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11 January 2017



Mr Andrew Hall
Deputy Chief Inspector of Rail Accidents
Cullen House
Berkshire Copse Rd
Aldershot
Hampshire GU11 2HP

Dear Andrew,

RAIB Report: Class investigation into rail breaks on the East Coast Main Line

I write to provide an update¹ on the action taken in respect of recommendation 3 addressed to ORR in the above report, published on 13 November 2014. The annex to this letter provides details of the action taken regarding this recommendation, the status of which is now **'Implemented by alternative means'**. We do not propose to take any further action in respect of this recommendation, unless we become aware that any of the information provided becomes inaccurate, in which case I will write to you again.

We will publish this response on the ORR website on 12 January 2017.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Oliver Stewart', written in a cursive style.

Oliver Stewart

¹ In accordance with Regulation 12(2)(b) of the Railways (Accident Investigation and Reporting) Regulations 2005

Recommendation 3

This recommendation is intended to reduce the risk of rail breaks due to the deterioration of rail pads.

Network Rail should establish a process throughout its infrastructure for inspecting parts of rail pads beneath rails (on a sample basis) and, if necessary, replacing rail pads outside rail replacement projects in areas where this is justified by benefits, including benefits from reducing rail break risk

ORR decision

1. Network Rail have undertaken work to understand the root cause of broken rails, with particular focus on rail foot failures. They identified a number of common factors in rail foot initiated breaks relating to: rail age; rail usage; and asset condition in the vicinity of the break that increases the dynamic impact forces on the rail (poor support, non-actionable track geometry faults, pad age/type). Network Rail concluded that whilst pad condition was a factor at many of the break sites, there were other more significant factors that contributed to the break, and are unclear as to the strength of causal link between pad condition and rail break. This uncertainty combined with the labour intensive/time heavy rail pad inspection arrangements leads Network Rail to conclude that better understanding of rail pad condition would not deliver the desired outcome and instead take a more practical and wider approach to tackling the rail break risk.

2. Network Rail describes action it has and is taking at locations where the risk of rail foot failure is higher to tackle these factors by re-railing, re-padding, and tackling the underlying associated asset condition issues. In addition they are also gathering and assessing information on pad condition where rail is replaced due to wear or defects.

3. Network Rail is taking action that satisfies the intent of recommendation 3, in that it reduces the risk of rail breaks initiating from the rail foot, which is one of the purposes of the rail pad. The proposed sampling of rail pad condition will improve Network Rail's knowledge of rail pad condition on the network, and together with the output of Recommendation 4, provide them with the opportunity to review and refine their approach to improve the targeting of their action.

4. After reviewing the information provided ORR has concluded that, in accordance with the Railways (Accident Investigation and Reporting) Regulations 2005, Network Rail has:

- taken the recommendation into consideration; and
- has taken action to implement it.

Status: Implemented by alternative means.

Previously reported to RAIB

5. ORR met with Network Rail on 6 October 2015 to review progress and agree further information required to demonstrate that Network Rail has addressed this recommendation. Network Rail agreed to provide a closure statement by 23 October 2015 for ORR to review; this will cover Network Rail's position concerning the risk mitigation against rail defects provided by the rail pad, the reasonable practicability of assessing rail pad condition in situ, and their regime for identifying and replacing rail pads.

Update

6. Following a timescale extension to 20 July 2016, Network Rail provided the following closure statement on 16 August 2016.



RAIB East Coast
Main Line Rec 3 closure

7. Network Rail state in summary:

The considered response of the Chief Track & Lineside Engineer concluded that specific sampling and visual inspection to assess rail pad condition was not a practicable or economic way to reduce the risk of broken rails.

This was better addressed by targeted re-railing at higher risk locations and replacement of older 5.5mm and 7mm pads where rails have carried higher cumulative tonnages. Accordingly, a programme of renewal, re-railing and re-padding has been implemented, particularly focussed on LNE Route as LNE has the largest proportion of broken rails nationally. (See Appendix C for a summary of LNE Route Control Period 5 (CP5) re-railing and re-padding volumes.)

