REPUBLIC OF THE MARSHALL ISLANDS

Maritime Administrator

AVIATOR AND ATLANTIC GRACE MARINE SAFETY INVESTIGATION REPORT

Collision

Gulf of Kachchh | 26 November 2021

Published by: Republic of the Marshall Islands Maritime Administrator on 21 March 2024

DISCLAIMER

In accordance with national and international requirements, the Republic of the Marshall Islands Maritime Administrator (the "Administrator") conducts marine safety investigations of marine casualties and incidents to promote the safety of life and property at sea and to promote the prevention of pollution. Marine safety investigations conducted by the Administrator do not seek to apportion blame or determine liability. While every effort has been made to ensure the accuracy of the information contained in this Report, the Administrator and its representatives, agents, employees, or affiliates accept no liability for any findings or determinations contained herein, or for any error or omission, alleged to be contained herein.

AUTHORITY

An investigation, under the authority of the Republic of the Marshall Islands laws and regulations, including all international instruments to which the Republic of the Marshall Islands is a Party, was conducted to determine the cause of the casualty.

Maritime Administrator

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LIST OF ABBREVIATIONS AND ACRONYMS

AIS	Automatic Identification System
ARPA	Automatic Radar Plotting Aid
ASD	Able Seafarer Deck
BRM	Bridge Resource Management
C/O	Chief Officer
CPA	Closest Point of Approach
DWT	Deadweight Tonnage
ECDIS	Electronic Chart Display and Information System
IMO	International Maritime Organization
km	Kilometers
kn	Knots
m	Meters
NM	Nautical Miles
OICNW	Officer in Charge of a Navigational Watch
OOW	Officer on Watch
SMS	Safety Management System
T	True
TSS	Traffic Separation Scheme
US NGA	United States National Geospatial-Intelligence Agency
UTC	Coordinated Universal Time
VDR	Voyage Data Recorder
VHF	Very High Frequency
VTS	Vessel Traffic Service
QHSE	Quality, Health, Safety, and Environment

DOCUMENTS CITED

COLREGs . . . . . International Regulations for Preventing Collisions at Sea, 1972

IMO Resolution A.1047(27) . . . . . Principles of Minimum Safe Manning

ISM Code . . . . . International Management Code for the Safe Operation of Ships and for Pollution Prevention

MLC, 2006 . . . . . Maritime Labour Convention, 2006

US NGA Pub. 173 . . . . . Sailing Directions (Enroute) - India and the Bay of Bengal

STCW Code . . . . . Seafarers' Training, Certification and Watchkeeping Code

PART 1: EXECUTIVE SUMMARY

On the night of 26 November 2021, the Republic of the Marshall Islands registered bulk carrier AVIATOR and the Hong Kong Special Administrative Region of the People's Republic of China (hereinafter "Hong Kong") registered oil/chemical tanker ATLANTIC GRACE collided while they were meeting in the Deep Water Route through the Gulf of Kachchh. The collision occurred in good weather with both ships in sight of each other.

AVIATOR was seriously damaged and was declared a constructive total loss. ATLANTIC GRACE received significant damage, was repaired, and resumed trading.

The Republic of the Marshall Islands Maritime Administrator's (the "Administrator's") marine safety investigation determined the collision was the result of ineffective navigational watchstanding on both ships in that neither OOW made effective use of all available means to assess the risk of collision and that neither took positive action in ample time to avoid collision.

The Administrator's marine safety investigation also determined that ineffective supervision by the Masters of AVIATOR and ATLANTIC GRACE of both ship's OOW may have also contributed to the collision.

PART 2: FACTUAL INFORMATION

The following factual information is based on the information obtained during the Administrator's marine safety investigation.

Ship particulars at the time of the incident for AVIATOR, *see* chart to right.

Ship particulars at the time of the incident for ATLANTIC GRACE, *see* chart on page 11.

AVIATOR

AVIATOR was a four hatch, single hull, geared bulk carrier *(see Figure 1)*. The ship was managed by Evalend Shipping Co. S.A. (hereinafter "Evalend").

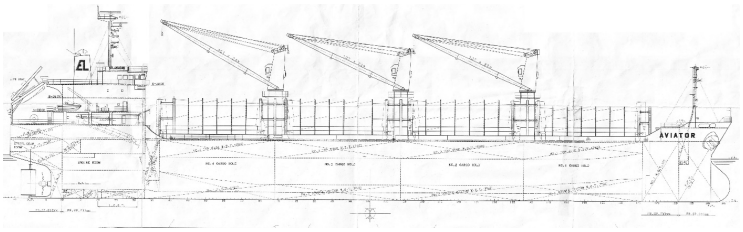

Figure 1: AVIATOR General Arrangement.

AVIATOR's navigation and communications equipment included an X-band and S-band radar equipped with ARPA, two ECDIS, two VHF radios, and an AIS unit.

The ship's navigation and communication equipment, the main engine, auxiliary engines, and steering gear were all reported to be operational and working properly. AIS information was displayed on the S-band radar and the two ECDIS units. The ARPA was set for manual target acquisition. Additionally, it was reported that the lights required by COLREGs for a power-driven vessel of 50 m or more in length were being exhibited.[1]

AVIATOR had a complement of 22. All of the ship's crewmembers held valid Republic of the Marshall Islands seafarer documentation required for their positions on board.

1 When underway, AVIATOR was required by COLREGs Rule 23 to exhibit a white masthead light fore and aft, a red sidelight on the port side, a green sidelight on the starboard side, and a white sternlight.

AVIATOR'S SHIP PARTICULARS

Vessel Name
AVIATOR

Registered Owner
Liberator Maritime Company

ISM Ship Management
Evalend Shipping Co. S.A.

Flag State
Republic of the Marshall Islands

IMO No.	Official No.	Call Sign
9363754	3023	V7NU9

Year of Build	Gross Tonnage
2007	11,743

Net Tonnage	Deadweight Tonnage
6,457	18,957

Length x Breadth x Depth
132.5 x 25 x 11.5 m

Ship Type
Bulk Carrier

Document of Compliance Recognized Organization
Nippon Kaiji Kyokai

Safety Management Certificate Recognized Organization
Nippon Kaiji Kyokai

Classification Society
Nippon Kaiji Kyokai

Persons on Board
22

The Administrator did not observe any indication that AVIATOR's Master, 3/O, or ASD had failed to receive the amount of rest mandated by the STCW Code, Section A-VIII/1, paragraphs 2 and 3, and MLC, 2006, regulation 2.3.[2]

Evalend's SMS and Master's Standing Orders

Evalend's SMS included procedures for shipboard tasks, including navigation watchkeeping. These procedures stated that the primary responsibility of the OOW is the safety of the ship. Further, the OOW was required to, at all times, comply with COLREGs and the principles of watchkeeping in the STCW Code. The procedures for navigation watchkeeping in Evalend's SMS included guidance regarding the need to:

1. maintain a continuous and effective lookout at all times when at sea;
2. make effective use of visual bearings along with radar in order to determine if there was a risk of collision with another vessel;
3. avoid close quarters situations except where there was no acceptable alternative;
4. not delay taking action when required by COLREGs to give way;
5. proceed with extreme caution when required by COLREGs to stand on; and
6. call the Master when the movements of another vessel caused concern.

