



Panama Maritime Authority
Directorate General of Merchant Marine
Marine Accident investigation Department

REPORT: M/V “MIRACH” R- 027-2011- DIAM

Date: 29 MARCH 2011





Investigation Report

MIRACH”, IMO NO. 8116881

GROUNDING ON CROCODILE ROCK

OFF CAPE COMORIN, INDIA

29 MARCH 2011

This investigation report was written to improve safety and prevent new accidents. The report does not address the possible responsibility or liability caused by the accident. The investigation report should not be used for purposes other than the improvement of safety.



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SUMMARY

“M.V. MIRACH”, 1982, Japanese built bulk carrier of dead weight 27192 mt, loaded iron ore fines from Vishakhapatnam on 24 March 2011 set sail for port of Karachi, Pakistan.

Bridge and Engine controls were tested and reported in working order.

During her passage she was steaming at 8 knots due to main engine fuel injector problem.

On 29 March, the day of incident, the Bridge was as usual manned by Second Officer from 1200 hrs to 1600 hrs. The vessel maintained her charted course till 1600 hours as plotted on BA chart 1566. Positions were plotted at hourly interval from GPS.

Chief Officer took over watch at 1600 hrs. Second officer continued on bridge engaged in some paper work. At this time Master was also on Bridge. There was no helm's man or look-out man on Bridge day watches. The vessel was steering a course of 308° T and speed 8 knots.

By 1730hrs, Master and Second Officer left for dinner.

At 1738 hours, Master who had the perceptive insight of vessel being close to coast instructed Bridge to adjust course so as to keep away from the shore. Chief Officer overlooked or forgot master's instruction and continued on same course of 308°T.

At 1745 hours, Chief Officer handed over watch to Third officer with course of 308°T and went for dinner. There were no positions plotted on chart since 1600 hours till 1745 hours. Third officer on taking over watch also did not plot and verify position of the ship and was unaware of the set and drift that had been continuously pushing the vessel towards coast.

At 1800 hours, Third officer saw the crocodile rock, off Muttam point at very short distance on starboard bow, switched over to hand steering and put wheel hard over to port. It was too late, by then she ran over “crocodile rock” at 1803 hours in position 08°04.9'N 077°17.2'E. Her grounded position was 3.5 NM off Muttam point, South India coast.

On feeling the thud of grounding the Master went on Bridge, immediately he stopped engine and put her on astern propulsion, raised emergency alarm and announced the situation on PA system.

Chief Officer was told to check tank soundings, forepeak, no1 double bottom port & starboard and no.1 cargo hold was found flooded. The forward hull of the vessel up to no.1 DB rested on ground while the aft portion was afloat.

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Master informed the Owners about the situation and requested for assistance. On 30 March, Salvage tug arrived for assistance and prevent oil pollution.

On early morning of 4th April, no.2 cargo hold was also seen flooded and posed imminent danger to vessel and safety of crew. In this situation Master took decision for abandonment of ship. Life boat and rafts were launched and all 25 crew including Master landed ashore safely.

By 06 April no.3 cargo hold was also flooded and she remained in this position till 10 April. The ill fated ship eventually submerged completely in water on 11 April 2011.

Casualty Details

Particulars		Details
Time and Date	:	1803LT, 29 March 2011
Casualty	:	Grounding
Location of Incident	:	Crocodile rock off Cape Comorin, Indian Ocean
Geographical position of Incident	:	Lat 08°04.9'N Long 077°17.2'E
Crew on board	:	25 including Master
Injuries / Fatalities	:	Nil

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ABBREVIATIONS USED

Abbreviation	Meaning
AB	Able Body Seaman
ARPA	Automated radar plotting aid
BA	British Admiralty
BM	Bending Moment
BRM	Bridge resource management
COC	Certificate of competency
Dwt	Dead Weight
DB	Double Bottom
EPIRB	Emergency position-indicating radio beacon
° T	Degrees true
GPS	Global positioning system
IMO	International Maritime Organization.
ISM	International Safety Management (Code).
LT/Hrs	Local Time/hours
Mt / MT	Metric ton
nm	Nautical Miles
OOW	Officer on watch
PA	Public Address System
PMA	Panama Maritime Authority
SF	Shear Force
SOLAS	Safety of Life at Sea.
SMS	Safety Management System

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SVDR	Simplified Voyage Data Recorder
SWL	Safe Working Load
TPC	Ton Per Centimeter
UTC	Universal Coordinated Time

1. EVENTS & INVESTIGATION

1.1 THE SHIP:



Photo no.1:M.V Mirach

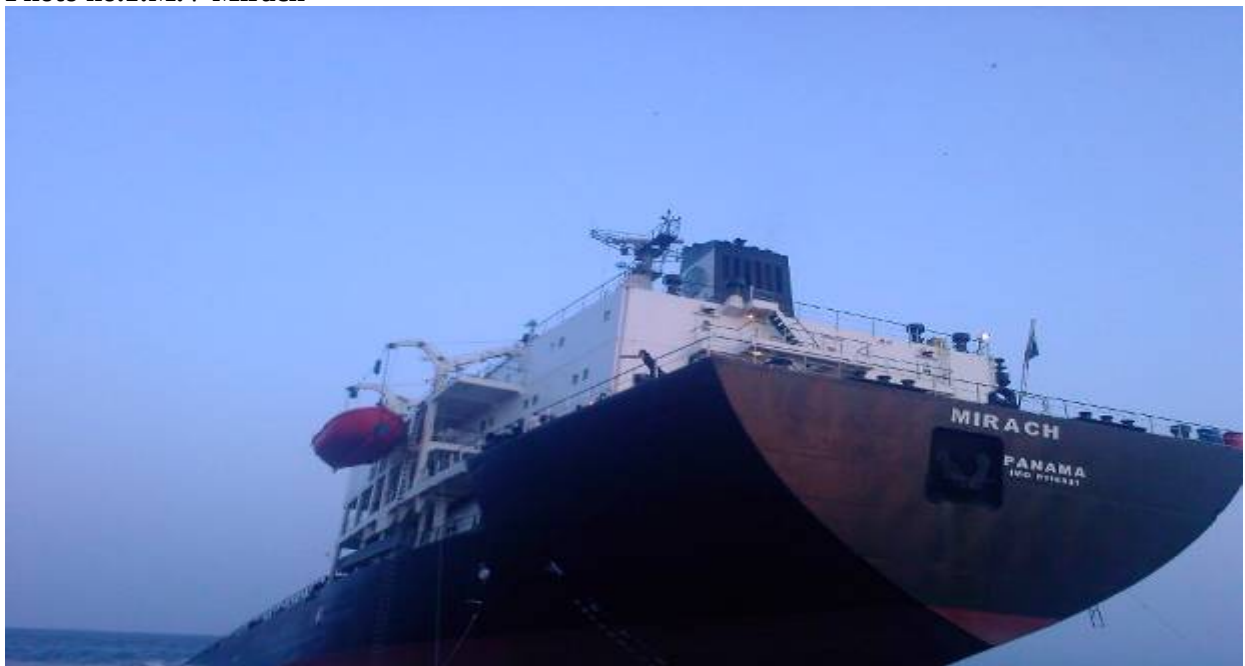


Photo no.2: Stern view of MV Mirach

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1.2 SHIP'S PARTICULARS – M.V. “MIRACH”

Category	Particular
Name	M.V Mirach
Home port	Panama
Call Sign	3EEH8
IMO number	8116881
Official No.	1952
Ex Name	Durumata / APJ Anjali
INM-C No.	437190210
Type	Bulk Carrier
Nationality	Panama
Builder	Shinuzu / Japan
Built Date	1982
Suez GRT/NRT	17509.22 / 13329.5
MMSI No.	371902000
Length overall	176.00m
Length (BP)	166.00m
Breadth	23.10m
Depth	14.60m
Class	Bulgarian Class

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P & I Club	American Club
Light Ship	6451
Deadweight	27192
Light ship	2162
T.P.C.	3490mt
Auxiliary GNR.	Daihatsu 6DSB22 (3pcs)
Auxiliary Power	600KW
Main Engine Type	Sulzer MAK/6LRB
Main Engine Power	11850BHP / 8836KW
Owner	Kumsal Denizcilik Ve Nakliyat A.S. Seyran Tepe Mah. Ibrahim Karaoglan cad. Ispar is merkezi 105/466. Kagithane/Istanbul/Turkey.
Manager	Pina Denizcilik Ve Nakliyat A.S. Kosuyolu mah. Cevatpasa Sok. No 11. Kadikoy/Istanbul/Turkey.

