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22 July 2014

Ms Carolyn Griffiths
Chief Inspector of Rail Accidents
Cullen House
Berkshire Copse Rd
Aldershot
Hampshire GU11 2HP

Dear Carolyn,

RAIB Report: Derailment at Princes Street Gardens, Edinburgh, 27 July 2011

I write to provide an update[1] on the action taken in respect of recommendations 1 to 5 addressed to ORR in the above report, published on 30 August 2012.

The annex to this letter provides details of the action taken in respect of each recommendation where the status of:

- Recommendations 1, to 4 are 'In –progress'. We expect to update you on progress by 19 December 2014; and
- Recommendation 5 has been 'Implemented'.

We will publish this response on the ORR website on 8 August 2014.

Yours Sincerely,

Chris O'Doherty

[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. [NR/L2/TRK/0053 Inspection and repair to reduce the risk of derailment at switches]

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 5 August 2013

1. Network Rail stated the following steps were to be taken to address the recommendation:

- *Issue a Letter of Instruction (LoI) to apply tighter manufacturing tolerances. [Completed]*
- *Issue briefing pack on switch repair procedures. [September 2013]*
- *Establish switch wear maintenance and safety limits. [October 2013]*
- *Develop inspection plans for monitoring switch deterioration for 'high risk' switches. [November 2013]*
- *Develop implementation plan for the proposed changes and publish maintenance limits [December 2013]*

Timescale: by December 2013.

Update

2. On 11 November 2013, Network Rail provided an update stating that*:*

Network Rail had identified that previous changes to the '053' standard had not been implemented consistently. Further time has been spent investigating the root cause of these issues.

The timescales have been extended to refine the implementation of the proposals into network operations, by addressing issues raised through consultation. This includes improvements to inspection equipment and associated calibration processes and providing further clarity on complex issues.

Revised timescale: 31 January 2014.

Two interim briefings have been delivered at the Track Standards Briefings, along with issuing good practice on switch repair processes. Workshops have

also been held with route representatives to raise awareness of the issues, in addition to discussing the details of implementation.

3. On 5 March 2014, Network Rail stated that:

The LoI has been signed off and briefed.

- *Letter of Instruction: NR/BS/LI/284; Issue date: 20th February 2014 Standard affected: NR/L2/TRK/0053 (Issue 5) Inspection and repair to reduce the risk of derailment at switches. (Annex B)*

The timescale for delivering the action plan for recommendation 1 has been extended. The revised timescales is now 30 April 2014.

4. On 23 May 2014, Network Rail stated that:

Review of past derailments, historic reports and vehicle dynamics

In-depth studies of past derailment reports and relevant British Rail Research reports, supplemented by vehicle dynamics modelling have been carried out to determine suitable intervention limits for switch wear. The important factors affecting derailment risk were identified as:

- *Switch geometry*
- *Frictional condition*
- *Wheel profile*
- *Angle of attack of wheel*
- *Speed of vehicle*
- *Suspension characteristics (wheelbase, type of bogies etc.)*
- *Track Geometry on the approach*

From the in depth studies the following conclusions were drawn:

- *Similar flexure switches are a particular risk*
- *Lateral forces are highest when the switch radius is below 300m*
- *High lateral forces are exerted within the first 2m of the switch*
- *First wheel contact with the switch will move towards the toe as the stock rail wears*
- *Monitoring of the switch contact angle is a key requirement*
- *Switch depth relative to the stock rail is a key issue*

Manufacturing tolerances

The current machining tolerance for machining of the switches can result in contact with a TGP8 gauge at or below the 60° marker when a switch is machined to the high end of the tolerance. Contact below the 60° marker could trigger a ban on any facing movement until appropriate action has been implemented.

Following a study on the geometrical interface between the wheel and rail, a few critical machining tolerances, specified in 'NR/L3/TRK/4004 (Issue 2), Switch and Crossing Assemblies', have been tightened after consultation with the manufacturers. New switches will now have a contact above the 60° marker. Letter of Instruction NR/BS/LI/283 (Issue 1, February 2013) was issued in response to these findings.

Maintenance Intervention and Safety Limits

The current 053 standard imposes a 'pass/fail' criterion, triggering an immediate action should a switch rail fail the inspection. To allow for the planning of timely maintenance intervention, an intervention limit has been set on a modified TGP8 gauge, based on the contact angle. If the contact angle falls between 60° and 65°, then the appropriate maintenance activity has to be planned within 13 weeks. In addition, two safety limits have been specified in light of the Shrewsbury derailment in 2012. All facing traffic shall be banned if 1. Contact angle is less than 55° or 2. Switch rail top relative height to the stock rail head is greater than 20mm at the location where flange contact on the switch rail is evident.

