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Mr Andrew Hall
Deputy Chief Inspector of Rail Accidents
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Dear Andrew,

RAIB Report: Derailment at Princes Street Gardens, Edinburgh

I write to provide an update¹ on the action taken in respect of recommendation 1 addressed to ORR in the above report, published on 30 August 2012.

The annex to this letter provides details of the action taken. The status of this recommendation is now '**Implemented**'. 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 23 March 2016.

Yours sincerely,

Andrew Eyles

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

Recommendation 1

The purpose of Recommendation 1 is to achieve a standardised procedure for monitoring and recording the degradation of switches at risk of causing derailment and the planning of timely maintenance intervention or renewal of worn components before the limits in the 053 standard are exceeded.

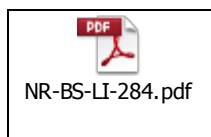
This is particularly necessary for switches in high risk areas such as the approaches to busy stations which are exposed to high levels of wear, where access for inspection and maintenance is limited and where their availability for service is critical.

Network Rail should provide guidance on maintenance intervention limits and their application to manage wear on switch rails as part of its asset management strategy to reduce the likelihood of switches failing the '053' standard and the risk of derailment.

Brief Summary on what was previously reported to RAIB on 22 July 2014

1. Network Rail had issued the following Letters of Instruction (LoI) to support the closure of recommendation 1:

- *LOI 283 Ref 002 (Issued February 2013) mandates tighter manufacturing tolerances for switches*
- *LOI 284 Ref 001 & REF 003 (Issued February 2013) defines high risk switches, which are required to be inspected 13 weekly*
- *LOI 284 clarifies the importance of contact angles, and specifies a maintenance intervention limit and safety limits*
- *LOI 284 mandates a more efficient and effective maintenance grinding process*
- *LOI 284 mandates an improved method of measuring the contact angle before and after switch repairs are carried out,*



and developed the following implementation plan.

- *Mandate Delivery Units to create and maintain a register of high risk switches [March 2014]*
- *Develop a national database for high risk switches [September 2014]*
- *Develop a TGP8 gauge with 3 lines and the associated calibration procedure [September 2014]*
- *Roll out of the modified TGP8 gauge [December 2014]*

- *Mandate the maintenance intervention and safety limits [January 2015]*

Update

2. On 16 July 2015 Network Rail provided the following closure statement:

Network Rail, Switch & Crossing Manager, has in consultation with the Professional Head [Track] considered the intent of this recommendation by reviewing the adequacy of guidance provided for maintenance intervention limits and their application to manage wear on switch rails as part of its asset management strategy to reduce the likelihood of switches failing the 053 standard and the risk of derailment.

This has been undertaken within Technical Services, part of the Safety, Technical & Engineering Directorate and the wider Network Operations frontline teams. The involvement of subject matter engineering experts has been a given throughout.

Network Rail understands that early intervention and corrective action will minimise risk and prolong the life of the components and actively seeks proactive management of worn switches by welding before the intervention limits are reached.

The response to this recommendation is addressed by:

- a) NR/L2/TRK/053 – Inspection and Repair Procedures to Reduce the Risk of Derailment at Switches (Issue 5; August 2008)*
 - b) NRIBS/LI/284 – Standard affected NR/L2/TRK/0053 (Issue 5) Inspection and repair to reduce the risk of derailment at switches*
 - c) NR/L3/TRK/003/TEF3029*
 - d) NR/SIN/131 – Management of flange climb derailment risk in facing switches (Issue 2; September 2014)*
- a) NR/L2/TRK/053- Inspection and Repair Procedures to Reduce the Risk of Derailment at Switches (Issue 5; August 2008)*

This specification describes the inspection regime, monitoring procedures, immediate actions and essential maintenance to be undertaken at switches to reduce the risk of derailment.

It identifies the particular derailment hazards associated with switch wear and damage and the remedial measures necessary.

The specification applies to all switches in Network Rail's permanent way that may at any time or circumstance be used in a facing direction with the exception of catch points, the switch half sets of trap points which are in the open position for ordinary running and switch diamonds.

Clause 13, 'Detailed inspection procedures and actions for particular derailment hazards', states:

When inspection (detailed or visual) reveals sub-standard conditions such that the switches will fail the criteria in this specification, or are likely to

fail if remedial work is not carried out (for example the removal of lipping or improving lubrication), then the Track Section Manager shall plan the necessary interventions.

A technical review of this standard considered that the reference to 'intervention' and associated remedial work required further understanding; Letter of Instruction NR/BS/LI/284 was subsequently issued in September 2014.

b) NR/BS/L/1284- Standard affected NRIL2/TRK/0053 (Issue 5) Inspection and repair to reduce the risk of derailment at switches

The aim of this instruction is to control the risk of flange climb derailments at the toes of tight radius switches caused by switch blade damage or excessive wear.

