

## 4 CONCLUSIONS

The conclusions include the causes of the occurrence. A cause means the various factors in the background of the incident and the direct and indirect circumstances affecting it.

1. Two shunting foremen were working in the shunting unit. One of them had little work experience.

**Conclusion:** *The division of responsibility in accordance with the rail traffic safety rules is clear but overall responsibility had not been defined clearly enough.*

2. Basic structure of rolling stock training is defined in directive 2007/59/EY, but training can otherwise be defined to meet the needs of the railway operator.

**Conclusion:** *Training at KRAO should focus on the rolling stock that will actually be used.*

3. Work guidance forms a major part of the training of shunting foremen. Work guidance mainly occurs during production. The special expertise of work guidance instructors can be focused on various sub-areas. A single trainee can have several work guidance instructors; in this case, they had nine. During work guidance, there is not always time to go through feedback by the end of a shift.

**Conclusion:** *Work guidance can be insufficient due to lack of time, and there is no guarantee that all of the issues are covered when there are several work guidance instructors.*

4. Documentation of vocational skills demonstrations is restricted to pass/fail, but says nothing about the employee's readiness to work independently.

**Conclusion:** *A written document should be drawn up on the vocational skills demonstration, evaluating the skills and training of the employee in various sub-areas.*

5. Training at the educational institute does not include the possibility to practice the use of radio-controlled equipment.

**Conclusion:** *Practical training on a simulator would improve the preparedness of trainees for work.*

6. After the cancellation of the departure of the timber train on the afternoon of 21 September, the shunting unit's destination track for the wagons from Soramäki was changed, but this was not informed to the shunting unit.

**Conclusion:** *The failure to inform the shunting foremen about the change of destination track initiated the events that led to the accident.*

7. There are no written instructions on making track changes, and no verifications of such procedures.

**Conclusion:** *The lack of an operational model and responsible parties for making and informing about track changes poses a serious safety risk on all railway yards.*

8. The primary communication device is a RAILI or VIRVE phone, but a GSM telephone is commonly used as a communication device during shunting.

**Conclusion:** *Calls made using the primary communication device are recorded. During group calls, the other members of the group can hear the conversations.*

9. During shunting work, routes are created by centralised traffic control, regardless of whether or not the track is free, and the Kouvola railway yard has no clearly visible track numbers at the ends of the tracks.

**Conclusion:** *Identifying the destination track is difficult and it may come as a surprise to the shunting unit that the track is occupied.*

10. Wagons in Russian interconnecting traffic have only limited safe platforms/footboards for directing shunting work.

**Conclusion:** *The structure of the wagons forces employees to position themselves in places where visibility can be limited.*

11. During shunting, the shunting unit was driven by a shunting foreman in the locomotive's cab. The shunting foreman in the wagon did not have a radio control unit with him, but directed the shunting movements via a voice connection.

**Conclusion:** *If the shunting foreman had had a radio control unit with him, he could have begun emergency braking as soon as he saw the danger.*

12. The shunting movement was performed at too high a speed.

**Conclusion:** *After the danger had been detected, there was no time to react and the speed could not be reduced before the collision.*

13. The radio control system of the locomotives responds slowly to the driver's commands. There is no separate *emergency stop* button on the radio control unit.

**Conclusion:** *The delay in the radio control system causes dangerous practices and delays the initiation of emergency braking in critical situations.*

14. Near misses and minor collisions, which are not reported, occur in the case of radio-controlled locomotives. Users do not dare to report such incidents, due to fear of sanctions.

**Conclusion:** *There is no way of learning from near misses and collisions involving radio-controlled locomotives, which hampers the development of the safety of radio-controlled work.*

15. The implementation of safety management systems in the railway sector remains inadequate. In practice, implementation of the safety management system is not supervised by the authorities, and self-supervision is limited.

**Conclusion:** *Lack of supervision of the safety management system's implementation makes it possible to act in practice in a way contrary to what is defined in the safety management system.*

16. Emergency service routes have not been numbered in the Kouvola railway yard and are not logged in the system of the Kuopio Emergency Response Centre. There were shortcomings in trainee induction regarding the internal emergency plan.

**Conclusion:** *The efficient use of emergency service routes would accelerate the start of rescue operations.*

17. Use of a local company's chemical handling equipment and expertise assisted the recovery of the hydrogen peroxide left in the tank. Contact with the company was achieved through

the local knowledge of a rescue department officer. The information was not in the emergency plans.

***Conclusion:*** *Chemicals companies have expertise and equipment that can be used in rescue operations.*