Evalend's SMS also stated that the OOW remained responsible for the safe navigation of the ship when the Master was on the Bridge unless the Master stated he/she had assumed that responsibility from the OOW. It further stated if the Master does assume the conn, the OOW continues to remain responsible for navigating the ship. Evalend's SMS also requires that Masters make allowance for inexperienced junior OICNWs and always personally supervise situations which may not be satisfactorily and efficiently handled by a junior officer.

Evalend's SMS included a reminder for OOWs that when using the automatic pilot for steering they should change over to hand steering in good time so a potentially dangerous situation can be dealt with in a safe manner. This guidance further stated that it is "highly dangerous" for a situation to develop where the OOW is without assistance and must break the continuity of the lookout to take emergency action and that the automatic pilot should not be used in confined channels.

AVIATOR's Master issued Standing Orders that, among other things, required that:

1. OOWs themselves maintain a good lookout while ensuring that any assigned Lookout does the same;
2. OOWs provide other vessels a good berth in ample time, "not try to bluff another vessel" that might have the right of way, and ensure that any maneuvers are clear to the other vessel;
3. OOWs call the Master at any time if in doubt, but to call in ample time;[3] and
4. the ship should use hand steering when within 5 NM of the coast or when within 3 NM of another vessel, regardless of the situation.

Each of the OICNWs on board AVIATOR had signed the Master's Standing Orders.

2 The Administrator observed that on four of the seven days prior to the time of the collision that the hours of rest for the Master and ASD were divided into three rest periods rather than only two as required by MLC, 2006, regulation 2.3, standard A2.3, paragraph 6. Similarly, the 3/O's rest hours were also divided into three rest periods on three days within the same seven day period. It was also determined that the Master, 3/O, and ASD each received at least the minimum required amount of rest during the 24 hours immediately before and the seven days preceding the collision. Also, they all had uninterrupted rest periods of six hours or more on each of the seven days prior to the collision.

3 The Standing Orders included a warning that it is better to call "too soon than too late."

ATLANTIC GRACE

At the time of the collision, ATLANTIC GRACE was a double hull oil/chemical tanker *(see Figure 2)*. The ship was managed by Anglo-Eastern Tanker Management (Singapore) Pte Ltd (hereinafter "Anglo-Eastern").

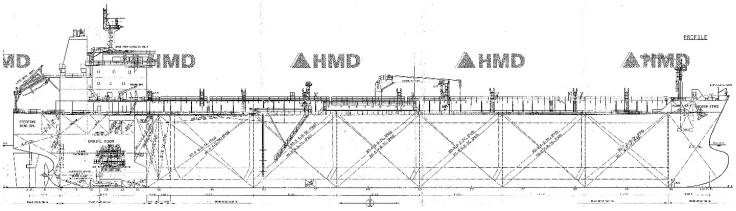

Figure 2: ATLANTIC GRACE General Arrangement.

ATLANTIC GRACE's navigation and communications equipment included an X-band and S-band radar equipped with ARPA, two ECDIS, two VHF radios, and an AIS unit.

The ship's navigation and communication equipment, the main engine, auxiliary engines, and steering gear were all reported to be operational and working properly. The ARPA was set for manual target acquisition. AIS information was displayed on the ship's radars and ECDIS units. Additionally, it was reported that the lights required by COLREGs for a power-driven vessel of 50 m or more in length were being exhibited.[4]

ATLANTIC GRACE had a crew complement of 21. All of the ship's crewmembers held valid Hong Kong seafarer documentation required for their positions on board.

The Administrator did not observe any indication that ATLANTIC GRACE's Master, 3/O, or ASD had failed to receive the amount of rest mandated by the STCW Code, Section A-VIII/1, paragraphs 2 and 3, and MLC, 2006, regulation 2.3.[5]

Anglo-Eastern's SMS and Master's Standing Orders

Anglo-Eastern's SMS included procedures addressing navigation watchkeeping and other shipboard operations. Based on these

4 When underway, ATLANTIC GRACE was required by COLREGs Rule 23 to exhibit a white masthead light fore and aft, a red sidelight on the port side, a green sidelight on the starboard side, and a white sternlight.

5 The Administrator observed that on three of the seven days prior to the time of the collision that the hours of rest for the Master, 3/O, and the ASD were divided into three rest periods rather than only two as required by MLC, 2006, regulation 2.3, standard A2.3, paragraph 6. It was also observed that the Master, 3/O, and ASD all received at least the minimum required amount of rest during the 24 hours immediately before and the seven days preceding the collision. They also all had uninterrupted rest periods of six hours or more on each of the seven days before the collision.

ATLANTIC GRACE'S SHIP PARTICULARS

Vessel Name
ATLANTIC GRACE

Registered Owner
Heroic Hera Inc.

ISM Ship Management
Anglo-Eastern Tanker Management (Singapore) Pte Ltd

Flag State
Hong Kong Special Administrative Region of the People's Republic of China

IMO No.	Official No.	Call Sign
9337511	HK-2101	VRDT7

Year of Build	Gross Tonnage
2008	29,266

Net Tonnage	Deadweight Tonnage
13,134	49,999

Length x Breadth x Depth
175.6 x 32.2 x 18.8 m

Ship Type
Oil/Chemical Tanker

Document of Compliance Recognized Organization
Korean Register

Safety Management Certificate Recognized Organization
Korean Register

Classification Society
Korean Register

Persons on Board
21

procedures, the primary responsibility of the OOW was to ensure the safety of the vessel. Further, Anglo-Eastern's SMS required that OOWs observe COLREGs at all times and included guidance regarding the use of visual bearings, radar, and ARPA for collision assessment and avoidance. Also provided was guidance regarding the use of the automatic pilot and the need for OOWs to change over to hand steering in good time before a dangerous situation developed. Anglo-Eastern's SMS also stated that hand steering should be used when required while navigating in coastal waters (i.e., less than 25 NM from shore). OOWs are also required to immediately inform the Master when in doubt or due to concerns with the movement of other vessels.

ATLANTIC GRACE's Master's Standing Orders stated that "the primary responsibility of OOWs was ensuring the safe navigation of the ship." They also required that OOWs:

1. comply with COLREGs;
2. maintain a proper and efficient lookout at all times by all available means;
3. take early and positive action when required to provide a wide berth to avoid collisions;
4. to the extent possible given existing conditions, maintain a minimum CPA of 1 NM when navigating in coastal waters;
5. monitor the vessel's progress to ensure the intended track is maintained per the passage plan; and
6. immediately call the Master when in doubt and when concerned about the vessel traffic conditions or the movement of other vessels.[6]

Each of the OICNWs on board ATLANTIC GRACE had signed the Master's Standing Orders.

