Summary

**Minerva Pisces** sailed from Sitra, Bahrain on 25 December 2015, bound for Daesan in the Republic of Korea. The vessel had a mean draft of 12.50 m (even keel).

On 13 January 2016, at about 0035 and two nautical miles from **Minerva Pisces**, the OOW observed a number of fishing boats forming a large group, moving at a speed of eight knots, on course of 074° and crossing from port to starboard. The boats were reportedly not engaged in fishing.

He quickly changed to hand steering and ordered the AB to port the helm to port. The OOW stated that he then moved to the bridge wing and saw the fishing boat passing clear on the starboard side.

The MSIU has no compelling evidence to confirm that physical contact was made between the two vessels. However, the echo of one of the fishing boat was lost on the radar whilst crossing **Minerva Pisces** bow.

The MSIU has issued one recommendation to the Company, designed to ensure that the importance of crossing situations is highlighted on board Company managed vessels.
FACTUAL INFORMATION

Vessel
Minerva Pisces is a 57135 gt Maltese registered oil tanker, managed by Minerva Marine Inc., Greece. The vessel was built by Hyundai Heavy Industries Co. Ltd., in the Republic of Korea in 2008. Minerva Pisces is classed by the American Bureau of Shipping (ABS). The vessel has a length overall of 244.18 m, a depth of 21.00 m and a moulded breadth of 42.00 m. Propulsive power is provided by a 6-cylinder MAN B&W, two-stroke, single acting diesel engine, producing 13,650 kW. This drives a fixed pitch propeller at 105 rpm to give a service speed of 14.6 knots.

Crew on board Minerva Pisces
There were 26 crew members on board Minerva Pisces. The master and chief engineer were Greek nationals and the navigation officers and deck crew were from the Philippines. The working language on board was English.

The crew compliment was in accordance with the Minimum Safe Manning Document issued by the flag State Administration.

At the time of the alleged accident, the second mate was in charge of the watch. He was 43 years old and had a Degree in Maritime Transportation. He also held a valid STCW Certificate of Competency as navigation officer of the watch (OW). The second mate had been at sea since 1995. He joined Minerva Pisces on 12 November 2015 and had previously served as a second mate.

Watch procedures and master’s night orders
The navigation watches were set by the master. In this respect, he was guided by the Company’s Instruction Manual. Accordingly, a vessel underway in open waters, clear weather and with little or no traffic, a qualified OOW was required with an AB for lookout and steering duties. In similar conditions but in higher traffic density or restricted visibility, the OOW had to be supported either by the master or the chief mate, together with a lookout and an AB to steer the vessel.

The master’s night orders of 13 January 2016 required the OOWs to:
- follow courses as laid down on the ECDIS;
- maintain a sharp lookout and to call the master if the visibility was less than three nautical miles;
- keep radar/ARPA running and maintain a radio watch on VHF channel 16;
- check weather reports and to call the master in case of weather deterioration; and
- allow plenty of space to crossing or meeting vessels (minimum CPA of 1.5 nautical mile).

OOWs were also required to call the master when in doubt of the situation.

Environmental conditions
The weather in the area was fine, with Northerly winds of Beaufort Force 6. The sea was rough with a moderate Northerly swell. It was night time but the visibility was reportedly moderate to good.

Narrative
Minerva Pisces sailed from Sitra, Bahrain on 25 December 2015. The vessel was on even keel with a mean draft of 12.50 m. The vessel was bound for Daesan in the Republic of Korea with 78,246 tonnes of Naphtha.

1 Unless otherwise stated, all times are ship’s time (UTC+9).
On 14 January 2016, the OOW reported for the 0000 – 0400 navigation watch. He had an AB as a look-out and for manual steering. At the time, Minerva Pisces was transiting the East China Sea in water depths of over 100 m. The vessel was on autopilot, on a course of 015° (T) and making 14.3 knots.

The S-band, X-band and ARPA radars were running. The AIS was also switched on. Soon after relieving the previous watch keepers, the AB sighted a cluster of white lights on the port side, about four to five points from the bow. Shortly afterwards at 0005, the radar echoes, relatively close to each other, appeared on the edge of the radar screen. The S-band radar was set on the six nautical mile range. The lights sighted by the AB were collaborated with the radar echoes. Observing the lights coming closer, the AB reported his observations to the OOW.