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1.3 SHIP'S CERTIFICATES STATUS – M.V. “MIRACH”

SR. NO.	CERTIFICATE	DATE OF ISSUE	DATE OF EXPIRY
1	Certificate of Registry	02.10.2010	30.04.2011
2	Document of Compliance	16.12.2010	16.05.2011
3	Ship Management Certificate	16.12.2010	16.05.2011
4	International Load line Certificate	06.12.2010	05.05.2011
5	Minimum Safe Manning Certificate	08.06.2010	Until Revoked
6	Certificate of Entry	08.12.2010	20.02.2011
7	International Tonnage Certificate	06.12.2010	06.05.2011
8	International Ship Security Certificate	18.01.2011	16.05.2011
9	Cargo Ship Safety Equipment Certificate	06.12.2010	05.05.2011
10	Cargo Ship Safety Construction Certificate	06.12.2010	05.05.2011
11	Cargo Ship Safety Radio Certificate	06.12.2010	05.05.2011
12	International Oil Pollution Prevention Certificate	06.12.2010	05.05.2011
13	International Air Pollution Prevention Certificate	06.12.2010	05.05.2011
14	International Sewage Pollution Prevention Certificate	15.01.2009	28.08.2013
15	Continuous Synopsis Certificate	07.12.2010	Until Revoked
16	Radio Station Statutory Licence	03.12.2008	02.12.2012
17	International Anti-Fouling Certificate	06.12.2010	05.05.2011

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1.4 SHIP'S NAVIGATION EQUIPMENTS – M.V. “MIRACH”

Sr. No.	Equipment	Manufacturer
1	AIS	Furuno
2	Course recorder	Tokyo Keiki
3	EPIRB	Furuno
4	Echosounder	Furuno
5	GPS Navigator	Furuno
6	Gyro Compass	Yokogawa
7	INMERSAT-C	Furuno
8	MF/HF Watch Receiver	JRC
9	Navtex Receiver	JRC
10	Radar / ARPA	JRC
11	Radio Telephony	JRC
12	SART	Jortan
13	VHF	JRC
14	VDR	JRC
15	Weather Fax	JRC



1.5 EXPERIENCE OF CREW

Master

Master, 46 years of age had joined the vessel in December 2010 and had completed more than 3 months on the day of casualty. He obtained his Master's COC in March 2002 from Turkey and had a valid Panama endorsement.

Master was from Turkish Navy where he worked for 15 years and his experience at sea as Master was 11 years. 2 years ago he had worked on same ship for 3 months.

Chief Officer

Chief Officer, 30 yrs of age joined the vessel on 02 February 2011. He had completed about two months onboard on the day of incident. His total sea experience was of five years as cadet, 10 months as third Officer, and 14 months as Second Officer and 9 months as Chief Officer.

Second Officer

Second Officer, 27 yrs of age joined the vessel on 02 February 2011. He had completed about two months onboard on the day of incident. His total sea experience was 5 years as certified officer. He was Chief Officer for two years and Second officer for three years.

Third Officer (On Duty)

Third Officer, 24 yrs of age joined the vessel on 12 March 2011 at port Haldia, India. He had total of only 17 days experience as OOW prior to the accident. He passed his Third officer examination in 2010 from home country, Turkey and he sailed first time on this ship as a navigating officer.

Engine Superintendent

Engine Superintendent joined the vessel on 16 December 2010 at Istanbul dockyard. He had been sailing with the vessel since the time she completed dry dock. He had fifteen years sea experience.



1.6 DATA, ITEMS AND RECORDS:

Date and time

Date and time mentioned in report is local time maintained in India referring to UTC + 0530 hrs.

Ships position

Ship's position indicated in latitude and longitude is derived from GPS system plotted on British Admiralty chart 1566.

Speed

Speed over ground is determined from GPS.

Heading

As indicated by the ship's GYRO / MAGNETIC compass.

Main alarms

This includes all mandatory alarms on the bridge as per SOLAS requirement.

Engine orders

Engine orders are recorded manually.

Wind speed and direction

Wind speed and direction were taken from anemometer.

1.7 CARGO / FUEL / FRESH WATER / BALLAST WATER

Cargo: Vessel had 25842mts of cargo (Iron ore fine in bulk) on 24 March 2010, departure last load port and on the day of the casualty.

Fuel: Fuel on 24 March 2011, the day of departure last load port, Vishakhapatnam was as follows.

Fuel Oil - 223 MT

D.O - 51 MT

Fresh Water: Vessel was carrying 251 MT of fresh water on departure last load port.