Actions taken supporting closure of recommendation

- *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*

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]*

ORR Decision

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

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

Status: ***In-Progress.*** *ORR will update RAIB by 19 December 2014.*

Recommendation 2

The purpose of Recommendation 2 is to gain assurance that the mechanisms of derailment are fully understood, that these are fully addressed by the inspection procedures in the '053 standard and that the inspection procedures

are uniformly applied as intended [NR/L2/TRK/0053 Inspection and repair to reduce the risk of derailment at switches].

Network Rail should carry out a thorough technical review of the '053 standard to satisfy itself that it has a full understanding of how the standard addresses the following:

- The risk of derailment from worn wheels on a switch rail that is compliant with the TGP8 gauge;
- The practicability of achieving a 1:600 gradient when blending-out a grinding repair of switch rail damage, or for removing a derailment hazard 1; and
- The potential risk of a ramp being created by the introduction of a switch rail that is failing gauge 2 in the first metre, between a side-worn stock rail and wheel flange, particularly where the wheel flange is in flange contact with the stock rail.

In the short term, Network Rail should also review the scope for misinterpretation and inconsistent application of the standard's requirements and take any necessary action, for example, through briefing and its competence management system, to ensure that there is a common understanding and application of the standard's procedures for inspection and repair.

Brief Summary on what was previously reported to RAIB on 5 August 2013

6. Network Rail stated the following steps were to be taken to address the recommendation:

- *Produce report confirming that the technical requirements of NR/L2/TRK/0053 are correct [September 2013]*
- *Issue LOI for the use of the protractor gauge [October 2013]*
- *Re-brief requirements of existing '053 standard [December 2013]*
- *Develop plan for full re-write of '053 [December 2013]*

Timescale: by December 2013.

Update

7. On 5 March 2014 Network Rail stated that:

The timescale for delivering the action plan for recommendations 2 has been extended. The revised timescales is now 30 September 2014.

8. On 23 May 2014, Network Rail stated that:

Review of technical reports, relevant standards and modelling work

A thorough review of derailment reports, technical reports and relevant standards concluded that the fundamental requirements of the existing

NR/L3/TRK/0053 are relevant and technically correct, subject to proper implementation.

- *Analysis showed that the risk of derailment from worn wheels on a switch rail that is compliant with the TGP8 gauge can be detected by the new switch topping depth safety limit; as an example, the switch topping depth at the Shrewsbury derailment incident was 21mm, which would have triggered a ban in facing traffic.*
- *The requirement for a '1:600 gradient blending out of grinding repair' is specified for the wheel rail running surface, i.e. on the stock rail head. Such grinding is not required for the switch rail blade as contact occurs on the flange. For switch blade repair, the requirement is to ensure any discontinuities are blended in over a distance of 200mm along the switch and through the switch depth.*
- *The risk of derailment due to the ramp will be detected by the required TGP8 inspection if Gauge 2 inspection has failed and/or the new switch topping depth safety limit.*

Review of '053 briefing and training material and human factors

The briefing document from 2007 & 2008 was very comprehensive and included some guidance that had not been included in other documents. Certain areas of the training documents highlighted areas that need amendment to improve understanding, and to give a more simplified approach. It was also identified the training material and briefing notes for the existing '053 competency was reviewed. The briefing notes, which were produced in 2007 & 2008, are comprehensive and contain additional guidance that is not present in the standard. Certain areas of the training documents highlighted areas that need amendment to improve understanding, and to give a more simplified approach. It was also identified that a number of the TEF forms that accompany the standard also need amending.

The workshops identified pockets of good practice, particularly where the routes had dedicated, experienced '053 inspectors who carried out detailed switch inspections on a regular basis. The workshops identified a number of different interpretations of details within the standard. The workshops also identified that an alternative approach to switch grinding would be beneficial. Workshops were held at Paddock Wood, Newcastle and Warrington training centres.

It was clear that different maintenance delivery units had very different approaches and that the risk based application of facing point inspections needed to be reinforced. Some delivery units where inspecting every switch where others were relying almost solely on routine inspections during the supervisors inspections.

