor (Artera)
- Oktay Çekmen Owner’s Surveyor (Orion)

2.0 SHIP’S GENERAL DESCRIPTION

Name	: “ARVIN”
Call Sign	: T8A2278
IMO No.	: 8874316
Flag	: Palau
Port of Registry	: Malakal Harbor
Type of Vessel	: General cargo
Year/Place of Build	: 1975 / Czechoslovakia
Class	: SRU
Gross Tonnage	: 2516
Deadweight	: 3509 MT
LOA	: 113,92 m
Breadth	: 13 m
Draught (summer)	: 3,85 m
No. of Holds/Hatches	: Four (4)
Type of Hatch Covers	: McGregor Pontoon type – Hydraulically operated
Cargo Gear	: N/A
Owners	: ARVIN SHIPPING Ltd.
Managers	: Tesoro Marine LLC.

3.0 BRIEF NARRATIVE / SEQUENCE OF EVENTS

Based on available evidence and supporting documentation provided to date:

The vessel, being fully certified sailed on 02/01/2021 from the port of Poti, Ukraine, loaded with 2,902.75 MT of a cargo of "Urea in bulk" destined for the port of Burgas, Bulgaria. The vessel was manned by a total of twelve (12) crew - of Ukrainian-Russian Nationality.

On 05/01/2021, the vessel whilst underway, due to adverse weather sought shelter and anchored at Sinop, Turkey and remained anchored at the same location until the 14/01/2021 when she sailed and proceeded to anchor at Bartın anchorage, Turkey, again in anticipation of heavy weather where she arrived on 15/01/2021 and anchored at position (41° 39' 30" N 032° 11' 21.6" E - position reportedly confirmed by the local Port Authorities).

On 17/01/2021 early am hours, the weather conditions started to further deteriorate, according to the local weather reports, winds of force 5-6 (16-18 knots) on the Beaufort scale and waves of up to 2 to 3 meters high were experienced in the area, causing the to pitch and roll heavily. On the same day at around 11:00hrs LT, the Master gave the order to ready the M/E on standby and at approximately 12:20hours LT, whilst still at anchor, the vessel suddenly suffered a catastrophic structural failure and broke up splittin in two parts at around midships and eventually sunk. A very loud noise was reportedly heard when the hull broke up and the sinking of both sections of the hull took place in a short timeframe. Upon realising the hull had broken up the Master immediately sent distress signal by VHF to the local Authorities and to all vessels in close proximity.

All crew members, except the Master and Chief Officer who were in the Navigation Bridge proceeded and gathered on the Poop deck i.e. total 10 crewmembers (officers and ratings) from where, as the aft section of the hull was beginning to list to port, the following crew members abandoned the vessel, the third officer, the cook (deceased), the oiler, a cadet and third engineer on a liferaft and the Chief Engineer and the 2nd engineer jumping to the sea. All crew members apart from the Chief Engineer were wearing immersion suits. Salvage and rescue operations took place by the local Coastguard, however, only 6 crew members were rescued/survived, 3 were lost to the sea/missing (Chief Officer Bosun and Cadet) and 3 (Master, 3rd Engineer, Cook) were found/recovered dead.

4.0 SURVEY FINDINGS

At this stage, whilst the Operators' investigation is still in progress, having reviewed all the available documentation, the following are noted:

1. The crew was provided with all necessary LSA which were readily available onboard, distributed as per the approved Fire Plan and certified with valid expiry dates. Both primary and secondary escape routes are clearly marked on the Fire Plan.
2. During the last PSC inspection, an Abandon Ship Drill was carried out. During the last three PSC inspections examined no serious deficiencies were imposed, questioning the seaworthiness of the vessel with respect to structural condition.

3. Based on the vessels Drill Schedule, last Abandon Ship drill was carried out on 22/12/2020 (scheduled every 2- month intervals)
4. The vessels Stability Condition including bending moments, was checked upon completion of loading and confirmed in order.
5. The last UTM Report provided, carried out at the last SS renewal, is dated 2016 - next SS was due for April 2021. It is not known if further thickness measurements of the hull were taken during the during the Intermediate Hull survey on 17/04/2019 (given the age of the vessel, thickness measurements of the hull should normally have been taken) and there is no information if any steel structural repairs/renewals have been carried out on the hull since 2016. Nevertheless, based on the 2016 UTM Report, the following are noted:

The original thicknesses of the steel plates and profiles are low (in line with the standards when the vessel was built in 1975) compared to current shipbuilding standards and classification requirements.

Most of the measurements taken indicate a high % diminution of the original steel thickness and are close to the limits. There are no remarks for risk areas. More specifically:

- Under deck longitudinals with original thickness of 7.5 mm: between 13-15 % diminution
- Bottom shell plating with original thickness of 10 mm: between 11-14 % diminution
- Inner bottom plating with original thickness of 10 mm: between 18-19 % diminution
- Inner bottom longitudinals with original thickness of 6.5 mm: between 8,5-15,5 % diminution
- Center girders of double bottom with original thickness of 7 mm: between 13-15 % diminution
- Side shell plating with original thickness of 7-10 mm: between 10-11 % diminution
- Side shell longitudinals with original thickness of 7 mm: between 10-15,5 % diminution

More noticeably, the following areas were noted with a diminution of more than 20%:

- Side Longitudinals PS between Fr. 64-75 with original thickness of 6,5mm: between 23,8-30% diminution
- Side Longitudinals STBD between Fr. 64-75 with original thickness of 6,5mm: between 21,5-25,5% diminution
- Side Longitudinals PS between Fr. 107-117 with original thickness of 6,5mm: between 22,3-30% diminution
- Side Longitudinals STBD between Fr. 107-117 with original thickness of 6,5mm: between 24,6-30% diminution
- Side Longitudinals PS between Fr. 148-158 with original thickness of 6,5mm: between 24,6-32,3% diminution
- Side Girder STBD between Fr. 148-158 with original thickness of 5 mm: 24,7% diminution
- Side Longitudinals STBD between Fr. 148-158 with original thickness of 6,5mm: between 24,6-26,9% diminution

6. The Divers videos of the vessel (forward and aft section) taken following the incident, were not taken with a high-resolution camera and given the murky waters in the area, they are not very clear and cannot be considered as conclusive evidence. The hull structure of the vessel in way of the midship section is shown in some parts of the video recording, and as far as it can be determined the plating and internal stiffening structure appears excessively thinned in places.