1.8 THE NAVIGATION CHART

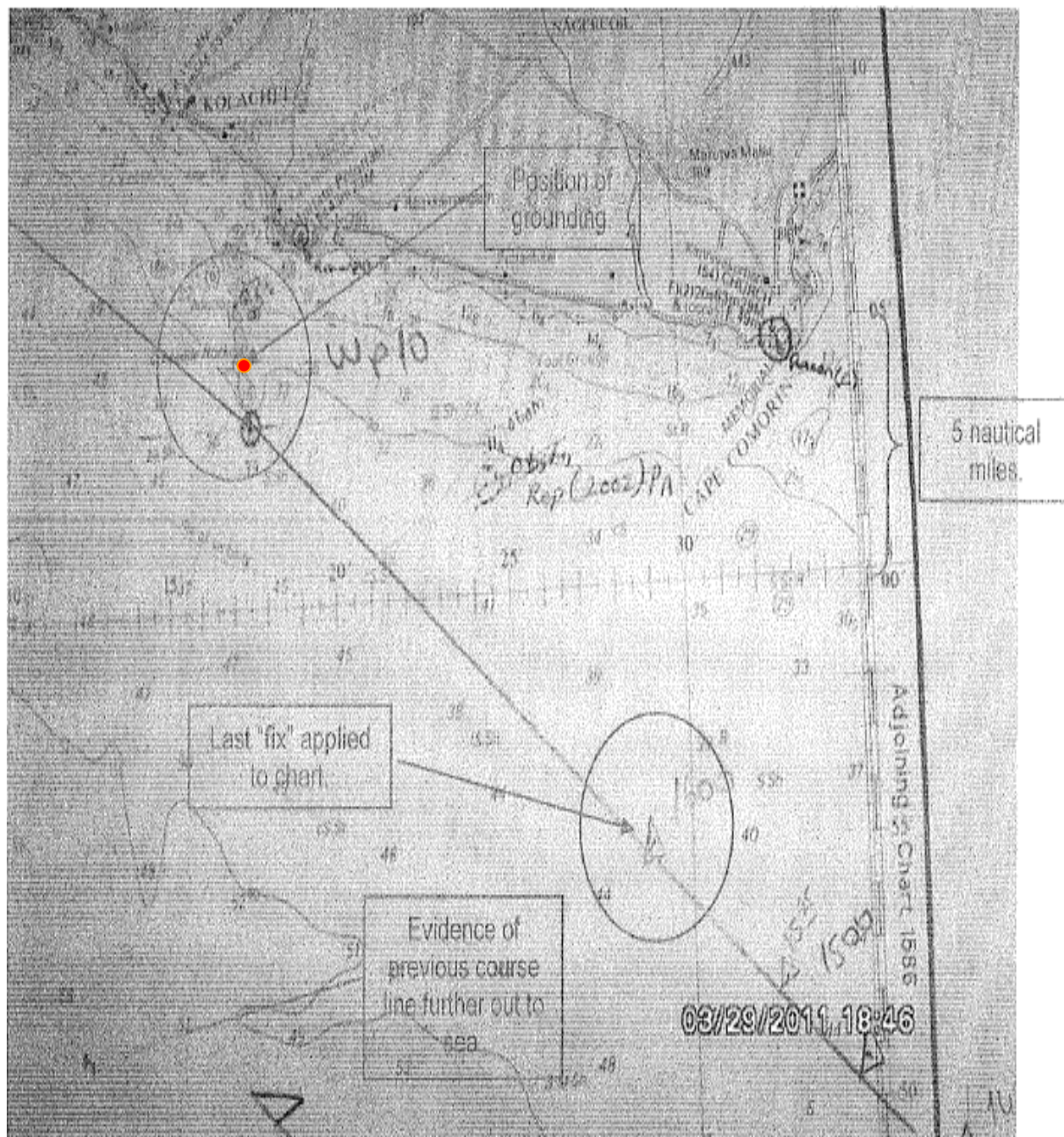


Photo no.3: BA Chart 1566, Vessel's last position plotted at 1600 hours

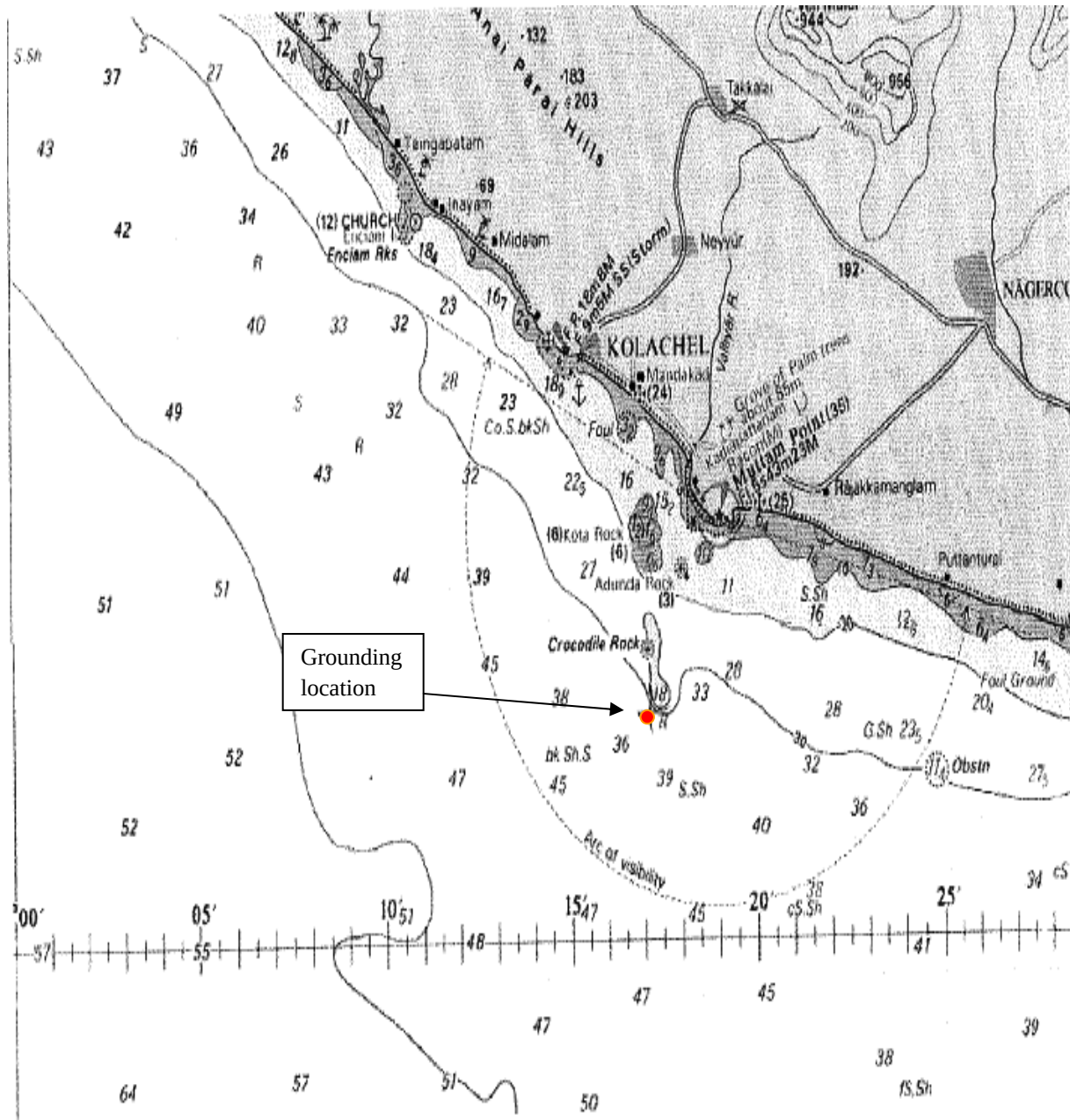


Photo no.4: BA Chart 1566, Location of grounding



1.9 WEATHER CONDITIONS

Weather

The weather experienced on 29 March was moderate breeze of force 4 on Beaufort scale (11- 16 knots) from North West and moderate sea with swell of about 1.0 to 1.5 meters. It was partly cloudy sky and the visibility of about 3 miles. There was no precipitation and air temperature was 31° centigrade.

The current / Tide

The current as reported was setting to South Easterly direction with 1 knots pushing the vessel towards east of the charted course.

The weather conditions at the time of the incident are summarized as follows:

Weather Parameter	Reading
Wind Direction	North West
Wind Speed	(11-16) Knots
Wind Force on Beaufort Scale	4
Tide current / tide	1 Knots
Tide direction	South Easterly
Sea	Moderate
Swell	1 – 1.5 meters
Precipitation	Nil
Visibility	About 3 miles
Air Temperature	31° C

The “currents note” as taken from the BA Chart 1566 states that a current of about 1knot was experienced setting in south east direction. Rate of 2 knots is experienced in July, August and December.



CURRENTS

The currents have a seasonal variation related to the monsoon. From February to September the most frequent set is towards the south-east with the greatest constancy during June to August; during October currents are variable in direction, but from November to January the most common set is towards the north-west. Rates are mostly less than 1 knot but 2 knots may be encountered at times, mainly during July, August and December. Exceptionally the current has a significant on-shore component. Admiralty Sailing Directions should be consulted for further details.

1.10 SEQUENCE OF EVENTS

The vessel

“M.V. Mirach” was 1982, Japanese built bulk carrier of 16712 GT, dead weight of 27192 mt. The Bulgarian Class vessel is owned by KUMSAL DENIZCILIK VE NAKLIYAT A/S.TURKEY and managed by MIRA DENIZCILIK VE GEMI A.S. TURKEY. The overall length of the vessel is 176 meters, beam 23.10 meters and molded depth 14.60 meters.

