Swedish Accident Investigation Authority

This document is a translation of the original assessment in Swedish by SHK of the response to the recommendation. In case of discrepancies between this translation and the Swedish original text, the Swedish text shall prevail in the interpretation of the assessment.

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Assessment of the Swedish Armed Forces' response to the recommendations in the report RM 2016:01

On 17 February 2016, the Swedish Accident Investigation Authority (SHK) published the final report RM 2016:01 into an accident that occurred during training in navigation in darkness in which a G-boat from the Swedish Armed Forces collided with a buoy at Klövholmsgrund on 1 October 2014. Seven recommendations were submitted to the Armed Forces in the report (RM 2016:01 R1–R7). The Armed Forces has responded to the recommendations and provided an account of the action that has been taken or is planned.

With regard to recommendations R1–R2 and R5–R7, SHK deem the responses to be satisfactory and the recommendations to have been taken care of.

With regard to recommendation R3, SHK makes the following assessment.

In recommendation R3, the Armed Forces was recommended to take action to ensure that equipment is not used without the risks of integration having been analysed in accordance with the Armed Forces' handbook for system security.

The background to this recommendation appears in Section 2.5 of the final report, the contents of which include the following.

An image intensifier renders the surroundings as a greenish image without depicting other colours. As sector light navigation largely involves navigating in each light's white sector and correcting the course if you end up in the light's red or green sectors or establishing your position by a light that is changing colour, image intensifiers are frankly inappropriate for use when navigating using this method.

The G-boat's own lighting is not adapted for use together with image intensifiers either, which results in the lighting reducing the usability of the image intensifier and also impairs vision outside of the lighthouse-illuminated fairway. Both the interviews and SHK's reference navigation have indicated that the placement of the lanterns impairs vision when they are turned on during the used of head-mounted image intensifiers in darkness from both the driver's seat and the navigator's seat. This limits the vision under already limited visual conditions, something which leads to impaired situational awareness and has an impact on safety during operation.

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The CSSB concerning the Mono 12 states that the equipment is intended for purposes including the operation of land vehicles and watercraft. However, no risk analysis or integration decision in accordance with the Armed Forces' system safety handbook has been conducted with respect to the integration between the Mono 12 and the group boat, each of which have a BoA and CSSB. This has meant that the risk described above have not been identified or taken care of. The text of the Mono 12's CSSB therefore appears misleading as it can give the impression that a risk analysis has been conducted and that no risks associated with the use of the Mono 12 in land vehicles or watercraft have been identified.

It is SHK's opinion that the Armed Forces should review how image intensifiers are used together with other systems and how adaptation of the light environment in which they are used is conducted in order to ensure that risks are minimised.

The response to the recommendation states that the Armed Forces has chosen not to treat night vision goggles (NVG) as an integration product and instead to deal with the use of NVG in the risk analysis. However, the considerations that have been made and the conditions there are for dealing with NVG as an integration product have not been reported.
Given that NVG are regarded as an integration product in other types of vehicle, e.g. aircraft, the Armed Forces' choice appears somewhat surprising. In the light of this, the Armed Forces' response cannot be regarded as satisfactory and the recommendation cannot be deemed to have been taken care of.

With regard to recommendation R4, SHK makes the following assessment.

In Recommendation R4, the Armed Forces was recommended to ensure that the planning of working hours provides good conditions for being able to conduct basic training without the risk of tiredness.

The background to this recommendation appears in Section 2.7, the contents of which include the following.

It is not possible to determine how tired the crew were at the time of the collision. However, it is probable that the crew were at some lower degree of alertness in conjunction with the accident. The combination of the time of day, limited field of vision and relative monotony in the form of the G-boat's regular movements and constant engine noise, may have further contributed to a low degree of alertness and thus have affected the performance of the instructor, navigator and driver. In this case, performance denotes attentiveness, situational awareness and alertness. In addition, the crew's working day, which consisted of both work duties that require concentration and physical training exercises had lasted approximately 15 hours at the time of the accident, which may be regarded as a long shift. Shifts such as this are not optimal from a learning perspective either. It is SHK's understanding that a basic training exercise that is conducted at night must be planned specifically with respect to other work duties in order to ensure that participants are given the best possible conditions for both providing and receiving the training without their degree of alertness being impaired.

In its response to the recommendation, the Armed Forces has stated that the current rules are sufficient, that these are based on scientific evidence and that the crew's mental and physical status is dealt with as a factor in the risk analysis.

It is SHK's opinion that a work schedule with a shift lasting 15–16 hours for students is not appropriate for a basic navigation training exercise. In addition to the task of teaching and monitoring interaction between the navigator and the driver, the instructor also has responsibility for the safety and work on board as commander of the boat. As stated in the report, it can be called into question whether the manner in which the exercise was conducted provided good conditions for taking care of this responsibility.

The Armed Forces has not supplied any details of the scientific evidence to which its response to this recommendation refers. In the light of this, the Armed Forces' response to this recommendation cannot be regarded as satisfactory and the recommendation it therefore deemed not to have been taken care of.

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