Network Rail continues to focus on removing the underlying causes of rail breaks by considering a wider range of conditions that increase the risk of failures at specific locations.

Whilst the additional sampling of rail pads may improve understanding of localised asset condition, it is believed that this alone adds little over and above Network Rail's current system of condition monitoring.

The conclusion of the work has resulted in the need to better to focus on the wider range of causes of rail breaks, rather than pad condition alone. This type of approach, such as a focus on dip angles at joints, has shown considerable reward in the downward trend in broken rails in the past.

Therefore, the intent of this recommendation has been addressed and can therefore be CLOSED.'

Previously reported to RAIB

Recommendation 3

This recommendation is intended to reduce the risk of rail breaks due to the deterioration of rail pads.

Network Rail should establish a process throughout its infrastructure for inspecting parts of rail pads beneath rails (on a sample basis) and, if necessary, replacing rail pads outside rail replacement projects in areas where this is justified by benefits, including benefits from reducing rail break risk (paragraph 121b).

Steps taken or being taken to address the recommendation

1. On 19 February 2015, Network Rail provided the following information:

A review will be undertaken around the network to look for good practice which can be shared.

The review will look at how the decision is made currently on where to undertake an inspection of pads (manually lift rail and confirm pad condition) to assess which sites should be included in a pad replacement programme.

Network Rail will then consider the benefit of providing guidance on how to identify where to efficiently target this manual inspection of pads. This guidance could be based on indicators such as:

- Poor geometry;*
- Tight radius;*
- 5mm pads originally installed;*
- High cant deficiency or excess cant.*
- Loss of toe load/loose fastenings*

There is no current train borne inspection process which can directly assess the condition of pads. A review will be undertaken to determine if any measurements currently taken can provide an indication of pad deterioration.

The process documents (standards or means of control) will be updated following the review and implemented.

Timescale: 30 September 2015

2. On 10 August, Network Rail provided the following additional information:

Identification of worn pads is generally difficult without removing a number of samples so that the centre of the pad can be inspected; normal practice is to sample a number of pads to allow their condition to be assessed. The edges of the pad that are visible with the rail installed can often appear to be in good condition when the centre of the pad is severely degraded.

Some development work is currently being undertaken to see if rail roll, which is measured as part of the train based laser profile measuring system, can be used to provide an indication of pad and / or rail fastening conditions. The theory is based on the condition of the pad and the toe load of the fastening leading to an variation in rail roll. Further work is required to understand the variations in vehicle lateral loading due to vehicle type, curvature and cant

deficiency which will also cause significant variations in the rail roll expected at a specific location.

Worn pads are identified normally through sampling and visual inspection with priority given to thinner 5 and 7.5mm pads with the highest tonnages since they were last replaced. Older worn 10mm pads would be expected to be identified in the same way although the expected service lives of the 10mm pads are anticipated to be much greater reducing the need for regular re-padding. This work has already started with plans put in Ellipse based on existing pad condition, tonnage carried and at site with known track circuit failure sites where pads have been identified to be an issue.

3. ORR wrote to Network Rail requesting the outcome of the review referred to in the February 2015 statement, as it is not clear how their August 2015 statement refers to the review or its outcomes. The update of 10 August 2015 also infers that some inspection activity has already been carried out. ORR has asked Network Rail to clarify the scope and geographical extent of that planned inspection activity; and whether this is in response to new process requirements, or part of BAU as required by current NR/L2/TRK/001.

4. ORR met with Network Rail on 6 October 2015 to review progress and agree further information required to demonstrate that Network Rail has addressed this recommendation. Network Rail agreed to provide a closure statement by 23 October for ORR to review; this will cover Network Rail's position concerning the risk mitigation against rail defects provided by the rail pad, the reasonable practicability of assessing rail pad condition in situ, and their regime for identifying and replacing rail pads.

ORR decision

5. ORR, in reviewing the information received from Network Rail has concluded that, in accordance with the Railways (Accident Investigation and Reporting) Regulations 2005, it has:

- taken the recommendation into consideration; and
- is taking action to implement it.

Status: Implementation on going. ORR will advise RAIB when further information is available regarding actions being taken to address this recommendation