LI/284 includes additional requirements associated with the detailed inspection and switch blade repair work and mandates use of Track Engineering Form (TEF3029, Switch Inspection Form).

Additional requirements include:

- Detailed Inspection of Switches – Mandatory 31st Oct 14
 - Populate and maintain a register of high risk switches in Ellipse
 - High risk switches shall be subject to scheduled detailed inspections at a default interval of 13 weeks
- Detailed Inspection using TGP8 Gauge- Mandatory 31st Mar 15
 - The phasing in of the new TGP8 gauge with 3 markers, representing the contact angles of 65°, 60° and 55° to assist in inspection and planning and maintenance activities
- Switch blade repair- Mandatory 31st Oct 14
 - Improvements to TEF3029 requiring the completion of the section 'Assessment of Details Prior to Repair Welding' when switch repair work is being scoped
 - Switch blades shall be ground to a minimum of 65° flange contact angle for all switch types after switch repair work has been carried out (welding or grinding)
- Switch blade post repair check using the protractor gauge - Mandatory 31st Mar 15
 - A protractor gauge shall be used to check that the switch blade angle is a minimum of 65° at the critical depth of 20mm to 40mm below the stock rail head after switch grinding or weld repair work has been carried out

c) NRYL3/TRK/003/TEF3029

Letter of Instruction NR/BS/LI/284 includes additional requirements associated with the detailed inspection and switch blade repair work and mandates use of the Track Engineering Form TEF3029 v5 form, Switch Inspection Form.

The specific requirement mandates the completion of the section headed 'Assessment of Details Prior to Repair Welding' when switch repair work is being seeped; Clause 4.3 refers and states:

4.3 Switch blade repair – Mandatory Requirements from 31st October 2014

Following a detailed inspection where switch repair work is required:

a) Page 2 of TEF3029 v5 under the section heading 'Assessment of Details Prior to Repair Welding' shall be completed when switch repair work is being scoped.

The TEF3029 allows the precise angle of the switch rail to be recorded before and after switch repair work. The measurements are taken at each bearer at the affected length of the switch. An extract of the relevant section on the form is shown below:

NR/L2/TRK/0053 ASSESSMENT DETAILS PRIOR TO REPAIR WELDING															
Note: Step number to be measured with NR4 gauge. Angles to be measured with protractor gauge															
Extent of damage repair required														Length	mm
Extent of sidewear repair to stock rail front required	Step No		Angle	deg	Length	mm									
Extent of sidewear repair to stock rail behind switchblade required			Angle	deg	Length	mm									
Extent of sidewear repair to switchblade required			Angle	deg	Length	mm									
Bearer															
Vertical Distortion (Gap between underside of switchblade and slide baseplate mm)	Toe	2	3	4	5	6	7	8	9	10	11	12	13	14	
Sidewear Angle (Measured with Protractor Gauge)															

Figure 11 Section on the TEF3029 v4 form where the switch blade angle is recorded

d) NR/S/N/131 – Management of flange climb derailment risk in facing switches (Issue 2: September 2014)

The aim of this Special Inspection Notice (SIN) was to provide positive reporting of the compliance to the instructions detailed in NR/BS/LI/284 and mandated assurance checks for all staff that undertake detailed 053 inspections.

All actions associated with the SIN were monitored until completion through the return of signed SIN Action Completion forms (SINACs) from all Routes confirming:

- Completion of the briefing of LI284 within the Routes, updates to Ellipse to identify high risk switches, scheduling of detailed inspections for high risk switches, inclusion of Hazard 5 check in detailed 053 inspection and confirmation that changes to switch blade repairs are implemented (SINAC Action 1)

- *The use of updated protractor gauges and TGP8 Gauges for 053 inspection and repair activities the provision (SINAC Action 2)*

The SIN was fully briefed at the Quarterly Track Governance and Safety Briefing 11 September 2015 (a copy of the QTGS briefing material is appended to this document; Appendix A). This meeting is attended by Route Asset Managers [Track] as well as Infrastructure Projects Engineering Managers.

SINACs 1 and 2 were formally closed in May 2015 by the Professional Head [Track].

Summary

The considered response of the Switch & Crossing Manager is that through the review of guidance within NR/L2/TRK/053 – Inspection and Repair Procedures to Reduce the Risk of Derailment at Switches (Issue 5; August 2008) and the subsequent issue, briefing and implementation of supplementary instructions (NR/BS/LI/284, NR/L3/TRK/003/TEF3029 and NR/SIN/131) the intent of this recommendation has been met and therefore considered closed.

ORR Decision

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

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

Status: *Implemented.*