Itinerary

The vessel loaded 13717 MTS of iron ore fines in bulk from her first load port Haldia and later 12125 MTS of iron ore fines from port Vishakhapatnam, India. She sailed on 24 March 2011 for port Karachi, Pakistan. ETA to Karachi (port Quasim) was 03 April 2011. There were 15 Turkish, 8 Georgian and 2 Azerbaijani crew members on the day of casualty.

Cargo & Drafts

She had 5 cargo holds and 5 cranes of 15 ton SWL each. The vessel was strengthened for heavy cargo. She was loaded with total of 25842 MT of iron ore in bulk and was drawing 10.24 meters forward and 10.28 meters aft draft.

Stability of vessel

The GM for this passage was 4.365 meters, SF 34% and BM 41% of permissible limits.

Vessel's general condition

Internal audit of the vessel was conducted in December 2010.

The general condition of the vessel as reported by Master & other officers was as follows:



There were no noticeable deficiencies reported by Master. Maintenance was followed as per PMS for the vessel.

General structural condition of ship was reported to be good.
Hatch covers and cargo holds were reported weather tight.
Some of the Top Side ballast tanks were leaking into holds.

Bridge & Engine room equipments

All Bridge equipments were reported in working order. Main engine had fuel injector problem and therefore she was steaming at slow speed 8 knots.
Steering response was reported normal.

Bridge / Engine room manning

On the day of incident, the Bridge was manned by Chief Officer from 1600 hrs. At about 1745 hours, Third officer relieved Chief Officer for dinner.
There was no helm's man or look-out man on Bridge.
The engine room was manned by Second engineer from 1600 hrs. Third engineer relieved him for dinner and was on watch at the time of incident i.e. at 1803 hours.

1.11 SITUATION PRIOR INCIDENT

The passage

The passage plan was laid out for the voyage from Vishakhapatnam to Karachi port. Waypoints for the navigation route were decided by Master and executed accordingly. "No Go Areas" for shallow waters and reefs were neither discussed nor marked on the chart. Courses to steer were not marked on the chart and the parallel index techniques were not used.

1200-1600 hour watch

On 29 March, the noon watch was manned by Second officer while she steamed on course 308°T, speed 8 knots. Vessel was not on her full sea speed due to problem with fuel injectors of main engine. S-band Radar was operational with off centre display at 6 miles range and ARPA was not used. GPS positions were plotted on chart at interval of 1 hour and same recorded in GPS log. Radar was not used to plot positions and there was no monitoring of Coast line and other prominent terrestrial objects but only for collision avoidance. There was only fishing traffic during this watch. Master was also on Bridge at 1600 hours.



1600-2000 hour watch

At 1600 hours, Chief Officer took over the Bridge watch. The vessel continued on course of 308° T. The position of the vessel was maintained on charted course till 1600 hours.

Master left Bridge at 1710 hours and Second officer at 1730 hours for dinner. At 1738 hours while Master was having dinner, instructed Second Officer to inform Bridge for adjusting course away from coast. Since Chief Officer was occupied with paper work also

engaged in receiving mobile phone / internet network signal, he forgot to alter course and continued on 308° T.

At 1745 Chief Officer was relieved for dinner by Third Officer. He handed over to Third Officer saying that, “there is an alteration and takes care”.

Ship's positions were plotted on navigation chart from 1600 hrs onwards for next two hours neither by Chief Officer nor by his reliever, Third officer due to distraction and loose presence of mind. Master's instruction was over looked to steer away from shore.

Third officer after taking over watch did not verify ship's position although the next alteration point was only 2 miles away. The ship continued drifting to east of the charted course, towards coast. Set and drift was not monitored and there was a total situational unawareness. The vessel was steering 308°T but making good 312 °T.

Look-out was not maintained. The crocodile rock was only seen when it was at a very close range of couple of meters on the bow.

1.12 THE INCIDENT

Grounding

At 1800 hours when Third officer saw the crocodile rock very close on bow, he took the vessel on hand steering. Second officer came up on Bridge at this time while Chief Officer arrived two minutes later at 1802 hours. They saw Third officer trying to make wide port alteration.

Chief Officer and Third Officer ran towards starboard wing to visualize the situation but it was too late and the stem of the vessel made impact with “crocodile rock” at 1803 hours. The grounding position was 08°04.9'N 077°17.2'E and heading was 302° T. This position of grounding had overshoot the alteration point (08° 3.4 8'N 077° 17.45'E). The location of grounding is 3.5 NM off Muttam point, Indian coast.



1.13 POST INCIDENT

Master's action

Master, at the time of grounding was having dinner. On feeling the thud and vibration of the ship which hit the Crocodile rock at speed of 8 knots, he came on Bridge and immediately stopped engine followed by astern movement.

Master raised emergency alarm and announced the situation on PA system.

Engineer's action

When the vessel grounded, the Chief engineer and Second Engineer who were also having dinner ran to engine room and followed Bridge orders for maneuvering. Tanks and bilges in engine room were monitored for ingress of water. Generators and steering were still working.

Tanks sounded

Chief Officer was ordered to check soundings of all ballast tanks and bilges. Forepeak, no.1 double bottom port & starboard and no.1 cargo hold were found flooded. The level

of water in these compartments had risen to sea level. The sea depths were also checked and it was found that bottom hull up to no. 1 DB was resting on ground.

Owners Notified

Master contacted Owner to inform about grounding incident and requested for assistance.

Pumping out flooded compartments

Master did not order to pump out water from flooded compartments but waited for instruction from the Owner.

Urgency message

After the vessel hit the rock and grounded she suffered significant damages resulting in flooding of tanks which posed a risk of foundering but the urgency message was not transmitted. Safety messages were also not transmitted on any frequency to warn shipping traffic.

Salvage

On 30 March, Salvage tug, "Smit Nicobar" arrived at the location. Salvage team boarded the vessel and took preventive measures against flooding other compartments and pollution. On 01 April diving operation was conducted to assess under water damages.



Progressive flooding

From 30 March till 03 April there was very marginal change in vessel's original damaged condition.

On 04 April, twilight hours it was observed that no.2 cargo hold also flooded and submerged in sea. The vessel was precariously down by head.

Abandon ship

On 04 April around 0600 Master analyzed the situation grave and decided to abandon ship. Crew was ordered for the same and to launch life boat and rafts for evacuating the vessel. Crew lowered 4 life rafts and port side life boat.

All 25 crew including Master was brought ashore to safety.

Foundering of Ship

A crack was observed in way of no.3 hatch coaming indicating excessive stress in this region.

By 06 April no. 3 cargo hold was also flooded. No. 1 crane and most of the forward mast was submerged in sea.

The vessel remained in same position till 10 April.

The ill fated ship eventually submerged completely in water on 11 April leaving only tip of funnel and forward mast visible above sea level.

Missing and fatality

There were 25 crew members on board "MIRACH" on 29 March, the day of grounding. All 25 crew abandoned the vessel safely on 04 April. There were no loss of lives or any injury reported.

Oil pollution

There was no oil pollution observed by crew till the abandonment of the vessel.

SVDR

The SVDR was not ceased and retrieved while Master waited for Owner's instruction to do so.

1.14 DAMAGES TO SHIP

The damages to ship were not visible as all damages were on the hull below water. Due to direct impact, fore peak tank and no.1 DB port and starboard ballast tanks were ruptured and flooded to sea level. No.1 cargo hold was also having ingress of water but damage location could not be verified as hatch cover was closed with cargo in hold, the damage were expected from forward collision bulkhead and/or ship side plates.

Most likely the progressive flooding caused collapse of no.1 cargo hold aft bulkhead and no.2 cargo hold was also flooded by 04 April. Due to forward tanks and cargo holds being flooded and aft areas of vessel being still afloat, maximum stress were on mid-ship section which was evident with crack on no.3 cargo hold coamings. With forward 3 holds being flooded, the progressive flooded continued in no.4 and 5 cargo holds as well in engine room/accommodation section then by 11 April the vessel completely foundered.