At about 0035 and two nautical miles from Minerva Pisces, the OOW observed the fishing boats forming a large group, moving at a speed of eight knots, on course of 074° and crossing from port to starboard. The boats were reportedly not engaged in fishing. The OOW stated that he flashed the Aldis Lamp in the direction of the boats. At 0039, the nearer and most Easterly of the fishing boats and two other boats close behind navigated across the bow; three altered their course to pass astern of Minerva Pisces, while one fishing boat (identified on the radar as AIS target ‘C’ (Figure 2)), maintained her course and speed.

The OOW reported that the boat then switched off its lights as it crossed the vessel’s bow. He quickly changed to hand steering and ordered the AB to put the helm to port. The OOW stated that he then moved to the bridge wing and saw the fishing boat passing clear on the starboard side. The occurrence occurred at 0042 in position 30° 17.1´ N and 123° 45.3´ E. The OOW stated that shortly afterwards, he adjusted the helm, brought Minerva Pisces back on the original course, and resumed the voyage to Daesan.

**Post occurrence inspection**

At 1030 on 14 January 2016, the Company informed the master of an investigation into an alleged collision with fishing boat Zhe Pu YU 42234. The master, together with the chief engineer, inspected the hull from the main deck while the vessel was underway. The master reported that they neither found fresh paint damage nor paint marks. Moreover, he stated that they neither observed deformation in the bow area nor damage to the ship’s shell plating above the waterline.

Eventually, the MSIU has been informed that the fishing boat had been sunk and her five crew members remain missing.

Minerva Pisces had not been part of the search and rescue operation.

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2 This is AIS target # B in Figure 1.

3 During the course of the safety investigation, the Chinese authorities provided the MSIU three photos, showing fresh paint damage in way of the starboard bow and the starboard anchor hawse.
Figure 1: Image at 0038/49s showing fishing boat - AIS target ‘B’ running across the bow of Minerva Pisces

Figure 2: Image at 0041/03s showing radar echo of fishing boat on the port bow of Minerva Pisces identified by AIS target ‘C’
ANALYSIS

Aim
The purpose of a marine safety investigation is to determine the circumstances and safety factors of the accident as a basis for making recommendations, and to prevent further marine casualties or incidents from occurring in the future.

Fatigue, drugs and alcohol
The hours of rest of the OOW and his AB were in accordance with the MLC and the STCW Convention requirements. The crew members were tested for drug and alcohol on arrival Daesan. The results of the tests were negative. Moreover, the MSIU did not come across any evidence which would have suggested a behaviour influenced by fatigue, drugs and alcohol.

Data from the voyage data recorder
Minerva Pisces was fitted with a voyage data recorder (VDR). The data saved on the VDR at the time of the alleged accident, included images from the S-band radar, vessel’s heading, speed over ground (SOG), course over ground (COG) and AIS information. VHF and bridge conversations were also recorded.

Key navigational information extracted from the VDR playback is reproduced in Table 1.

Interpretation of VDR data
By capturing the events from the VDR, the MSIU was able to reconstruct the alleged accident.

It transpired that the fishing boats, whose lights were previously sighted by the AB, first appeared at the edge of the radar screen at about 0005. The S-band radar was set on the six nautical mile range, North-up, off-centre, relative motion. The off-centred setting extended the range ahead beyond the six nautical miles. The fishing boats, seven in number, were heading in the same direction at about the same speed.

As events progressed, the compass bearings of the fishing boats remained steady and with no action taken, a close quarter situation was inevitable. Visibility at the time was good and there was no other traffic in the close proximity of the vessels.

Table 1: Data extracted from the VDR of the vessel at the time of the alleged accident

<table>
<thead>
<tr>
<th>Time UTC</th>
<th>Minerva Pisces</th>
<th>Fishing Boats</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>hh:mm:ss</td>
<td>Heading₀</td>
<td>SOG Knot</td>
<td>Bearing₀</td>
</tr>
<tr>
<td>15:38:49</td>
<td>015</td>
<td>14.3</td>
<td>007:4</td>
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<td>15:46:03</td>
<td>015</td>
<td>14.3</td>
<td>019:1</td>
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<tr>
<td>15:41:03</td>
<td>015.4</td>
<td>14.3</td>
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<td>15:42:00</td>
<td>015</td>
<td>14.3</td>
<td>343.5</td>
</tr>
<tr>
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<td>002</td>
<td>14.3</td>
<td></td>
</tr>
<tr>
<td>15:49:30</td>
<td>007.4</td>
<td>14.3</td>
<td></td>
</tr>
</tbody>
</table>
Monitoring and avoiding action under Collision Regulations

There was no evidence to suggest that the fishing boats were either singly / collectively engaged in fishing or restricted in their ability to manoeuvre within the meaning of regulation 3 of the International Regulations for Preventing Collisions at Sea 1972 (COLREGs).