Narrative

On the evening of 26 November 2021, AVIATOR and ATLANTIC GRACE were both underway in the Deep Water Route through the Gulf of Kachchh.[7]

Vessel traffic through the Gulf of Kachchh was monitored by the Gulf of Kachchh VTS, which consisted of four sectors that each had a designated VHF working channel.[8] Participation in the VTS was mandatory for all vessels over 300 GT and all passenger vessels. Both AVIATOR and ATLANTIC GRACE had reported into the VTS as required.

AVIATOR was in ballast with drafts of 3.6 m forward and 5.1 m aft and was proceeding inbound using the Deep Water Route to the anchorage off Kandla, Republic of India (hereinafter "India"). ATLANTIC GRACE was also in ballast with drafts of 6.4 m forward and 7.9 m aft and was outbound in the Deep Water Route bound for Fujairah, United Arab Emirates.

AVIATOR's bridge team consisted of the OOW and a Lookout. The OOW was the 3/O. He had joined the ship on 16 November 2021 at Fujairah. This was his first contract sailing as an OICNW after being promoted to 3/O from ASD. He had previously served 2 years on ships managed by Evalend. The Lookout was an experienced ASD

6 The Standing Orders also included the statement "I would rather be called a number of times unnecessarily, than be called too late once!"

7 The Gulf of Kachchh is located on the northwest coast of India and extends inland approximately 180 km from the Arabian Sea. The main portion of the gulf ranges from approximately 16-65 km wide and is fringed by coral reefs.

8 *See* US NGA, Pub. 173, paragraph 1.10 for the locations of the Gulf of Kachchh VTS sector boundaries, the assigned working channel for each sector, and reporting requirements.

who had also joined the ship on 16 November 2021 at Fujairah. AVIATOR's Master was working in the Chart Room behind the bridge curtain and was periodically going forward to monitor the ship's progress and other vessel traffic, which he described as being light.

ATLANTIC GRACE's bridge team also consisted of the OOW and a Lookout. The OOW was the ship's 3/O who had signed on board ATLANTIC GRACE at Jawaharlal Nehru, India on 19 November 2021. This was his first time sailing on a ship managed by Anglo-Eastern. He had previously served 2 years as a 3/O and 1.6 years as an ASD. The Lookout was an experienced ASD who had joined the ship on 19 November 2021 at Jawaharlal Nehru. The ship's Master and Second Officer were both working in the Chart Room at the back of the Bridge behind the bridge curtain.

Both AVIATOR and ATLANTIC GRACE were being steered by autopilot.

The weather was reported as good, with clear skies, and visibility of 10 NM. The winds were Beaufort Force 2-4 from the north. The sea was calm with a swell of 0.5 m. Sunset occurred at 1808 local time.[9] Civil twilight ended at 1832.

At 2016, AVIATOR's Master, who had gone forward from behind the bridge curtain after the change of watch at 2000, and OOW detected ATLANTIC GRACE off their ship's port bow at a range of approximately 8 NM *(see Figure 3)*. They reported seeing ATLANTIC GRACE's masthead lights and green side light. At the time, AVIATOR was proceeding along the ship's planned route on the southern side of the Deep Water Route on a course of 116° T at a speed of about 11 kn. AVIATOR's bridge radios were set for VHF Channel 16 and the working channel for the Gulf of Kachchh VTS Sector 2, VHF Channel 71.

When first sighted by AVIATOR's Master and OOW, ATLANTIC GRACE was on the north side of the Deep Water Route on a course of 245° T at a speed 13.5 kn and was 0.3 NM to the right of ATLANTIC GRACE's planned route *(see Figure 3)*. ATLANTIC GRACE was being steered by autopilot and the bridge radios were tuned to VHF Channel 16 and the working channel for the Gulf of Kachchh VTS Sector 3, VHF Channel 17.

9 Unless stated otherwise, all times are ship's local time (UTC +5.5).

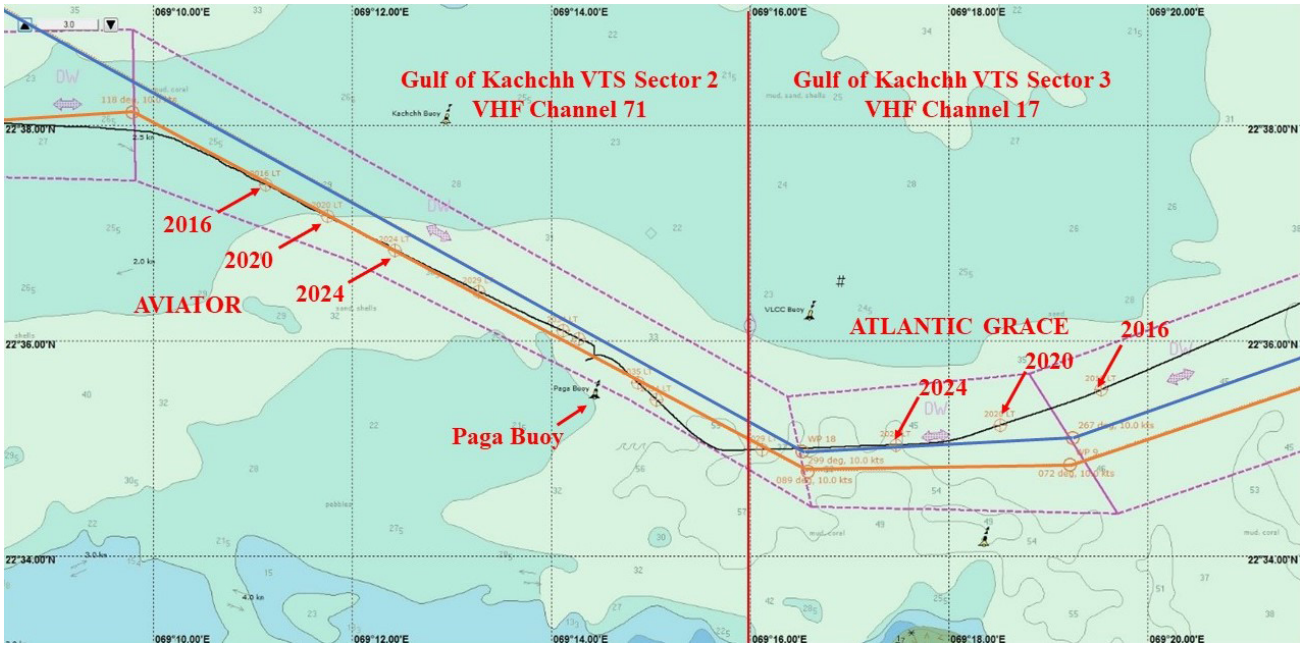

Figure 3: Positions of AVIATOR and ATLANTIC GRACE from 2016–2024 on 26 November 2021. AVIATOR's planned route is shown in orange and ATLANTIC GRACE's planned route is shown in blue. The vertical red lines indicate the boundary between the Gulf of Kachchh VTS Sectors 2 and 3. The ships' actual routes are depicted by the black line.

