

EXTENDED SUMMARY IN ENGLISH

Pölsebo is a part of Göteborg station on a railway line westward from Göteborg C, which serves a number of harbours on Hisingen island. This "Harbour line" is run under fully centralized traffic control (Swedish "system H") from the traffic control centre at Göteborg C. At 15.07 hrs on 5 September 2015, a machine operator (A) was hit by a passing train (79012, a light engine) as he walked into the danger zone of the track branching off towards Skandia Harbour (see fig. 6 and 7).

On the day of the accident, a team of track technicians had been performing exchange of sleepers on a stretch of track from Pölsebo towards the Skandia Harbour. The work was carried out under a track possession with an overseer in charge (tsmS). The exchange of sleepers was carried out using an excavator, equipped with suitable machinery for that task and also for stabilising the track bed afterwards. Machine operator M was in charge of the excavator and the other persons performed preparatory and finishing work with the sleepers, such as removing and attaching the fastenings etc. The work area concerned was in the western end of the station, partly under a bridge that carries a major road with heavy traffic.

The track possession had been given the time between 10.40 and 15.30, but a request had been made to the overseer, regarding the possibility of the track being released earlier, as a shunting movement needed to be made from the Skandia switchyard to the Skarvik harbour. The request was made by the shunter himself to the overseer, after he had found out from the traffic controller that Pölsebo was closed to him due to the track possession.

When the team decided that there was not time enough left of the track possession to continue with the exchanging of sleepers, the excavator was removed, the track inspected and then the overseer contacted the traffic controller and released the track at about 15.00. He informed the other workers that the track was released, in the case of M, he talked to him over the mobile phone. The traffic controller then set the route for the shunting movement that was requested earlier. The overseer tsmS and the two workers A and B continued with some finishing work, such as collecting equipment, cleaning up etc, as well as preparing a number of new sleepers, that were due to be shifted in the next day. tsmS asked M, who had put away the excavator in a suitable parking space, to come and join them in these tasks, so that they would be finished quicker. During this time the shunting movement was carried out (a light T44 engine going from Skandia to Skarvik using track 3 in Pölsebo).

At about 15.00, train 79012, a light engine of the RC4 class, left Sävenäs depot for Skandia Harbour. It ran before schedule, but in the "system H" environment that is fully permissible. The maximum speed on this line is 40 km/h and the reading of the ATC system of 79012 shows that the train travelled within this speed limit all the way. As the track possession had ended, the train had clear signals through Pölsebo. After passing through the station area on track 1, the train was led towards Skandia harbour. As the train approached the stretch of track that just had been worked on, it hit M, as he was walking inside the danger zone. The driver did not see M until very late and immediately applied full brake and blowed the horn, but there was no time to stop the train. The driver had the impression that M suddenly appeared in the front window view and then disappeared.

Nobody has been able to give an account of exactly what happened in the moment of impact, but testimonies mention seeing M being "tumbled" under the side of the engine before coming to rest beside the track. He was severely injured.

According to tsmS, M was walking from the excavator, just being parked, to join the others in the finishing work. It was just a short walk and there is no obvious reason to choose a path that runs close to the track on which 79012 was approaching, nor has any definite explanation been given as for why he would choose to walk inside the danger zone. Suggestions have been made that M wanted to inspect the stretch of track that would be worked on the next day. (See fig. 9 and 10).

The driver of 79012 remarked that he saw persons in the vicinity of the track, as the train approached the former working site, but he had the impression that they had seen him and therefore was out of danger.

There is a clear line of sight from the vicinity of the point of impact in the direction from which the train approached; the train would have been detectable at a distance at least equivalent to 15 seconds of travel at the permissible speed. The possibility of hearing the light engine, even at a short distance, is however small, as that type of engine is fairly silent and the noise level at the site is high, due to the heavy traffic on the road bridge above. It has not been possible to determine the relative movements of the train and the technician who was hit, immediately prior to the accident; i.e. how the technician moved as he walked from the excavator to the place where he was hit and at what point in time he actually entered the danger zone and where the train was at that particular moment. The view from the ground towards the train is unrestricted, while the view from inside the drivers' cabin is partly limited by the design of the windows.

For any activity that is to be carried out in the track area, a risk assessment must be carried out. From the result of the risk assessment, the type of protection for the personnel involved is chosen. The highest degree of protection is the track possession, when the traffic is closed over the part of track involved. In this case, a track possession was mandatory for the work being carried out, as the track was made unusable. However, after the track had been restored, inspected and released, work of another nature was being performed, but no new risk assessment was carried out.

The rules that regulate protection of activities and personnel inside the track area rely heavily on the interpretation of the term "track area". During the investigation it has become clear, that the rules allow for an interpretation that equals the "track area" to the actual danger zone, which is inside 2,2 m distance from the nearest rail ("safety zone" in swedish terminology). Following this, risk assessments are not always carried out for activities that are planned to take place outside the danger zone (= the track area), even if they take place in the vicinity of one or several tracks; thus the risk of someone unintentionally entering the danger zone during the activities is not assessed in all cases.

The exact reason why M came to be in a place where he could be hit by a passing train, that is, walking inside the danger zone, has not been possible to establish. What is known is that he was asked to join the rest of the team, to assist in the finishing work that was being carried out. One probable reason for M to approach the track during the walk, would be to inspect the track to gather information that might be of interest for the work to be carried out the next day.

Significant factors, that may have had impact on the events, are the noise level on the working site and the fact that the safety situation was altered: from the protection of a track possession to a situation with a track that was open to traffic. The track possession was given over

somewhat earlier than originally planned and although he was informed by the tsmS about the situation, M may have mixed up the two situations.

An underlying factor that contributed to the situation, was that no particular safety measures were taken to protect the finishing work, with reference to the activities in question not being regarded as activities inside the danger zone/ track area. An underlying factor on the systemic level is that it is not self-evident from the rules and instructions that a risk assessment should be carried out for that type of activity. There is no systematic verification of how rules in this regard are interpreted and applied in actual practice.

Safety recommendations

The Swedish Transport Agency, possibly in conjunction with the Swedish Work Environment Authority, is recommended to ascertain, that the Infrastructure Managers perform a review of their Safety Management Systems, in order to assure, that these systems reach a higher level of efficiency pertaining to their influence related to overall safety in connection with work on the tracks. The review should address particularly the following items:

- The design of the relevant rules, especially with an aim to make them clear and easy to understand and use, to the persons who are expected to use them.
- The efficiency of the system of education of track workers; all railroad workers should have the same understanding of how the rules should be used and why they exist.
- The system of following-up of rule adherence in actual practice.
- The system of feedback regarding how the rules actually relate to the real environment in which they should be applied. A reliable procedure to collect information about deviations, deficiencies and suggestions for improvements should exist, which includes personnel in all levels of contracting (contractors, sub-contractors etc).
- The greater perspective that needs to exist in all planning of safety and security of any work in the track environment. E.g. how risks related to an activity are assessed, having in mind that preparatory and finishing work must be included.
- The on-site responsibility for safety and security in connection with activities in the track environment, should be given to a designated person/function in the working team, and it should be clearly pronounced to include all activities carried out in the connection with work in an area with railroad tracks, i.e. what goes on outside the track area proper should also be considered from a safety perspective.

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