1.15 SHIP'S PHOTOS AFTER GROUNDING



Photo no.5: 3 April 2011, Bow view



Photo no.6: 3 April 2011, Cargo hold 1, fore peak tank and 1DB port and starboard flooded



Photo no.7: 3 April 2011. Seas shipping on forward main deck



Photo no.8: 3 April 2011, flooded cargo hold no.1



Photo no.9: 3 April 2011, salvage team taking preventive measures against flooding

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Photo no.10: Shipping seas on main deck, forward of no.1 cargo hold



Photo no.11: 3 April, Sea water coming on port side forward main deck

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Photo no.12: 03 April, Sea water coming on starboard side forward main deck



Photo no.13: 03 April, Salvage tug crew on board, vessel down by head

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Photo no.14: 04 April, before abandoning ship. Cargo hold no.2 flooded



Photo no.15: Lifeboat being lowered to abandon the vessel



Photo no.16: Crew in fishing boat after abandoning the ship



Photo no.17: Crew in fishing boat after abandonment of ship

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Photo no.18: 04 April. Ship after abandonment



Photo no.19: 04 April, Partially sunken ship



Photo no.20: 04 April, Forward mast, no.1 and no. 2 crane mostly submerged



Photo no.21: 04 April, Local fishing boats around the ship

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Photo no.22: 06 April, Cargo hold no.3 flooded, Crack on port side hatch coaming of no.3



Photo no.23: 06 April, Front view with cargo hold no.3 flooded

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Photo no.24: 10 April, Side view with cargo hold no.1, 2 & 3 flooded



Photo no.25: 10 April, Salvage tug "SMIT NICOBAR" a/s for transfer of bunkers

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Photo no.26: “Smit Nicobar” salvage tug engaged in transfer of fuel from engine room



Photo no.27:10 April, Crack was also observed on no.4hatch coaming



Photo no.28: Ship foundered on 11 April 2011

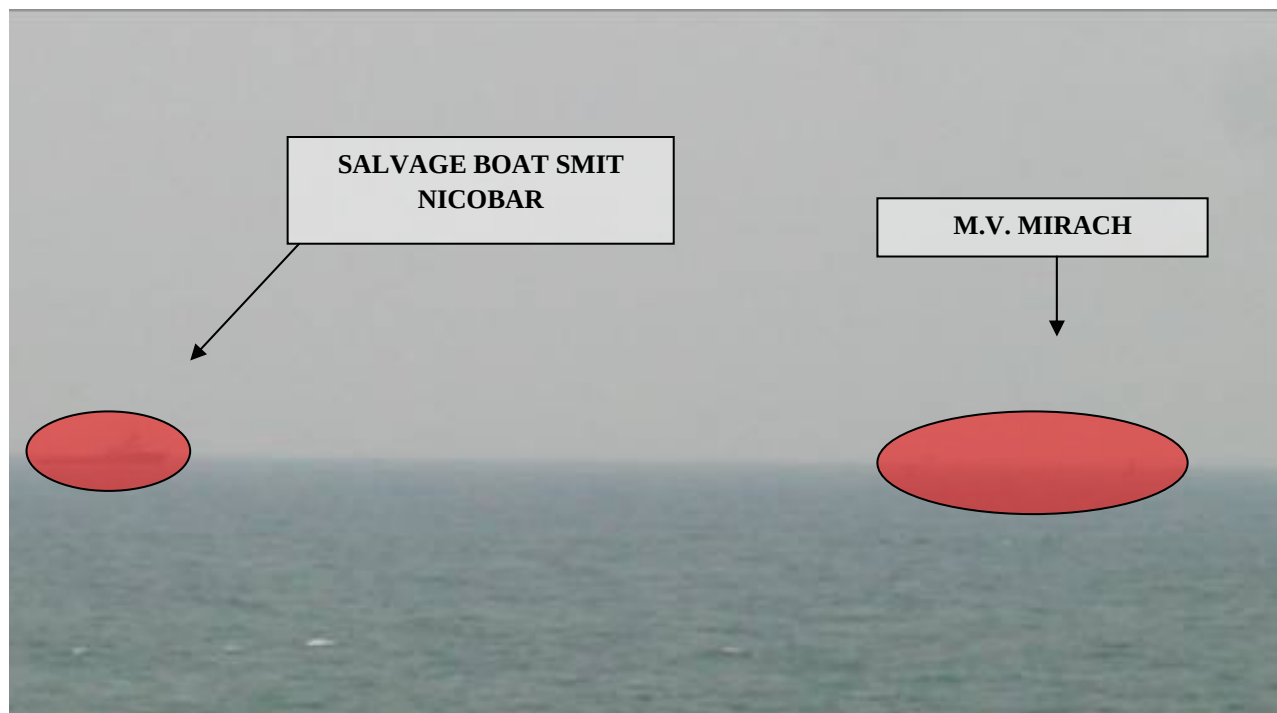


Photo no.29: M.V. Mirach foundered & salvage tug seen stand by

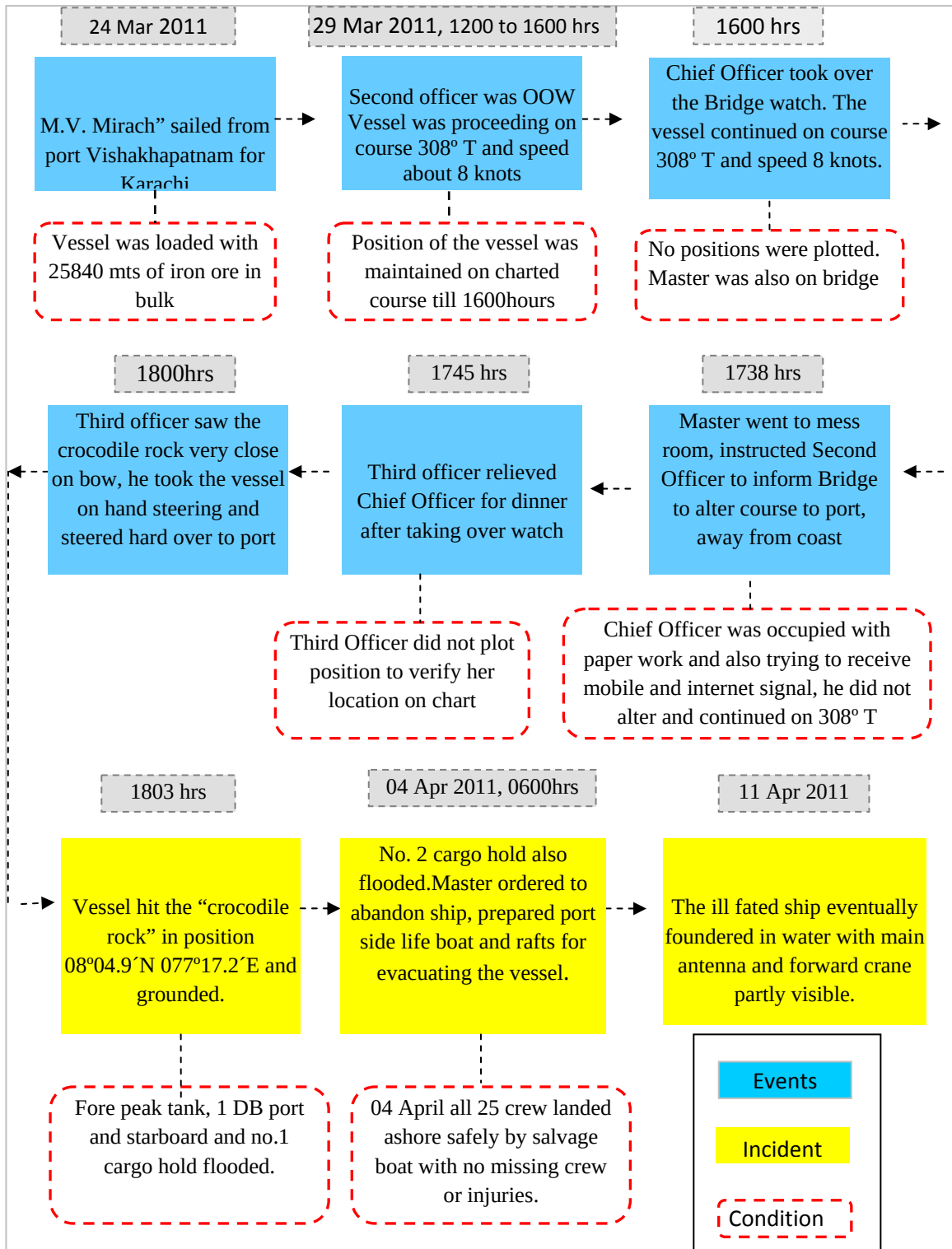
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1.16 SEQUENCE OF EVENT - FLOW HART





