ORGANISATION INTERGOUVERNEMENTALE POUR LES TRANSPORTS INTERNATIONAUX FERROVIAIRES

ZWISCHENSTAATLICHE ORGANISATION FÜR DEN INTERNATIONALEN EISENBAHNVERKEHR

INTERGOVERNMENTAL ORGANISATION FOR INTERNATIONAL CARRIAGE BY RAIL

OTIF/RID/CE/GTDD/2015/7

26 May 2015

(English only)

RID: **3rd Session of the RID Committee of Experts' working group on derailment detection**
(Berne, 27 and 28 May 2015)

Subject: **Finland's opinion on the derailment detection device**

Summary

1. Finland does not oppose the detection device itself or its use, but use of the device should not be mandatory, but rather voluntary. In the long term, installing of derailment detection devices in wagons transporting dangerous goods (TDG), as specified in the proposal, might be of limited economic value viewed from the perspective of OTIF member states and the EU. A careful risk analysis should be drafted when weighing the reasonability for implementing the device. The risk analysis should take into account transportation circumstances and volumes as well as the geographical conditions on the transport route. The type of rolling stock used for transportation should also be taken into consideration. Some OTIF/EU member states widely use rolling stock registered to third-party countries, the structural regulations of which deviate from UIC leaflets, technical specifications complying with the Interoperability Directive, and EN standards.

2. Viewed from the perspective of safety, a detection device that automatically stops the train is clearly a better option than the derailment identification device, since the engine of a freight train is not able to sense derailments occurring behind the first railcars of the train. A device that merely identifies the derailment and signals the driver involves a delay comprising the driver's response and decision-making times, and this delay may be several seconds. Due to this delay, the train may travel a long distance, depending on speed, before braking begins.

3. Finland understands the great risks related to transports between Europe's large industrial hubs, using a heavily trafficked railway network often running through large population clusters. In terms of area, the Nordic countries are medium-sized countries: Finland is somewhat smaller than Germany, but larger than Great Britain or Italy. Finland is different from similarly sized countries in Central Europe in terms of population density, which is around one tenth of the population density seen in Central and Western Europe. Protecting every single life is important, but risk preparations and risk management measures are different in sparsely populated countries than they are in densely populated ones.

3. Finland finds it very curious that, while the actors' responsibility for safety management is stressed and attempts are made to moderate the detailed regulation of the rail system, a device that only marginally improves safety should be made mandatory without taking local circumstances into account. The derailment identification device is, without a doubt, a useful device in certain operating environments, but the regional characteristics of countries such as Finland to a great extent reduce the device's benefits in proportion to its costs. For this reason, the decision on the implementation of the device should be left to the actors, based on their risk assessments. If, ultimately, use of the device is made mandatory, the obligation should only apply to new rolling stock, and an adequate transition period should be guaranteed for the use of older rolling stock.

Finland's perspective

4. Even if the identification device is made mandatory in the RID, the obligation will only inconvenience national operators and apply to a few goods wagons in Finland. Some 85 per cent of the tank wagons transporting dangerous goods in Finland are registered to third-party countries, which are not subject to RID regulations. The situation is only heightened with regard to the substances specified in the proposal, since 93 per cent of these transports are driven as direct block trains to customer's sidings using rolling stock registered to third-party countries. The remaining seven per cent are transported in mixed freight trains via marshalling yards using domestic rolling stock. Derailments – the consequences of which the device is designed to mitigate – have traditionally been very rare in Finland. In hindsight, if the derailment detection device had been implemented in Finland ten years ago to the proposed extent, the device would not have mitigated the consequences of a single accident. Estimated on the basis of accident and transport statistics from 2005–2014, the expected frequency of accidents related to domestic tank wagons transporting the substances specified in the proposal was $4,1 * 10^{-11}$, i.e. at Finland's level of freight flows, a domestic railcar transporting these substances will be derailed definitely once every 480 years. In all likelihood, derailment will occur at slow speed in connection with shunting activity, and will not result in any major damage.

5. In the spring of 2015, fewer than a hundred tank wagons in domestic traffic were capable of transporting the substances specified in the proposal. These tank wagons represent less than one per cent of all wagons (image). The entire share of TDG wagons only amounts to five per cent of domestic goods wagons. However, several thousand goods wagons registered to third-party countries – a major part of which are TDG tank wagons – operate on the Finnish railway network every day.

Image, goods wagons in Finland, 2015

6. Since mixed freight trains operating in Finland may comprise various types of TDG wagons as well as other freight wagons, it would be purely coincidental in cases of derailment whether or not the derailed wagons had a derailment detection device. In Finland, the obligation of having a derailment detection device in wagons allocated to transporting the goods specified in the proposal would reduce a previously infinitesimal risk by a method whose efficiency is doubtful in spite of the costs that are not too high.

7. Even though the device would only have to be installed in fewer than a hundred railcars in Finland, device implementation would, in addition to moderate low procurement and installation costs, cause other expenses to railway undertakings through risk assessments, alterations to operating procedures, staff training, and possible changes to authorizations for placing in service.