AVIATOR's Master directed the OOW to monitor ATLANTIC GRACE. The Master also told him that they could pass south of the Paga Buoy *(see Figure 3)* if necessary to avoid a close quarters situation with ATLANTIC GRACE. The Master then went behind the bridge curtain to use a computer at the back of the Bridge to send departure messages. AVIATOR's OOW stated he monitored ATLANTIC GRACE on radar and ECDIS but did not acquire it on the ARPA. The OOW also stated that he thought, based on ATLANTIC GRACE's radar vector, that it would leave the Deep Water Route and pass south of the Paga Buoy.

At 2020, the ATLANTIC GRACE's OOW adjusted the autopilot to change course to 267° T. He reported seeing AVIATOR, which was approximately 6.5 NM away, approaching from off the starboard bow as ATLANTIC GRACE turned to starboard while regaining its planned route. At the time it was approaching the center of the Deep Water Route *(see Figure 3)*. ATLANTIC GRACE's OOW did not acquire AVIATOR, whose target was displayed on the ship's radar, on the ARPA.

At 2023, there was a radio transmission from the Gulf of Kachchh VTS on VHF Channel 17 directing an outbound ship to remain on the starboard side (i.e., the north side) of the Deep Water Route and to pass all inbound vessels to port. The name of the ship to which the radio transmission was directed was not clear. This transmission, which was made on the working channel for the Gulf of Kachchh VTS Sector 3 (VHF Channel 17) was part of the bridge audio recorded by ATLANTIC GRACE's VDR. It was not part of the bridge audio recorded by the VDR on board AVIATOR, as it was in the portion of the Deep Water Route monitored by the Gulf of Kachchh VTS Sector 2 and was thus only monitoring VHF Channels 16 and 71.

At 2024, AVIATOR's Master went forward from behind the bridge curtain to check on the ship's progress and observed ATLANTIC GRACE's two masthead lights and green sidelight off the port bow at a range of 4.8 NM

(see Figure 3). He determined that ATLANTIC GRACE, which was steady on a course of 267° T, was in the center of the Deep Water Route. At the time, AVIATOR was still on a course of 116° T.

Between 2026–2028, AVIATOR's OOW made five radio transmissions to the Gulf of Kachchh VTS on VHF Channel 16, rather than on the working channel for either sector, as it approached the boundary between the Gulf of Kachchh VTS Sector 2 and Sector 3. These transmissions, which were part of the bridge audio recorded by the VDRs on board AVIATOR and ATLANTIC GRACE, were not acknowledged by the Gulf of Kachchh VTS.

At 2029, ATLANTIC GRACE's OOW directed the Lookout to shift to manual steering, at which time the Lookout assumed the duties of the Helmsman. He then directed the Helmsman to turn to course 315° T. By the time ATLANTIC GRACE started turning, the ship was approaching the southern boundary of the Deep Water Route and was approximately 0.7 NM past the waypoint where the ship was supposed to turn to a planned course of 299° T *(see Figure 4)*. ATLANTIC GRACE was on course 315° T by 2031, at which time the ships were less than 3 NM apart.

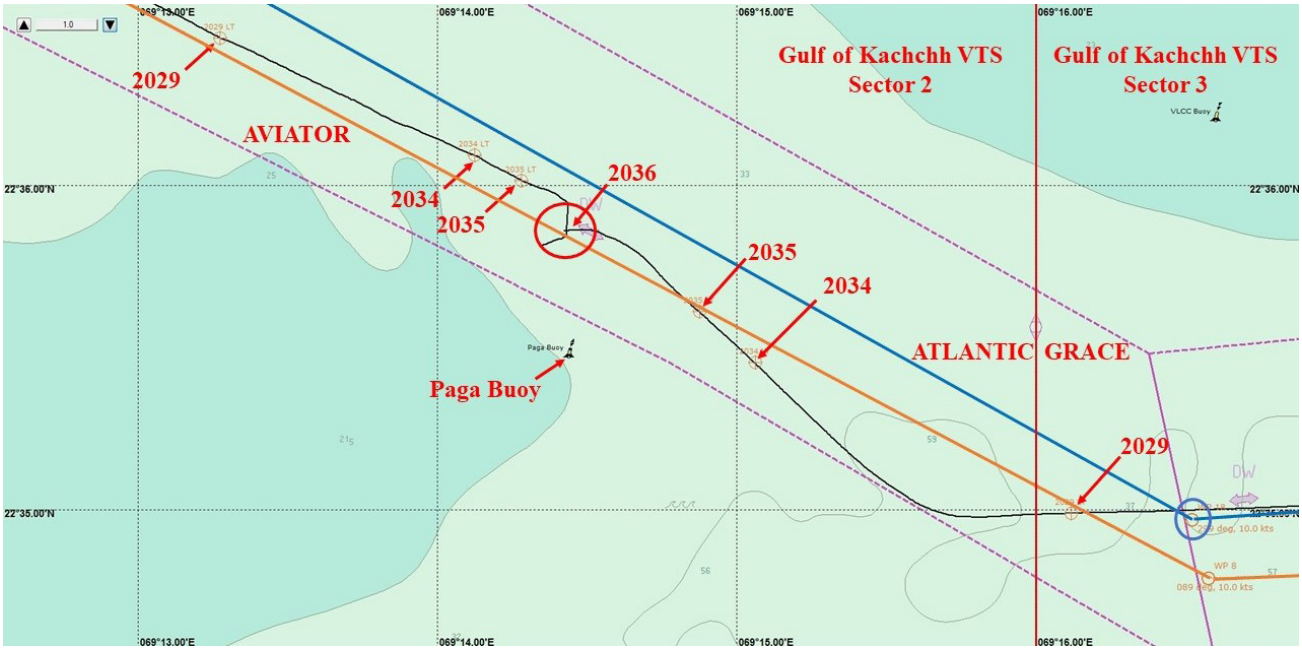

Figure 4: Positions of AVIATOR and ATLANTIC GRACE from 2029–2036 on 26 November 2021. AVIATOR's planned route is shown in orange and ATLANTIC GRACE's planned route and the waypoint where the ship was supposed to turn to course 299° T are shown in blue. The ships' actual routes are depicted by the black line. The location where the ships collided at 2036 is marked by the red circle.

ATLANTIC GRACE's OOW stated that he passed the waypoint without turning to avoid fishing nets that he and the Lookout had seen off the ship's starboard side. The ship entered the Gulf of Kachchh VTS Sector 2 as this was occurring. Based on the VDR recording of ATLANTIC GRACE's bridge audio, the ship's OOW did not inform the Gulf of Kachchh VTS either before or after the ship crossed the sector boundary.