2 ANALYSIS

2.1 AIM

The purpose of the analysis is to determine the contributory causes and circumstances of the accident as a basis for making recommendations to prevent reoccurrence of similar accidents.

2.2 CAUSAL FACTORS

2.3 HUMAN FACTORS

There was a considerable role of “Human Factor” has been in line with the IMO Resolution A. 884 (21), in addition to poor bridge resource management, which contributed to this incident.

2.4 LIVE WARE

Inadequate Lookout

There was no dedicated lookout man on the bridge while the vessel was navigating in coastal waters and OOW was not diligent and lacked advertency while keeping watch.

Bridge resources were not used to optimal so as to make a full appraisal of the situation and of the risk of going over rocks dangerous for surface navigation.

OOW was not able to detect warnings prior grounding over the rock.

OOW saw the “crocodile rock” only when it was a few meters away at a very close range. There was a complete negligence of keeping effective look- out for safe navigation.

Inadequate Use of Navigational Equipments

GPS

GPS was not monitored since 1600 hours till vessel ran aground over Crocodile rock at 1803 hours, i.e. for 2 hours.

Positions were not plotted on chart and therefore OOW was not aware of the actual position of the vessel leading to complete situational unawareness.

GPS was not checked for cross track error.

GPS was not checked for Distance to go to next alteration which had already passed when the ship hit the rock.



GPS alarms were not made use of to give pre warning of approach to alteration point.

GPS was not checked for course to steer for next way point. GPS was not monitored to determine set and drift.

Radar / ARPA

OOW was using RADAR on 6 mile range with off centre display which was not monitored efficiently.

Crocodile rock was not observed on RADAR as it was not monitored carefully.

Radar was not monitored to watch for the distance and bearing of “Crocodile rock” or any other terrestrial objects/coast line and land marks.

Guard ring / guard zones were not used on RADAR.

The alarm systems were not utilized to give warning of the detection of crocodile rock and a warning indicating collision with new target. There was no acquisition or monitoring of targets painted on RADAR screen.

Parallel index technique was not used so as to maintain required safe distance from the rock or coast line or other prominent land marks/points.

RADAR fixes were not plotted on chart to verify positions.

Second means of plotting and verifying ship’s position was not a standard practice on board.

Echo Sounder

Echo sounder was not used although the vessel was navigating close to coast with shallow water and many rocks and obstructions around.

Use of Electronic Chart

It was established that the Bridge watch keeping Officers were using personal Laptop which belonged to Second Officer. It was programmed with electronic chart system. There was much navigational information which were not provided in this system and posed a threat to safe navigation. The system in use was not an approved system for navigation and should have been restricted for its use for safe navigation.

Inattentiveness

The OOW were not alert and attentive while keeping bridge watch and did not maintain proper lookout, monitor equipments or the progress of the vessel. This was due to the fact that OOW were involved in other activities and neglected the duty towards safe navigation of ship.



Lack of Situational Awareness

The watch keepers were imprudent and unable to detect warnings of imminent danger. OOW were not aware of ship's position, the position of the rock, the rate and direction of drift, the distance to alteration point which passed at 1800

hours, a few minutes before the incident and alteration was not made. Appropriate allowance was not made for set and drift in time.

Distraction

Due to various activities happening on the Bridge simultaneously, the OOW who was on watch till 1745 hours was distracted from keeping prudent and efficient navigation watch. The navigation watch was completely neglected due to priority given to other activities of paper work and making mobile telephone calls.

At 1738 when Master reminded Chief Officer about altering course to port, Chief Officer being the OOW, did not make appropriate substantial alteration also did not plot and confirm the position of the ship.

Inexperience Watch Keeper

The OOW (3/Officer) had a total of only 17 days experience on this ship. He joined the vessel at last load port Haldia, India on 12 March 2011. He appeared to be lacking of competency towards knowledge of bridge procedures as it was evident in his interview. He was not vigilant while watch keeping and did not care to verify the position of the ship or observe GPS for cross track error / course made good or observe RADAR for any collision warnings. He lacked aptitude, training and experience to maintain an efficient and safe bridge watch as expected from a prudent and competent watch keeper.

Set and Drift

The set and drift due to tide / current was not monitored by any of the available bridge resources and the effect of tide on the vessel was left unnoticed, unattended and was not counteracted till she ran aground. There was a prominent note about current pattern for this area which was also overlooked and went unnoticed to follow.



Ship Culture

Poor ship culture due to personal ego and attitudes, leading to lack of communication amongst Master and Officers, was observed to be another contributing factor of the accident. Inappropriate handing over / taking over between OOWs and ignorance of Master's instruction, of keeping the vessel away from coast were outcome of poor ship culture.

2.5 SOFT WARE

Poor Bridge Resource Management

There was a complete deliberate ignorance of the appropriate usage of Bridge equipments required for safe navigation. Ship's positions were not plotted and Bridge equipments were not used to optimum. OOW were engaged in other activities than navigation causing distraction and unable to keep efficient navigational watch.

The progress of the vessel in accordance with the passage plan was not carefully, closely and continuously monitored since the time Chief Officer took over watch at 1600 hours till the vessel hit rock at 1803 hours.

Handing / Taking Over Watch

There was inappropriate handing / taking over of bridge watches. Chief Officer who handed over watch to Third Officer did not inform him about the position of the vessel and distance to go for next alteration, which was only 2 NM. He did not alert him due to the fact that he himself had not plotted ship position on chart and was unaware of the situation.

Third Officer took over watch without knowing the position of the ship and he also did not bother to plot her position or make any observation on RADAR to assess the navigational situation.

Since OOW were engaged in paper work and making mobile phone calls, they were distracted from their actual job of navigation resulting in negligence to perform the required job.

Inappropriate Choice Of Route

There was no need for vessel to go 1 NM near to rock considering the safety of navigation or additional safety measures should have been imposed.

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The decision of Master to pass so close to Crocodile rock was not analyzed and expected hazards were not identified. Possibilities of human errors, negligence,

inattentiveness and distraction of OOW while doing paper work and making calls on mobile phone were not considered.

Passage Plan

Passage plan was poorly made with incomplete and missing information.

The course was passing 1nm off “crocodile rock” which was very near to rock and was unsafe for navigation if diligent and prudent watch was not maintained.

Course to steer was not written on the chart.

Passage plan did not mention about squat.