The fishing boats under power and in sight of one another were approaching Minerva Pisces in a crossing situation as defined by regulation 15 of the COLREGs, which states:

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

The VDR data indicated that the fishing boats were on Minerva Pisces’ port bow and in accordance with regulation 16, they were required to give way to Minerva Pisces. Regulation 16 states:

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

It is evident from the available information that a risk of collision existed and at a two nautical mile range, it had become apparent that the fishing boats had not taken any collision avoidance action. The OOW on Minerva Pisces was obliged under regulation 34(d) to sound a warning signal - at least five short and rapid blasts on the whistle – to indicate his doubt and to clarify the fishing boats’ intentions.

Moreover, regulations 17(a)(ii) and 17(b) necessitated the OOW to avoid collision; even more, taking into consideration the manoeuvring characteristics of Minerva Pisces and the master’s night orders of maintaining a passing distance of 1.5 nautical miles.

The MSIU was aware that there were no navigational hazards and / or other traffic constraints. The OOW did not alter course and / or speed. Instead, he directed the beam of the Aldis Lamp towards the fishing boats. In response, three fishing boats diverted their course to pass astern of Minerva Pisces. Three, however, crossed the bow at close range; a CPA of less than four cables. One fishing boat, identified on the radar as AIS target ‘C’, maintained her course. The OOW no longer saw the boat’s lights as she passed forward of the vessel.

The MSIU was of the view that rather than switching off its lights as suggested by the OOW, it was likely that the fishing boat was passing within the shadow zone ahead and the forecastle structure blocked the view of the lights. It was unclear as to what extent the port helm ameliorated the situation; however, the OOW reported that he had sighted the fishing boat (AIS target ‘C’) passing clear on the starboard side.

The crew on board Minerva Pisces reported no shudders or vibrations and remained asleep. The OOW and the AB reported no impact or unusual vibration from the forward part of the vessel.

From the evidence made available to the MSIU, it was neither possible to reconstruct precisely what subsequently happened nor determine the ensuing loss of radar and AIS.

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4 In accordance with COLREGs Regulation 17(a)(ii), a stand-on vessel may take action by her manoeuvre alone to avoid a collision as soon as it becomes

5 COLREGs Regulation 17 (b) states that: *When from any cause, the vessel required to keep her course and speed finds herself so close that collision cannot be avoided by the action of the give-way vessel alone, she shall take such action as will best aid to avoid collision.*
signal of AIS target ‘C’ logged by the ship’s VDR (Figures 3 and 4).

Figure 3: Radar image at 0043/30s showing AIS target ‘C’ (without radar echo) astern of Minerva Pisces
Figure 5: Radar image at 0049/30s showing position of lost AIS target ‘C’
Evidence of collision, or not?
The MSIU had very unclear evidence for analysis during the course of the safety investigation. The OOW and the look-out were convinced that their ship was never involved in a collision during their watch.

The MSIU is unaware of any tests carried out on paint samples from the vessel and the wreck. In fact, initially, the MSIU did not have any evidence to confirm whether the wreck had eventually been found and lifted until the consultation stage of the safety investigation when it was confirmed by Chinese authorities that the fishing boat’s wreck had been found but not lifted, and paint samples taken from *Minerva Pisces*.

It was very clear, however, that after *Minerva Pisces* cleared the fishing boats, one of the radar echoes and its AIS signal were subsequently lost. As yet, there was no compelling evidence that potentially this was either due to actual physical contact or swamping, say, by the bow waves generated by the vessel. Taking into consideration the VDR voice recordings and the concerns on the event expressed by the OOW and the look-out, the MSIU believes that *Minerva Pisces* was the vessel in very close proximity of the fishing boat just before the AIS target was lost.

The emphasis of this safety investigation report was therefore the actions which were taken (or not taken) before the accident happened.