The bearing between the two ships remained nearly constant after ATLANTIC GRACE steadied on a heading of 315° T by 2032. At 2034, AVIATOR's Master, who along with the OOW had been monitoring ATLANTIC

GRACE visually and on radar, directed the Lookout to assume the duties of Helmsman and shift to hand steering. The distance between AVIATOR and ATLANTIC GRACE was approximately 1 NM *(see Figure 4)*.

At 2035, AVIATOR's Master ordered his ship's rudder hard to starboard and ATLANTIC GRACE's OOW ordered his ship's rudder hard to port *(see Figure 4)*. ATLANTIC GRACE's OOW stated he turned to port to prevent his ship from colliding with AVIATOR in way of that ship's Accommodations. ATLANTIC GRACE's OOW then immediately called the Master, who had been working on a computer in the Chart Room at the back of the Bridge since 1945, for assistance. ATLANTIC GRACE's Master promptly went forward. He said that he saw a masthead light off his ship's starboard bow and a second masthead light off the port bow as the OOW told him that there was another ship directly ahead.

Within a minute, the two ships collided as ATLANTIC GRACE's stem contacted AVIATOR's port side in way of Cargo Hold No. 3. The force of the collision caused the main engine and auxiliary engines on board AVIATOR to shut down. The emergency generator started as required.

Neither AVIATOR nor ATLANTIC GRACE sounded the signal prescribed by COLREGs Rule 34(d) prior to the collision.

Post-collision

Immediately after the collision, the Master of ATLANTIC GRACE ordered the ship's main engine stopped. The Masters of AVIATOR and ATLANTIC GRACE both directed that their ships' emergency alarms be activated, and the crewmembers mustered. They subsequently directed the crewmembers to assess the damage to their ships, which were entangled with ATLANTIC GRACE's bulbous bow caught inside of AVIATOR's Cargo Hold No. 3 *(see Figure 5)*.

Figure 5: ATLANTIC GRACE (on the left) and AVIATOR (on the right) on 27 November 2021. (Source: India Coast Guard)

Within a few minutes of the collision occurring, the Masters of both AVIATOR and ATLANTIC GRACE had informed Gulf of Kachchh VTS that the ships had collided with each other and that they were entangled. AVIATOR's Master also informed Gulf of Kachchh VTS that he intended to drop anchor to stop the ships from drifting.

As the crewmembers on board AVIATOR and ATLANTIC GRACE were assessing the damage to their ships, the Masters established radio communications with each other and confirmed that none of the crewmembers on either

ship had been injured. The Master of AVIATOR informed ATLANTIC GRACE's Master that Cargo Hold No. 3 was flooded and that the ship had a 3° list to starboard.

The ships, which remained entangled, drifted in a westerly direction at approximately 1-2 kn. By approximately 2145, AVIATOR's starboard anchor had been dropped and appeared to be holding both ships. AVIATOR's engineers were able to restart the ship's auxiliary engines and main engine a short time later.

After AVIATOR had anchored, the Masters of both ships agreed to try and separate them. Their plan for accomplishing this was for AVIATOR to back down on its anchor so that the ship would be held in position as ATLANTIC GRACE engaged astern propulsion. The efforts to free the ships, which at one point included running ATLANTIC GRACE's main engine astern full, were not successful and they remained entangled until salvage crews separated them on 4 December 2021.

Consequences of the Collision

AVIATOR incurred serious structural damage on the ship's port side in way of Cargo Hold No. 3. The damage included the watertight envelope being breached, permitting flooding of Cargo Hold Nos. 3 and 4, and buckling of the main deck *(see Figure 6)*. The ship was determined to be a constructive total loss.

Figure 6: Damage to AVIATOR's port side shell and main deck.

ATLANTIC GRACE suffered significant structural damage forward in way of the stem and bulbous bow *(see Figure 7)*. The ship's hull was breached above the waterline. ATLANTIC GRACE underwent repairs and resumed trading.

Figure 7: ATLANTIC GRACE's starboard side hull forward showing damage to the stem and bulbous bow. (Source: Indian Coast Guard)

Gulf of Kachchh TSS

On 1 September 2022, the India Directorate General of Shipping replaced the Deep Water Route through the Gulf of Kachchh with a TSS. The stated reason for the change was to improve the safety of navigation and protection of the marine environment.[10] The TSS includes designated lanes for inbound and outbound vessel traffic and a separation zone *(see Figure 8)*. In the area where AVIATOR and ATLANTIC GRACE collided, the TSS is also wider than the Deep Water Route had been.

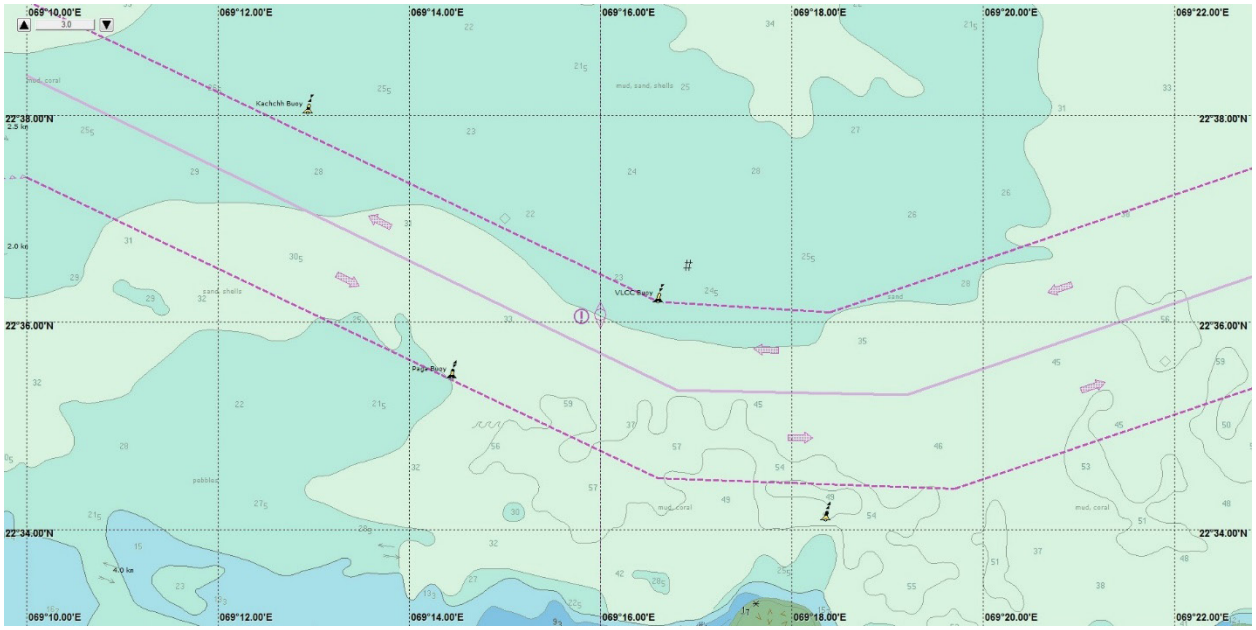

Figure 8: TSS through the Gulf of Kachchh in the vicinity of where AVIATOR and ATLANTIC GRACE collided.

