## SUMMARY IN ENGLISH

On the 2 April 2017, at about 7 o'clock in the morning, a bus with 58 passengers ran off the E45 just south of Sveg in Härjedalen Municipality, Jämtland County. The bus leaned heavily in the steep slope and after a maneuver to get the bus back on the road it rolled over and skidded about 60 meters on its right side. During this stage, the bus seemingly hit an embedded stone in the outer slope and straightened up slightly in the direction of the road. Three people died, five were critically, seriously or severely injured, nine suffered moderate injuries and 24 minor injuries.

The driver has stated that an uneven road surface displaced the bus towards the ditch on the right side and that the movement could not be counteracted. However, the investigation has not been able to identify any deficiencies in the roadway surface that can explain why the bus ran off the road. Based on the technical investigations of the bus, the assessment has also been made that at the time of the accident there were no technical deficiencies on the vehicle that could have contributed to the accident.

This specific segment of the road, however, is a narrow two lane road with narrow hard shoulders and steep slopes. Due to the incline of the slopes the risk of a bus rolling over when it runs off the road is very high. In spite of the safety standard of the road, the speed limit was 100 km/h. Under such conditions, an instant of inattention may be enough to cause an accident with serious consequences.

The SHK has not been able to establish with absolute certainty the direct cause of the bus running off the road. However, the fatigue analysis shows there is a very high probability that the driver at the time of the accident was affected by fatigue at a level that leads to a high risk of falling asleep. Even though the evidence do not allow for the conclusion that the driver actually fell asleep, it is the assessment of SHK that the driver, at least momentarily, had a severely reduced vigilance. In addition, the fact that the driver did not eat or drink during the trip has probably further reduced his vigilance. The reduced vigilance is according to SHK also a probable explanation for the bus running off the road. The low angle with which the bus ran off the road further strengthens this conclusion. Such a low angle is namely a characteristic for accidents that have been caused by reduced driver consciousness.

When the bus had run off the road, considering the speed of the vehicle, an accident was difficult to avoid and the possibilities for applying countermeasures were very limited. The maneuver that was performed in an effort to steer the bus back up on the road, led to the loss of the remaining lateral stability and to the bus rolling over.

The investigation has in addition shown that Bergkvarabuss AB (the bus company) at the time of the accident did not in a sufficiently in-depth and clear way handle the risks involving fatigue and working at night. The drivers were presumed to be able to carry out their tasks safely as long as the planning complied with current legislation within the areas of working time and driving times and rest periods. That these regulations are complied with is however, according to SHK, not a guarantee for traffic safety. SHK concludes inter alia that the specific risks of working night time have not been taken into due consideration in the elaboration of the regulations of driving times and rest periods. In addition, the investigation clearly shows that the planning of the trip was done on the basis of the maximum allowance in the regulations for working time and driving time and rest periods.

The fact that the bus company did not regularly perform a more in-depth risk analysis of an assignment, besides checking that the maximum allowance in the regulations for working time and driving time and rest periods was not exceeded, is therefore, referring to what has been mentioned above, to be considered as an underlying cause of the accident. This may be explained by the fact that within the road traffic sector, as opposed to within other transport sectors, there is no requirement of a safety management system that deals with safety issues in relations to not only employees but also to passengers and other road users.

Several factors have contributed to exacerbating the consequences of the accident. One important factor is that a large portion of the passengers, 72 %, did not use seat belts at the time of the accident. A contributing factor to that was that the actions that were taken to make sure that everyone was using a seat belt were not sufficient.

The three passengers that lost their lives did not use seat belts and they were all thrown out of the bus. The fatal injuries most likely arose when they were caught between the bus and the ground. Additionally two other passengers were thrown out of the bus, but they survived. One of these passengers survived due to the fact that there was a certain survival space in between the bus and the ground. Only one of the belted passengers was severely injured. To conclude, the investigation shows that there is a clear causal connection between the use of seat belts and the sustained injuries. The investigation thus underlines the importance of using seat belts in buses.

Another factor that, according to SHK, has contributed to exacerbating the consequences is the speed limit, which must be considered to be high in relation to the safety standard of the road.

The efforts of the rescue services, emergency medical responders and the police were comprehensive and the conditions on the accident site were complex. Units from surrounding regions, counties and municipalities were involved in the efforts on the site. SHK can draw the conclusion that the medical efforts on the accident site and during transport to hospital contributed to the survival of three passengers. In addition SHK can conclude that the cooperation and coordination of efforts on the site worked mainly well, despite the large number of units that were involved. However, SHK can conclude that there was a certain delay in the process of assigning emergency medical responders to the accident and that there is a potential for improvement in this aspect. Furthermore there were some issues with the communication system used on the site (Rakel).

## Safety Recommendations

**The Swedish Government is recommended to:**

- Within the framework of the ongoing review of the European Union's regulations for driving time and rest periods, especially work for that the specific risks of working at night are taken into consideration when elaborating the new regulations. *(RO 2018:01 R1)*

- Investigate the prerequisites for introducing a requirement for operators within the road traffic sector to have a safety management system (SMS) to handle the risks in road operations. *(RO 2018:01 R2)*

- Review the authorisation in the 13 ch. 7 § Traffic Ordinance (1998:1276), which authorises the Swedish Transport Agency to adopt regulations on speed limits and guidelines for how different speed limits should be used, and address the issue if there is a need to extend or clarify the authorisation, or if the Swedish Transport Agency should be tasked with publishing general guidelines on the subject. *(RO 2018:01 R3)*

- Investigate the prerequisites for introducing a requirement of seat belt reminders or other equivalent technical solutions in buses. *(RO 2018:01 R4)*

- Investigate the prerequisites for introducing a requirement of side impact airbags or curtains in buses. *(RO 2018:01 R5)*

- In an appropriate manner ensure that it is clarified what is implied by the requirement in the 4 ch. 10 c § Traffic Ordinance that the driver, other on-board personal, guides and group leaders shall take suitable actions so that persons under the age of 15 years use seat belts or other protective devices. *(RO 2018:01 R6)*

**The Region Jämtland Härjedalen is recommended to:**

- In cooperation with SOS Alarm investigate the possibility of developing general strategies, or to develop current instructions, for a more standardized and faster alerting of the emergency medical responders with the future aim to decrease the time it takes to get responders on site in the event of a large-scale accident. *(RO 2018:01 R7)*