

4 CONCLUSIONS

4.1 Statements

1. Track capacity had been applied and granted as a train on the Kemi–Kontiomäki section.
2. It was planned that the change of drivers would occur on the *Nokela* track 208, because it was located close to the drivers' lounge and the train would stand for two hours; due to the long length of the train, this could not be done at the Oulu passenger station.
3. Beyond track 185, the switches at the railway yard are operated manually. The switches do not have position control or any indication that tracks are occupied.
4. The traffic controller ordered the switchman to protect the route to track 208.
5. The switchman decided to protect the route via track 118.
6. Because the switchman could already see the positions of the switches at the southern end of track 118 while at the front of the goods yard office, the switchman only needed to check the switches in the southward direction towards *Nokela* and track 208.
7. The switchman drove to the turnout area in *Lyötty* by car and checked the position of switch V101 from the car window, and then immediately drove back to the goods yard office. On the way, the switchman stopped the car and checked the position of switches V111 and V113 while standing next to the car, and then continued driving. At switches V122–V123, the switchman slowed the car and looked south to check that track 118 was empty.
8. The switchman did not notice the wagons on track 118.
9. The tracks were not visibly numbered.
10. When the shift changed, the switchman received a railway yard situation report from the previous shift's railway yard worker. The yard work supervisor also had information about the occupied status of tracks at the freight yard.
11. No verification procedures to prevent human error were set for route protection.
12. The speed of the train at the moment of arrival at the railway yard was 26 km/h. The railway yard sloped southwards, due to which the engine driver allowed the train to coast without activating the drive mode. The engine driver was preparing for the driver change that would soon take place, and the driver's attention may have been on things other than driving the train.
13. The engine driver failed to observe the wagons standing on the track in time, and the train collided with the empty wagons at 16:49 at a speed of 33 km/h.
14. The engine driver did not brake or take cover. The engine driver was injured on the right side of the body.
15. When arriving from the north, the railway yard curves to the left. At the time of the accident, there were trees and bushes on the inner side of the curve.
16. The bolsters of the wagons on track 117 on the outer side of the curve formed a uniform surface of the same colour as the wagons on track 118, and as a result, the engine driver or the switchman may not have been able to distinguish them from each other at a distance.

17. The neighbouring track 119 was empty.
18. During the collision, two of the wagons reared up and broke the locomotive and the electric railway portal. The flat wagons with fixed sides that reared up absorbed energy from the collision.
19. According to instructions, engine drivers must take their own share of responsibility for traffic safety while driving a train. However, when moving along a protected route, the instructions do not instruct engine drivers to observe matters as closely as in shunting operations, or assign them responsibility to do so.
20. During shunting operations, in all situations engine drivers have responsibility for driving carefully, controlling their speed and paying attention to the sightline in the direction of travel, so that they can stop the unit before meeting any obstacles.

4.2 Causes of the occurrence

The switches at the Oulu railway yard are manually operated, the switches do not have technically implemented position control and there is no indication of occupied tracks on the tracks. Regardless of this, the route was protected for a train.

The switchman made a mistake when ensuring that the track was not occupied. Neither instructions nor training had been provided on the procedure used to protect a route. The procedure used by the switchman for route protection is vulnerable to errors. The switchman alone made the decision to protect the route, and this was not verified in any way.

One of the underlying causes of the accident was the failure of the risk assessments conducted at the railway yard to identify risks related to the working methods and practices used. Overlapping instructions that are not fully consistent were also viewed as a problem. Some of the instructions are drawn up for common use, but some of their content cannot be followed everywhere. The instructions are not consistent in all parts, and some of the actors do not know which instructions should be applied to which function.

The engine driver's attention prior to the collision had been on things other than driving the train, which contributed to the occurrence of the accident. It is likely that greater attentiveness by the engine driver would have either prevented the accident, or at least considerably reduced the damage caused.