10 *See* India, Ministry of Ports, Shipping and Waterways, Directorate General of Shipping, MS Notice 09 of 2022.

PART 3: ANALYSIS

The following Analysis is based on the above Factual Information.

Collision

AVIATOR, which was inbound in the Deep Water Route through the Gulf of Kachchh, and ATLANTIC GRACE, which was outbound in the Deep Water Route through the Gulf of Kachchh, collided approximately 0.5 NM to the north of the Paga Buoy on the evening of 26 November 2021 *(see Figure 4)*. The collision occurred when ATLANTIC GRACE's bulbous bow penetrated AVIATOR's port side in way of Cargo Hold No. 3.

AVIATOR sustained serious structural damage and was subsequently determined to be a constructive total loss. ATLANTIC GRACE suffered structural damage and resumed trading after undergoing repairs. None of the crewmembers on either ship were reported to have been injured when the collision occurred.

Lookout

AVIATOR and ATLANTIC GRACE were both required by COLREGs Rule 5 to maintain "a proper lookout by sight and hearing as well as by all available means appropriate to the prevailing circumstances." All available means for maintaining a lookout on board both AVIATOR and ATLANTIC GRACE included posting a crewmember, other than the OOW, as a designated Lookout and monitoring of radar, AIS information, and radio transmissions from other vessels and the Gulf of Kachchh VTS.

AVIATOR's Master, OOW, and Lookout first sighted ATLANTIC GRACE at 2016 when the two ships were 8 NM apart. ATLANTIC GRACE's OOW and Lookout sighted AVIATOR at 2020, by which time the distance between the two ships was 6.6 NM *(see Figure 3)*. Both AVIATOR's and ATLANTIC GRACE's OOWs reported that they identified the other ship on radar and ECDIS. The available information indicates that the bridge teams on both AVIATOR and ATLANTIC GRACE were aware of the other ship's location relative to their own ship from the time the other ship was first detected until they collided.

Although the transmission from the Gulf of Kachchh VTS on VHF Channel 17 at 2023, directing an outbound ship to remain on the starboard side (i.e., north side) of the Deep Water Route and to pass all inbound vessels to port, may not have been addressed to ATLANTIC GRACE, it was a warning from the Gulf of Kachchh VTS that there was a risk of inbound and outbound ships colliding when meeting in the Deep Water Route. There is no indication that ATLANTIC GRACE's OOW or Lookout were aware of this transmission, although it is included on the bridge audio recorded by the ship's VDR. Since AVIATOR was monitoring the working channel for Sector 2 (VHF Channel 71), the transmission from the Gulf of Kachchh VTS was not available to the Master and bridge team on board AVIATOR since it was made on the working channel for Sector 3 (VHF Channel 17).

Risk of Collision

Both AVIATOR and ATLANTIC GRACE were required by COLREGs Rule 7(a) to use all available means appropriate to the prevailing circumstances and conditions to determine if there was a risk of the two ships colliding. Further,

since both ships were equipped with operational radar, they were also both required by COLREGs Rule 7(b) to make proper use of the radar equipment to obtain early warning of the risk of collision. This includes radar plotting or equivalent systematic observation of detected objects. Per COLREGs Rule 7(d), the risk of collision "shall be deemed to exist if the compass bearing of an approaching vessel does not appreciably change," and "such risk may sometimes exist even when an appreciable bearing change is evident…when approaching a vessel at close range." The intent of this rule is to determine if there is a risk of collision with another vessel early enough so that action can be taken as required by COLREGs Rule 8.

Although the OOWs on AVIATOR and ATLANTIC GRACE were both aware of the other ship for 16-20 minutes from the time each first sighted the other ship and when the collision occurred, the available information indicates that neither of the OOWs made use of all available means, including ARPA or similar means of systematic observation,[11] to determine if there was a risk of the two ships colliding.

Further, there is no indication when AVIATOR's OOW first recognized that the two ships would likely meet inside the Deep Water Route while on reciprocal or nearly reciprocal courses. In fact, the OOW stated he had thought that ATLANTIC GRACE would leave the Deep Water Route and go south of the Paga Buoy based on his observation of the other ship's radar vector. This is particularly noteworthy since it indicates the OOW did not anticipate that ATLANTIC GRACE would remain inside the Deep Water Route. Further, AVIATOR's Master had instructed the OOW when they first sighted ATLANTIC GRACE at 2016 to closely monitor the other ship. This along with the Master's comment that AVIATOR could, if necessary to avoid a close quarters situation, pass to the south of the Paga Buoy *(see Figure 3)* should have been sufficient to make the OOW aware that ATLANTIC GRACE would potentially remain inside the Deep Water Route and that the two ships could be expected to meet on reciprocal or nearly reciprocal courses.

There is also no indication that ATLANTIC GRACE's OOW had recognized that there was a risk of colliding with AVIATOR until after ATLANTIC GRACE was steady on a heading that was nearly reciprocal to AVIATOR's *(see Figure 4)*. The information that is available indicates that ATLANTIC GRACE's OOW had prioritized avoiding the fishing nets that he and the Lookout had reported seeing off the ship's starboard side and remaining inside the Deep Water Route over assessing the risk of collision with AVIATOR.

The bearing between AVIATOR and ATLANTIC GRACE, which were approaching each other at a combined speed of almost 24 kn, did not change appreciably from the time that ATLANTIC GRACE was steady on course 315° T at approximately 2031 until they both turned at 2035. The fact that the bearing had remained nearly steady for even just a minute or two after ATLANTIC GRACE turned should have alerted AVIATOR's Master and OOW and ATLANTIC GRACE's OOW that there was a risk of collision and would have provided a little more time for both ships to take action to avoid collision.

Action to Avoid Collision

AVIATOR and ATLANTIC GRACE were both required by the COLREGs Rule 8 to take action to avoid collision. Further, COLREGs Rule 8(a) required that any action taken to avoid collision "shall, if the circumstances of the case

11 "Similar means of systematic observations" includes taking and comparing multiple visual bearings. The interval between observations should be shorter when the other vessel is at close range.

admit, be positive, made in ample time and with due regard to the observance of good seamanship." Since AVIATOR and ATLANTIC GRACE were in sight of one another and were meeting on reciprocal or nearly reciprocal courses, any actions taken by either ship were required to be made in accordance with COLREGs Rule 14.

In accordance with COLREGs Rule 14(a), when two vessels are meeting on reciprocal or nearly reciprocal courses so that there is a risk of collision, "each shall alter her course to starboard so that she each shall pass on the port side of the other." Further, per COLREGs Rule 14(c), "when a vessel is in any doubt" if there is a risk of collision, "she shall assume that it does exist and act accordingly."