“No go” areas were not marked on chart and dangers to navigation were not highlighted.

Set and drifts were not established and displayed on chart while navigating close to coast near “Crocodile rock”.

The use of parallel index technique was not mentioned in passage plan and officers did not use the technique so as to maintain and pass safe distance from the identified hazards.

Passage plan was not amended when the vessel encountered problem with main engine which was running on low power and reduced speed.

No Risk Assessment

Master, planned the passage passing very near (1nm) to “Crocodile rock”, without discussing with bridge team and taking additional safety precautions as required when navigating in coastal waters.

Passage plan was not revised when vessel encountered engine problem and unable to proceed on full power making only 8 knots. “Risk assessment” for this change was not made.

Navigational hazards were not identified for the vessel approaching closer to rock posing higher threat to safety of navigation.

The effect of current on the ship was not analyzed.

There was no monitoring of the progress of the vessel and positions not plotted for last 2 hours before the vessel ran aground.

Master had instructed OOW to plot positions at an hourly interval although vessel was navigating near coast and in close proximity of dangers of navigation and heavy fishing traffic.



It was not considered to plot positions at a shorter interval as required when navigating in coastal waters and approaching to alteration point.

Master considered it safe without helm's man on the bridge when vessel was on coastal navigation.

Casualty was not foreseen and OOW did not use any bridge equipments to assess situation and avoid risk of grounding over the rock.

Master did not instruct OOW to call him prior making alteration of courses at such strategic points.

Failure to Comply With Procedures

Navigation watch was not maintained in competent and efficient manner. There was complete failure of bridge resource management and non-compliance of bridge procedures while navigating through shallow waters, rocks or other dangers of surface navigation.

2.6 HARDWARE
 NONE

2.7 ENVIRONMENT

Dazzling of Shore light

There was no dazzling due to shore lights which would hamper navigation. Also it was daylight when the incident occurred at 1803 hours.

Current

The note about currents on BA Chart 1566 stated that 1 knot current was setting in south east direction. The component of this current was continuously setting the vessel towards coast which was unnoticed by OOW.



3. CONCLUSIONS

Ship grounding is a marine accident that involves the impact of a ship on the seabed resulting in damage of the submerged part of her hull, particularly the bottom structure, potentially leading to water ingress and compromise of the ship's structural integrity leading to loss of stability. Grounding induces extreme loads onto ship's structures. Sometimes due to grounding, the ship might completely lose its balance and become unstable, leading to ship capsizing.

If the grounding has resulted into a major marine accident, it can have outstanding adverse effects on both- the ship and the environment. The ship involved in grounding may suffer from heavy structural and stability damage. Apart from the damage to the ship, grounding causes following effects:

- The environmental impact, especially in the case where large quantity of oil spillage is involved.
- If the situation becomes grave and uncontrollable, it might lead to loss of human life.
- The coastal areas near the accident will be drastically affected by the leaked cargo.
- Heavy financial losses will be incurred by the ship-owners, due to ship loss or penalties.
- Financial consequences to local communities close to the accident.

The grounding depends on the maneuvers made before the impact and will decide how the ship will be stranded after the grounding. Depending on the nature of the seabed i.e. being muddy or rocky, different measures have to be taken to release the ship.

Human error has been the cause of most of the grounding accidents in the past. Amateur maneuvering and loose presence of mind of navigating officer during the time of navigation is the root cause of any grounding. Improper retaliations at the time of grounding have been the root cause of major accidents.

The following conclusions have been reached after the investigation. These conclusions identify the different factors contributing to the incident and should not be read as apportioning blame or liability to any particular organization or individual.

Poor Bridge Resource Management

There was lack of bridge resource management on part of OOW by not making appropriate use of GPS, RADAR/ ARPA, Echo sounder and other means possibly due to reasons that OOW were engaged in activities other than navigation.

There were no procedures or guidance on the proper use of GPS, RADAR / ARPA, Echo Sounder and navigation plans. Parallel index technique was not used to maintain safe distance.



Navigation watch was not maintained in competent and efficient manner as required during coastal navigation. The OOW ignored correct bridge procedures required to keep safe navigation watch.

Handing / Taking Over

There was inappropriate handing over and taking over between officers of watch. Relieved Officer did not furnish required navigational information and also relieving officer after taking over watch put no effort to establish the vessel's position or monitor RADAR so as to be aware of the situation.

Passage Plan

IMO RESOLUTION A.893 (21) CHAPTER-5, SOLAS, REGULATION 34

Passage plan did not ensure sufficient sea room for the safe passage of the ship. Navigational hazards particularly when vessel was navigating in shallow water with off lying rocks and obstructions around were not anticipated. A passage plan was not reviewed and discussed well in advance with the bridge team when approaching close to rock or dangers of navigation.

The passage plan did not take into consideration many navigational activities and safety barriers which should have been highlighted.

Arguments furnished to justify the courses near to coast or rocks were to avoid pirate attack and shortening the voyage distance. Both reasons appeared to be fabricated and unprofessional. Passing 1nm or 5nm from the rock would make no difference in shortening of passage or avoiding pirate attack.

No Risk Assessment

Master, when deviated from the original course, to steer near to "Crocodile Rock", in order to receive mobile phone network signals for making phone calls, did not make "Risk assessment" for this change in navigation which was posing more threat to safety of navigation.

Hazard identification, assessment of risk associated with those hazards, prioritizing the risks, application of controls was neglected and vessel was left almost unattended which lead to the casualty. There was no monitoring of the progress of the vessel for last 2 hours before the vessel ran aground.

Both OOW were not aware of the ship's position and the effect of current on the ship as they were not vigilant on lookout for possible danger while keeping Bridge watch. Since the casualty was not foreseen, the risk assessment was not made and preventive measures were not even thought of due to priorities given to work of documentation and personal interest.

Possibilities of human errors, negligence and distraction of OOW were not considered by Master while the vessel attempted to pass close to rock in order to receive telecom network.



3.1 Other Safety Observation

SVDR

The vessel was equipped with SVDR but the equipment was not seized. There are no documented procedures specified in company's SMS on guidance and requirement for retaining of Voyage Data. The Master was not aware of circumstances under which VDR Data must be saved. Also Master awaited Owner's instruction for seizing SVDR and did not take initiative to do the needful as required by regulation.

Safety, Urgency and Distress Messages

Master did not send safety, urgency or distress alert by any means or on any DSC frequencies.

Coast guard and nearby port authorities were not informed or requested for assistance although the vessel's hull was breached and no.1 cargo hold including its bottom tanks and forepeak tanks were flooded.

Abandon Ship

The vessel, after hitting the rock had potential risk to foundering due to severe underwater damages. Damages resulted in flooding of forepeak, 1 DB port and starboard and no.1 cargo hold, making vessel un-seaworthy but was not abandoned. The severity of the situation was not realized and all crew remained on board. The situation on board was gradually deteriorating with progressive flooding of other compartments. The Master did not use his "over riding authority" pertaining to safety of lives of crew on board, rather opted to consult the Owners and then ordered abandon ship on 04 April at 0600 hours while no.2 cargo hold was also flooded and submerged in sea.



4. RECOMMENDATIONS

Individual errors are a subset of human failures, which are a subset of system failures, it is critical that the reduction of individual error rates should be encompassed with a total systems approach.

Major cause for marine casualties is the weakness in bridge organization. Accidents in operations are frequently caused by error in resource management.

Bridge Resource Management

Weakness in bridge organization and management has been cited as a major cause for marine casualties worldwide. Accidents in operations are frequently caused by resource management errors. Bridge Resource Management reduces the risk of marine casualties by helping a ship's bridge crew anticipate and correctly respond to their ship's changing situation.