8. It should also be noted that railway regulation and the related costs are already imposing pressure on actors to shift transports from the rail network to the road network. The marginal safety improvement gained through the implementation of the derailment detection device would further increase the costs pertaining to rail transports. An increased rail transport cost level could increase the pressure to transfer transports to the road network, which features a significantly lower level of safety. This should be considered especially if detection device will be wanted to install to all freight wagons. The more design types of wagons the more € 10 000 costs of carrying out "suitability" checks in accordance with information notified by the UK (see document OTIF/RID/CE/GTDD/2015/3).

9. The majority of derailments are caused by the failure of a track or turnout under the weight of the rolling stock. Factors such as the poor condition of the rolling stock – e.g. worn-down wheel sets or rotational stiffness of the bogie – may also contribute to these failures. Another common reason for derailment is human error. In our opinion, more efficient maintenance of the rolling stock and infrastructure as well as enhanced staff training will reduce the number of derailments, which can be considered to be symptoms of underlying serious defects or deficiencies requiring rectification. Greater attention should possibly also be paid by the authorities to the plans concerning railway operations and traffic control included in the safety management system when issuing safety certificates and licences.

9. In Finland, derailment has not been considered to be a problem in the last few years, since Finland has been able to reduce the annual number of derailments to a few individual cases by developing operating procedures and maintenance. This has been greatly aided by the implementation of the safety management system. In our experience, a more effective method for mitigating the consequences of derailments than the detection device is to reduce the number of derailments by developing the maintenance of the track and rolling stock as well as the expertise required to do this. With regard to rolling stock from third-party countries, enhanced border inspections would also yield improvements.

Winter testing performed in Sweden

10. According to the proposal, the operation of the identification device in Nordic winter conditions was assessed in 2009 in tests organised by the device manufacturer in Sweden. No false alarms occurred in the tests, which were conducted between January and April. Test temperature conditions and variations can be viewed in the test presentation, but factors such as snow and ice conditions or moisture variations during the tests are not included in the presentation. The amount of snow and ice accumulating on railcars varies substantially between winters. When the freezing of the rolling stock was studied in the late 1990s, it was found that as much as ten tonnes of snow and ice could be accumulated on the structures of railcars travelling between Helsinki and Oulu (600 km) during "real winters".

11. Operating tests performed during a short period are not necessarily enough for assessing winter-time operation, unless variations in environmental conditions have been considered in sufficient detail. These factors may have a great impact on the behaviour of a wagon's suspension. Moreover, the crystal structure of snow changes in accordance with temperature variations, necessitating an extensive analysis of the behaviour of the bogie structure in snowy and icy conditions. At the beginning of the century, the effect of temperature on the creation of wheel flats was studied in Finland. The parameters used were wind, temperature, moisture and rain (snowing). During the research period, extending from January to April, no statistically significant causes for the correlation between temperature conditions and wheel flats could be identified in spite of the sample size of hundreds of railcars.

12. The rolling stock used in Finland and Sweden is not necessarily comparable due to the different track gauges and potentially different bogie structures. According to the winter test presentation, the devices were installed in LKAB-owned wagons without first determining the types of wagons. LKAB is a mining company operating out of Kiruna; LKAB rolling stock is primarily used for transporting ore concentrate to ports on the shores of either the Atlantic Ocean or the Baltic Sea. The routes were well selected as such, since they provided experiences of varying weather conditions between the tundra and ocean climate. The type of wagon used would have been an important piece of information to know. Heavy Y25 bogies suspended with spiral springs are usually a good option for ore concentrate wagons due to their high load-bearing capacity. On the other hand, a lower mass per axle is sufficient for tank wagons, and this would seem to favour the use of a more inexpensive G-type bogie suspended with leaf springs. The body structure of a bogie suspended with leaf springs is more enclosed, thus preventing the shedding of ice and snow accumulating in the brake triangle, for instance. Therefore, we cannot eliminate the risk of an empty freight car wagon equipped with bogies frozen all the way to their springs triggering a false alarm through "jumping" on the rail. False alarms as such cannot be considered to diminish safety or increase the risk of derailment. The train performs an emergency braking procedure in Automatic Train Protection system error situations (ATP errors) and when the train breaks into parts. The problem is that this kind of empty wagons may frequently trigger false alarms and stop the train, disrupting the entire rail system, which is based on a single-track solution in Finland.

Possible unanalysed risks

13. The implementation of the detection device in rolling stock designed for transporting the substances specified in the proposal is, of course, a step in the right direction, and will improve safety on the densely-populated routes via which large amounts of these substances are transported. However, this is an active safety component, which means that the problem of derailment remains unresolved; in the worst-case scenario, the engine driver may neutralise the potential benefits of the device by changing his or her driving behaviour – a pattern identified in road traffic in connection with the wider adoption of ABS brakes and automatic stability systems on.