AVIATOR and ATLANTIC GRACE had been meeting each other on nearly reciprocal courses for approximately 4 minutes without either ship taking any action to avoid collision. It was not until 2035, a minute before the collision occurred *(see Figure 4)*, that AVIATOR's Master ordered the ship's rudder hard to starboard. Although AVIATOR's Master had turned to starboard as required by COLREGs Rule 14(a), this action was not made in ample time. ATLANTIC GRACE's OOW did not take any action until he saw AVIATOR turning to starboard, and then he turned to port.

Navigation Watchstanding

Evalend's and Anglo-Eastern's SMSs both established clear requirements regarding the OOW's responsibility for the safety of the ship and compliance with COLREGs, including maintaining a proper lookout using all available means. Similarly, the Standing Orders issued by the Masters of AVIATOR and ATLANTIC GRACE both provided clear guidance to the OOWs on board their respective ships regarding maintaining a lookout and collision avoidance. The expectations and guidance in both ship manager's SMSs and Master's Standing Orders were consistent with the principles for navigational watches in the STCW Code, addressing the OOWs primary responsibility for safe navigation, compliance with COLREGs, and ensuring that a proper lookout is maintained at all times.[12]

The requirements in Evalend's SMS and AVIATOR's Master's Standing Orders regarding assessing the risk of collision and maneuvering in ample time to avoid a close quarters situation were not fully implemented by the AVIATOR's OOW or Master. Neither the OOW nor the Master made full use of all available means to monitor ATLANTIC GRACE and to assess the risk of the two ships colliding. Further, AVIATOR's Master, who had previously cautioned the OOW about avoiding a closed quarters situation with ATLANTIC GRACE, delayed taking action to avoid a potential collision until the two ships were in a close quarters situation. Further, there is no indication that either AVIATOR's Master or OOW recognized that the ship was not maintaining its planned track and was moving toward the center of the Deep Water Route *(see Figures 3 and 4)*. It is possible that even a slight change of course to starboard might have reduced the risk of collision with ATLANTIC GRACE.

Likewise, the requirements in Anglo-Eastern's SMS and ATLANTIC GRACE's Master's Standing Orders concerning the assessment of the risk of collision and taking early and positive action when required to provide a wide berth to avoid collision were not implemented by the ship's OOW. Not only did the OOW not make full use of all means that were available to him for assessing the risk of collision with AVIATOR, but he also did not take any action to avoid collision until a collision appeared to be imminent.

12 *See* STCW Code, section A/VIII, part 4-1 for all of the principles particular to navigational watches included in the STCW Code.

Both Evalend's and Anglo-Eastern's SMSs established clear expectations for when the OOW should call the Master. The Standing Orders issued by AVIATOR's and ATLANTIC GRACE's Masters for their respective OOWs also included clear, pithy guidance regarding when the Master should be called. The Standing Orders issued by AVIATOR's Master included guidance to call when in doubt, clarifying that it is better to call "too soon than too late." ATLANTIC GRACE's Master's Standing Orders included a similar warning: "I would rather be called a number of times unnecessarily, than be called too late once!"

AVIATOR's OOW had not called the ship's Master, however the Master came forward from behind the bridge curtain at 2024 when ATLANTIC GRACE was off his ship's port bow at a range of 4.8 NM. When interviewed, the OOW did not provide any indication that he had been in doubt regarding ATLANTIC GRACE's intentions while the Master was behind the bridge curtains.

ATLANTIC GRACE's OOW stated he passed the waypoint where it was planned for the ship to turn to the northwest in order to remain inside the Deep Water Route without turning *(see Figure 4)* to avoid fishing nets that he and the Lookout had seen off the ship's starboard side. He also stated that he was aware his ship was on the south side of the Deep Water Route and that ATLANTIC GRACE and AVIATOR were closing in on each other after he had ordered the Helmsman to steer 315° T *(see Figure 4)* to stay inside the Deep Water Route. This occurred as ATLANTIC GRACE crossed from the Gulf of Kachchh VTS Sector 3 into Sector 2 without making the required report to the Gulf of Kachchh VTS. Why the required report was not made cannot be determined with certainty. However, it is noted that as ATLANTIC GRACE was entering Sector 2, the OOW needed to perform a number of concurrent tasks, including assessing the risk of collision with AVIATOR, avoiding the fishing nets that had been observed off the ship's starboard side, and turning to remain inside the Deep Water Route. Further, ATLANIC GRACE's OOW may have benefited from calling the Master for assistance, however, the OOW did not call the Master, who was working in the Chart Room behind the bridge curtain, until less than a minute before the collision occurred.

Use of Autopilot and Continuity of Lookout

The assigned navigation watches on board both AVIATOR and ATLANTIC GRACE consisted of an OOW and a Lookout. The two-person navigational watches were possible since each ship was being steered by autopilot.

The principles for navigational watches in the STCW Code state that the duties of the Lookout and Helmsman are separate, and that the Helmsman shall not be considered to be the Lookout while steering.[13] Further, these principles state that the Lookout cannot be assigned any other duties and allow for the OOW to serve as the sole Lookout only in daylight and then only under certain circumstances.[14] These principles also require that OOWs take into account the need "to station a person to steer the ship and to put the steering into manual control in good time to allow any potentially hazardous situation to be dealt with in a safe manner."

The guidance in both Evalend's and Anglo-Eastern's SMSs and both AVIATOR's and ATLANTIC GRACE's Master's Standing Orders for the use of autopilot was consistent with the principles of the STCW Code for navigational watches.

13 *See* STCW Code, Section A-VIII/2, part 4.1, paragraph 16.

14 *See* STCW Code, Section A-VIII/2, part 4.1, paragraphs 16.1-16.3.

An additional watchstander was not called on ATLANTIC GRACE when the OOW directed the Lookout to assume the duties of Helmsman at 2029. Similarly, neither AVIATOR's Master nor OOW called an additional watchstander when the Master directed his ship's Lookout to assume the duties of Helmsman and shift to hand steering at 2034. The implication is that there was a break in the continuity of the lookout on board both ships.

AVIATOR's Master's Standing Orders further required that hand steering should be used when within 3 NM of another vessel, regardless of the situation. There is no indication that AVIATOR's OOW had considered shifting to hand steering at 2029 when AVIATOR and ATLANTIC GRACE were within 3 NM as required by the ship's Master's Standing Orders.

Contrary to the requirement in Anglo-Eastern's SMS that the vessel should be in hand steering when navigating in coastal waters (i.e., less than 25 NM from land), ATLANTIC GRACE had been steered by autopilot while within 5-15 NM of land during the outbound transit of the Gulf of Kachchh. Neither the ship's Master nor OOW provided any indication of the reason for the use of the autopilot while within 25 NM of land contrary to Anglo-Eastern's SMS.