Based on the forgoing, the catastrophic structural failure causing the breaking and splitting in two of the ship's hull at around midships and the resultant sinking of the vessel, may be reasonably attributed the hull structure having weakened to a degree which could not sustain the bending stresses imposed by the weather conditions (swell/waves) in conjunction with the loaded condition of the vessel.

Lessons Learned / Corrective preventive actions recommended:

Available evidence not conclusive and operators investigation still ongoing thus at this point, we cannot effectively comment on lessons learned.

Corrective preventive actions recommended to be taken following this incident in order to prevent re-occurrences would include:

1. Ensure that Master, Officers and all crew are fully and regularly briefed on mustering procedures and that they are able to properly don their available LSA (immersion suits and lifejackets) through realistic abandon ship drills which should be supervised and evaluated.
2. Review the frequency and type of structural surveys on a ship-specific schedule based on the condition of the hull structure, vessels age, available maintenance records and building standards to ensure that all required criteria are met.
3. Review the conduct and auditing of structural surveys and inspections conducted to ensure that the required standards are robustly applied. This review should take into account the experience, qualifications and training of the surveyors.
4. Review the SMS "Heavy Weather Risk Assessment" to include a more holistic and realistic approach to the dangers involved and relevant actions and preventive arrangements which should be taken by the crew.

5.0 GENERAL REMARKS

The following documents were requested from owners on 28/01/2021 in order to further investigate the case. A large number of documentation is still pending. Refer to the below list where we have also marked the documents in hand:

1. Ship particulars (in hand)
2. Crew List (in hand)
3. Latest Class Status Report (in hand)
4. Copies of all Class and Statutory Certificates (in hand)
5. Copies of all LSA (Life Saving Appliances) Certificates (only expiry dates in hand)
6. Copies of last three (3) Paris MOU - PSC Inspections (in hand)
7. Crew Certificates of Competency (complete file)
8. Last Noon Reports received for 15, 16 & 17/01/2021 (in hand)

9. Last two (2) Ultrasonic Thickness Gauging (UTM) reports for the hull (in hand UTM report during SS dd. 2016)
10. Ballast and Bunker Statement at the time of the incident (quantities and tanks)
11. Copies of General Arrangement, Capacity, Midship Section, Bulkheads and Transverse Section & Shell Expansion Plans (in hand transverse, midship and part of GA)
12. Copy of Trim & Stability Booklet
13. Copy of Fire and Safety Plan (in hand)
14. Copy of last Berth to berth Voyage/Passage Plan and any amendments
15. Vessel Stability calculation carried out following loading at last port (Poti, Georgia) (in hand)
16. Draft Survey Report following completion of loading at Poti, Georgia (in hand)
17. ISM – Incident report with root cause analysis (Brief narrative report received on 26/02/2021)
18. ISM – Last External & Internal Audit Reports (in hand)
19. ISM – Crew Familiarization Records
20. ISM – Anchor watch checklist / any specific instructions (in hand)
21. ISM – Heavy Weather Risk Assessment (in hand)
22. ISM – Drill Schedule (when was the last Abandon Ship Drill carried out?) and reports (in hand)
23. ISM – Last Master and C/E Handover Reports
24. ISM – Last Master Review Report
25. ISM – Last Superintendent Visit Inspection Report
26. ISM – PMS programme for Hull (incl. condition of ballast tanks and last internal survey records) – latest checklists and reports
27. Latest DD Report and Steelwork carried out
28. Full copy of SMS Manual (in electronic form) (in hand - but major parts in Russian language)
29. Deck and E/R Watch schedule
30. Monthly Officers and Crew Rest and Work Hours (last month)
31. Type and specification of anchors and anchor chain cables
32. Vessel anchorage position at Bartin on 15th of January 2021
33. Vessel Sinking position at Bartin on 17th of January on 2021 (in hand)
34. Official Weather Forecast for the day of the incident (in hand)
35. Cargo Documents (B/L, Mates Receipts, Commercial Invoice, Stowage Plan etc.)
36. Vessel's P&I Club and Hull & Machinery insurance details (in hand)
37. Divers reports / videos / photos taken at Bartin following the incident – (videos in hand)
38. Crew Interview Statements taken at Bartin following the rescue operations (in hand – total six (6) Statements from C/E Mr. Krinov Nikolai, 2nd Officer Mr. Kachur Vitali 2nd Engineer Mr. Kravchenko Hennadii, Welder/OS Mr. Perkaty Oleksandr, OS Mr. Merezhko Vitaly, Motorman Mr. Zaterka Vladyslav)

39. Casualty report - Coast Guard/ Bartin Port – copy of coastguard logbook – (also requested from District Prosecutor) (Harbor Master's Logbook photos of incident day provided)

Below link for safe download of the collected documentation presently in hand:

<https://drive.google.com/drive/folders/1yDZ0fF4ZmZ2trLbtAjeGsovlCn2ex4p?usp=sharing>

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For Mentor Marine Consultants

ORIGINAL SIGNED

Dursun Topaloglu
Attending Surveyor