The environment in which the OOW was operating, required a continuous cycle of monitoring of the situation, an assessment of the events, followed by actions and re-evaluation of the results.

Naturally, the decision-making process requires an assessment of the situation and a decision approach in order for someone to choose a course of action. The assessment of the situation would have actually been triggered when the OOW (or the skipper on board the fishing boat) recognised that there was either a problem, or a change of state requiring intervention.

This first assessment was critical for the decision-making process. Irrelevant of whether or not the collision had actually occurred, the efforts done in trying to understand the circumstances and react to them were taken at a very late stage, with the CPA reducing continuously.

The MSIU did not have any evidence as to why this had happened. However, whilst expertise and workload did not seem to have been an issue, it was hypothesised that the OOW’s expectations, with respect to the actions by the fishing boats, would have had a significant influence on his decision-making process, as much as the perceived risk of the collision and the predicted outcomes.

CONCLUSIONS

1. The compass bearings of the fishing boats remained steady and with no action taken, a close quarter situation was inevitable;
2. The fishing boats under power and in sight of one another were approaching *Minerva Pisces* in a crossing situation, as defined by regulation 15 of the COLREGs;
3. The fishing boats were on *Minerva Pisces*’ port bow and in accordance with regulation 16 of the COLREGs, they were required to give way to *Minerva Pisces*;
4. A risk of collision existed and at a two nautical mile range, it had become apparent that the fishing boats had not taken any collision avoidance action;

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6 ECDIS screen shots provided by the Chinese authorities actually show the vessel and one other target getting closer and eventually overlap.
5. The OOW on *Minerva Pisces* did not sound a warning signal (at least five short and rapid blasts on the whistle) to indicate his doubt and to clarify the fishing boats’ intentions;

6. The OOW did not alter course and / or speed to maintain a 1.5 nautical mile passing distance;

7. The OOW did not take any actions in accordance with regulation 17(a)(iii) and 17(b) of the COLREGs.

8. From the evidence made available to the MSIU, it was neither possible to reconstruct precisely what subsequently happened nor determine the ensuing loss of radar and AIS signal of target ‘C’ captured by the ship’s VDR;

9. The MSIU believes that *Minerva Pisces* was the vessel in very close proximity of the fishing boat just before it was lost;

10. Irrelevant of whether or not the collision has actually occurred, the efforts done by the OOW in trying to understand the circumstances and react to them were taken at a very late stage, with the CPA reducing continuously;

11. It was hypothesised that the OOW’s expectations, with respect to the actions by the fishing boats, would have had a significant influence on his decision-making process, as much as the perceived risk of the collision and the predicted outcomes.

**RECOMMENDATIONS**

Minerva Marine Inc., Greece is recommended to:

01/2017_R1 Circulate this safety investigation report on board all vessels within the fleet and highlight the importance of timely actions, including in crossing situations.
### SHIP PARTICULARS

<table>
<thead>
<tr>
<th>Vessel Name:</th>
<th>Minerva Pisces</th>
<th>Zhe Pu Yu 42234</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flag:</td>
<td>Malta</td>
<td>China</td>
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<tr>
<td>Classification Society:</td>
<td>ABS</td>
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<td>IMO Number:</td>
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<td>Oil Tanker</td>
<td>Trawler</td>
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<td>Registered Owner:</td>
<td>Moss Enterprises Co.</td>
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<td>Managers:</td>
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<tr>
<td>Construction:</td>
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### VOYAGE PARTICULARS

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<th>Port of Departure:</th>
<th>Sitra, Bahrain</th>
<th>Zhoushan, China</th>
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<td>Port of Arrival:</td>
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<tr>
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<td>Cargo Information:</td>
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### MARINE OCCURRENCE INFORMATION

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<td>Very Serious Marine Casualty</td>
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<td>Location of Occurrence:</td>
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<tr>
<td>Place on Board:</td>
<td>Ship/Other</td>
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<tr>
<td>Injuries / Fatalities:</td>
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<td>Damage / Environmental Impact:</td>
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<td>Ship Operation:</td>
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<td>Voyage Segment:</td>
<td>Transit</td>
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<td>External &amp; Internal Environment:</td>
<td>Weather was clear with visibility of 12 nautical miles. Northerly winds Beaufort Force 6. Rough sea with swell of up to 3 m.</td>
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<tr>
<td>Persons on board:</td>
<td>26</td>
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