Bridge Resource Management (BRM) is the effective management and utilization of all resources, human and technical, available to the bridge team to ensure safe completion of the vessel's voyage.

BRM begins before the voyage with the passage plan and continues through the end of the voyage with the passage debrief.

The Master must implement BRM by considering and addressing the following but not limited to:

- All bridge team members must be briefed on the passage plan and understand the intended route and procedures to transit the route.
- Master must use passage plan to anticipate areas of high workload and risk and set manning levels appropriately.
- Master must ensure that all bridge crew members are sure of their roles and responsibilities, both for their routine duties and their duties in the event of an incident/emergency.
- Master must set appropriate manning levels and make contingency plans based on anticipated workload and risks.
- Acquire all relevant information early and anticipate dangerous situations.

When BRM is practiced correctly onboard the result would be a "Bridge Team" that maintains its situational awareness, continually monitors the progress of the vessel making appropriate adjustments and corrections as necessary to maintain a safe passage and acquires relevant information early.

It would also result in appropriately delegating workload and authority.

It would anticipate the dangerous situations and avoid becoming pre-occupied with minor technical problems and losing sight of the bigger picture also undertake appropriate contingency plans when called for.



It would recognize the development of an error chain and take appropriate action to break the error-chain sequence

Training.....Regulation II/1 and II/2 of STCW'95 Convention, Section A-II/1, II/2, A-VIII/2 and B-VIII/2 Part 3-1 of STCW'95 Code.

It is strongly recommended to Owners / Operators to provide **training** to ships navigating officers on bridge resource / team management time to time in order to keep them updated with regards to following but not limited to.

- The importance of Look-out which must be maintained at all times during navigation.
- The Bridge Resource Management
- To plot positions more frequently during coastal navigation.
- To confirm position of the ship and keep the course in agreement with the passage plan and/or keep it clear of any possible dangers.
- The use and advantages of parallel indexing techniques and to keep track of ship's set and drift.
- Passage plan to be prepared in detail and any changes made must be discussed in advance with bridge team and additional preventive measures taken. The plan must be followed strictly.
- The effect of environment like wind, sea, swells, current and tide on course and speed of the vessel.
- Formulate and execution detailed passage plan using specified bridge procedures and making optimum utilization of all available resources of personnel and equipment.
- Identify and respond efficiently to potential hazards and emergency situations.

Master's Standing Orders

Master's Standing Orders must be read and signed before the commencement of the voyage and followed accordingly. Orders are clear on the chain of command, how decision and instructions are given on the bridge and responded to, and how bridge team members bring safety concerns to the notice of the Master.

Passage plan IMO Resolution A.893 (21) CHAP-5, SOLAS, Regulation - 34

Passage plan must cover ocean, coastal and piloted waters. Particular attention is paid to high traffic areas, shallow waters, or piloted waters where the plan incorporates appropriate margins of safety and contingency plans for unexpected incidents.

A passage plan shall be made from berth to berth acting on the principle of safety-first, while also taking operating efficiency into consideration.



Passage plan must ensure sufficient sea room for the safe passage of the ship through out the voyage and anticipate all navigational hazards particularly when vessel is navigating in narrow channel, restricted waters or in restricted visibility. A passage plan must be ready in all respects prior to commencement of voyage and must be verified by Master and discussed well in advance with the Bridge team and discrepancies clarified, if any.

The progress of the vessel in accordance with the voyage should be closely and continuously monitored. Any changes made to passage plan should be made consistent with these guidelines and clearly marked and recorded.

Drawing the Passage Plan on the Chart

Necessary information in the Passage Plan must be shown on the navigation chart; however, these marking shall not cause the fundamental information on chart to be obscured. The general information would include the course and distance on each leg of the voyage. It must also include Alteration points: Wheel-over points: No-go areas: Abort points: Distance off from an obstacle etc (Parallel Indexing): Clearing line: Point where it is necessary to change to the next chart and the Next chart number: Reporting points: Navigational warnings: Fishing traffic areas etc.

Points To Be Kept In Mind in Passage Planning

In drawing up a Passage Plan, the Master shall not be too much swayed by how to shorten the distance but select an optimal ship track which is safe for navigation.

Parallel Indexing

This is useful method of monitoring cross track tendency in any condition of visibility. It is particularly valuable tool while approaching port and during piloted waters when the Master is able to continually monitor the vessel's position.

Position fixing

The frequency of position fixing, as a maximum, should be such that the ship is kept free from danger between fixes and if a deviation occurs, avoiding action can be taken to guarantee the safety of the ship.

Changes or deviation in passage plan

Any changes or deviation made to the plan should be made consistent with this procedure, bridge team meeting shall be held & new supplementary passage plan shall be made to cover changes or deviation in route to ensure safe passage of vessel. Such changes or deviation clearly marked and recorded in Deck Log Book.



End of Voyage Debriefing

It is recommended to make debriefing at the end of passage which would provide the opportunity for the bridge team to review the passage plan's strengths and weaknesses, make suggestions for improved safety or communications, and improve team problem solving skills.

Risk Assessment

Risk assessment is a continuous process and must be reviewed if the circumstances change or there are indications that there exists greater risk than initially assumed. Grounding is an indication that the risk assessment did not identify all factors and safety barriers were insufficient.

Hazard identification, risk assessment with severity and probability of occurrence must be evaluated and preventive application of controls to be decided and implemented. Later the risk assessment must be reviewed and updated, if necessary.

The Organization is recommended to provide risk management training to raise basic awareness of risk management concepts and mechanisms, to enable (crew) participants to identify, mitigate and manage risks.

The controls may be applied either to reduce the likelihood of occurrence of an adverse event, or to reduce the severity of the consequences.

Risk Management Log

It is recommended to maintain a "Risk Management Log" on board which shall include risk name and description, likelihood, severity, priority, and mitigation /contingency plans, and any metrics defined for tracking the risk and risk dependencies. The risk rating and priority should be determined

SVDR: CHAP-5, SOLAS Regulation 20

A vessel's VDR where fitted must be considered "Critical Equipment". Ships Owners/Managers must develop documents and guidance on operation, maintenance and requirement for retaining of Voyage Data always in connection with abnormal situations to assist in casualty investigation. This would assist Owners and Flag State administration in investigation and prevent further incidents from happening by promulgating recommendations based on findings of the incident.

The Managers must instruct vessels under which circumstances all VDR Data must be saved. Incorrect commissioning of equipment or data inputs of SVDR by its interface of other equipments may some times result in no recording from helm, engine data or bridge microphones.

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Master's Overriding Authority

The Ship's master in the event of any interference from the external sources should not hesitate to use his overriding authority for safety of crew, ship and environment protection provided under the Safety Management System.

Incident occurred on 29 March but Master ordered abandon ship on 04 April endangering life of crew by keeping them on board although no.1 cargo hold was flooded which had heavy cargo of iron ore fines and vessel was un-seaworthy.

ISM Compliance

The Master must ensure that all operations like passage planning and other contingencies on board are carried out in strict compliance with Company's Safety Management System keeping safety as utmost priority.

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REFERENCE

Following supporting documents form part of final investigation report.

S. No.	Reference Material
1	Ships Particulars, Ship certificates & surveys, Master's preliminary report, Progress report, Investigation report from Noble Denton consultant (UK).
2	Passage planning, Cargo sequence plan, Cargo manifest, Mate's receipt, Watch schedule, Draft survey report, Joint draught survey, Contract for employment as seafarer, Stability summary, Ballast calculation form.
3	Compass error log, GPS log book, Bridge log book, Engine log book,
4	Statements & Interview of crew



Panama Maritime Authority
Directorate General of Merchant Marine
Department of Marine Accident Investigation