Supervision of Junior OICNWs

A responsibility of a ship's Master is to provide oversight and guidance to OICNWs serving on board. Such oversight and guidance is particularly important with respect to a junior officer, who, although the individual completed the training required by the STCW Code and is qualified for service as an OICNW, may have limited experience standing watch as an OOW while navigating in a Deep Water Route or other recognized vessel traffic routing scheme.[15]

AVIATOR's Master went forward from behind the bridge curtain after the 3/O, who had been on board for 10 days and was on his first contract as a deck officer, assumed the watch as OOW at 2000. As the Master assessed the AVIATOR's progress, he and the OOW first observed ATLANTIC GRACE at 2016. After directing the OOW to monitor ATLANTIC GRACE and explaining how they could avoid a close quarters situation, the Master then went back behind the bridge curtain rather than remaining forward to oversee the OOW's performance navigating in the Deep Water Route and how he went about monitoring ATLANTIC GRACE and assessing the developing situation. AVIATOR's Master again went forward from behind the bridge curtain at 2024, or 8 minutes after he and the OOW had first observed ATLANTIC GRACE, to assess the ship's progress and to monitor ATLANTIC GRACE.

ATLANTIC GRACE's Master had been working in the Chart Room behind the bridge curtain since 1945. while his ship's 3/O was on duty as the OOW. Although the 3/O had 2 years of experience as an OICNW, he had been on board ATLANTIC GRACE for 7 days and was on his first contract on board a ship managed by Anglo-Eastern. There is no indication that ATLANTIC GRACE's Master had gone forward from behind the bridge curtain to monitor the 3/O's performance navigating in the Deep Water Route or to assess the ship's progress after the change of watch.

STCW Work Rest Hours

Per MLC, 2006, regulation 2.3, standard A2.3, paragraph 6, a seafarer's hours of rest "may be divided into no more than two periods, one of which shall be at least six hours in length, and the interval between consecutive periods of rest shall

15 The importance of qualified and experienced seafarers is noted in the preamble to IMO Resolution A.1047(27), which states that "safe manning is a function of the number of qualified and experienced seafarers necessary for the safety and security of the ship, crew, passengers, cargo, and property and for the protection of the marine environment."

not exceed 14 hours." As previously noted, the rest hours for both AVIATOR's and ATLANTIC GRACE's Masters and the navigational watchstanders who were on duty when the ships collided, had been divided into three rest periods on three or four of the seven days preceding the collision.[16] However, it was also determined that they all received at least the minimum required amount of rest during the 24 hours and seven days preceding the collision.[17] They each had uninterrupted rest periods of six hours or more on each of the seven days before the collision. In no case did the interval between consecutive rest periods exceed 14 hours. Based on the information available to the Administrator this non-conformance was not systematic. Further, there was no indication that it contributed to the collision.

PART 4: CONCLUSIONS

The following Conclusions are based on the above Factual Information and Analysis and shall in no way create a presumption of blame or apportion liability.

1. Causal factors that contributed to this very serious marine casualty include:
   (a) ineffective navigational watchstanding on board AVIATOR in that:
      i. the OOW did not make effective use of all available means, including ARPA, to assess the risk of collision with ATLANTIC GRACE; and
      ii. the Master did not take positive action in ample time to avoid collision;
   (b) ineffective navigation watchstanding on board ATLANTIC GRACE in that:
      i. the OOW did not maintain a proper lookout specific to hearing by failing to acknowledge the transmission received from Gulf of Kachchh VTS;
      ii. the OOW did not make effective use of all available means, including ARPA, to assess the risk of collision with AVIATOR;
      iii. the OOW did not call the ship's Master until a collision with AVIATOR was imminent; and
      iv. the OOW did not take positive action in ample time to avoid collision.
2. Additional causal factors that may have contributed to this very serious marine casualty include:
   (a) ineffective supervision by both ship's Masters of their respective OOWs; and
   (b) the failure of both AVIATOR and ATLANTIC GRACE to sound the signal as prescribed by COLREGs Rule 34(d) as they approached each other.
3. Additional issues that were identified but that did not contribute to this very serious marine casualty include:
   (a) both AVIATOR and ATLANTIC GRACE were without an assigned Lookout after they shifted to manual steering; and
   (b) the requirements for the maximum number of rest periods prescribed by MLC, 2006, regulation 2.3, standard A2.3, paragraph 6 were not strictly complied with on board both AVIATOR and ATLANTIC GRACE.

16 The seven-day lookback period was started at 2030 on 26 November 2021.

17 The minimum amount of rest required by MLC, 2006, regulation 2.3, standard A2.3, paragraph 5 is ten hours of rest in any 24 hour period and 77 hours of rest in any seven day period.

PART 5: PREVENTIVE ACTIONS

In response to this very serious marine casualty, Evalend has taken the following Preventive Actions:

1. Masters of all Evalend managed ships:
   (a) conducted BRM training using a scenario based on this collision for all onboard navigational watchstanders; and
   (b) discussed the incident during a safety meeting attended by all deck and engine officers.
2. The incident investigation report and lessons learned were shared among all Evalend managed ships reminding all Masters and OICNWs of this scenario.

In response to this very serious marine casualty, Anglo-Eastern has taken the following Preventive Actions:

1. Anglo-Eastern's QHSE Superintendent conducted onboard training for navigational watchstanders on board ATLANTIC GRACE that addressed passage planning, COLREGs, navigation in coastal waters, situational awareness, timely calling of the ship's Master, and challenge and response communications.
2. The OICNWs who were on board ATLANTIC GRACE when the ship collided with AVIATOR were required to complete a BRM course and ECDIS refresher course prior to their next contract on board an Anglo-Eastern managed ship.
3. A safety flash addressing the collision was sent to all Anglo-Eastern managed ships in November 2021 and a fleet wide safety stand down was held in December 2021. The lessons learned that were identified during Anglo-Eastern's investigation were subsequently shared with all of their managed ships.
4. A webinar based on lessons learned that were identified during Anglo-Eastern's investigation of the collision titled "Human Elements and Back to Basics" for officers was completed in January 2022.
5. Established a requirement for all first time 3/Os and all new deck officers, regardless of rank, joining Anglo-Eastern to complete a simulator assessment. All new deck officers are also required to complete a BRM course.
6. Provided a copy of Anglo-Eastern's investigation report to training centers so that the lessons learned from this collision can be used as a case study for future training.
7. Anglo-Eastern's QHSE auditors were instructed to discuss the lessons learned from this collision during internal audits on board Anglo-Eastern managed ships.
8. Lessons learned from this collision are reviewed during pre-joining briefings for all deck officers.

PART 6: RECOMMENDATIONS

The following Recommendations are based on the above Conclusions and in consideration of the Preventive Actions taken.

1. It is recommended that Evalend and Anglo-Eastern use the lessons learned from this very serious marine casualty as the basis for reviewing with Masters of ships in their respective managed fleets their expectations for providing oversight of and guidance for junior deck officers.

The Administrator's marine safety investigation is closed. It will be reopened if additional information is received that warrants further review.