Switch Repair

The analysis carried out to date has highlighted the critically of maintaining the correct switch and stock rail profile. A number of derailments have occurred after repair work was carried out.

The universal application of the protractor gauge, used by welders, was deemed a priority to give better control of the switch contact angle.

The TEF 3029 form was amended following a trial with the LNE route. The switch contact angle is recorded before and after a switch repair is carried out. This will assist with scoping the work and will give added assurance that a switch is left in a safe state following the repair.

A more efficient switch grinding procedure was developed, based on modelling work and a review of current practice. This method targets the 'at risk' region of the switch where contact with the wheel will occur. This method will reduce the amount of material that has to be removed, reducing the time of grinding process and prolonging the life of the switch. The process will also set a reasonable margin between the ground profile and the intervention limit which will increase the time before follow up grinding is required.

A vertical wear limit has been specified. Where the topping of the switch rail falls below the 20mm depth relative to the stock rail head at any locations where flange contact on the switch rail is evident, there is a high risk of flange climb. All facing traffic shall be banned until switch repair work has been carried out or the half set of switches is replaced. No attempt shall be made to grind repair, the switch rail shall be weld repaired to build up the topping height or the half set shall be replaced.

Actions taken supporting closure of recommendation

- *Review of '053 core requirements completed*
- *Investigation of derailment mechanism undertaken and review of past derailments including Shrewsbury derailment*
- *Use of the TGP8 gauge reviewed*
- *Review of '053 training and briefing material undertaken along with associated TEF forms. TEF forms being updated for re-issue.*
- *Competency requirements between TRK/001 and TRK/053 have been identified and clarified*
- *A full detailed inspection has been mandated in LOI/284 for all high risk switches*
- *Analysis has shown that the risks are associated with the curved switch as specified in the '053 standard. This has been reinforced in the clarification briefing. Similar flexure switches have a mandated detailed inspection*
- *A plan has been developed to re-write the '053 standard by December 2014. This document will be developed in line with the Business Critical Rules Programme and the risk based approach*
- *A more efficient switch grinding procedure was developed and introduced in LOI/284*

Implementation Plan

- *LOI/284 briefing [Completed]*
- *Compete review and update TEF forms [June 2014]*
- *Produce and issue new '053 standard [December 2014]*

ORR Decision

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

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

Status: *In-Progress.* *ORR will update RAIB by 19 December 2014.*

Recommendation 3

The purpose of Recommendation 3 is to achieve a means for gauging the flange contact angle of switch rails which reduces the reported difficulties of use of the current TGP8 gauge and which engenders greater confidence in the readings obtained.

Network Rail should investigate potential improvements to the TGP8 gauge for conducting detailed inspections to the '053 standard, or develop an alternative means for assessing the flange contact angle of switch rails.

The aim should be to provide a more accurate and objective method for determining a non-compliant flange contact angle on a switch rail and which is more ergonomically suited to on-track conditions of use.

Network Rail should then take steps to implement any improvements identified, or introduce any alternative assessment method, and train/brief staff as necessary.

Brief Summary on what was previously reported to RAIB on 5 August 2013

10. Network Rail stated the following steps were to be taken to address the recommendation:

- *Provide clarification on the use of the TGP8 gauge [December 2013]*
- *Action any required changes to the markings on the P8 profile [October 2013]*
- *Issue LOI for the use of the protractor gauge [October 2013]*
- *Develop plan for the trial and implementation of a laser based switch profile inspection system [October 2013]*

Update

11. On 5 March 2014 Network Rail stated that:

The timescale for delivering the action plan for recommendation 3 has been extended. The revised timescales is now 30 September 2014.

12. On 23 May 2014, Network Rail stated that:

TGP8 Gauge

Proposals have been adopted to modify the TGP8 gauge, to have three marked lines at 55°, 60° and 65°. These three lines will enable more

appropriate action to be taken, removing the need to make a decision based on a single line. If contact occurs between the 65° and 55° lines; then further investigation will be carried out, by the welding or grinding team, using the protractor gauge to determine the appropriate repair procedure.

The calibration procedure for the TGP8 gauge will be amended to include a check of the profile gauges against a master template.

The TGP8 will still be used during the supervisor's inspection and the detailed switch inspection. High risk switches will have a detailed switch inspection carried out every 13 weeks.

Details of the changes to the gauge, and revised actions are included in LOI/284. Samples of the revised gauges are now available for the delivery units to buy. A process is being developed to exchange the profile gauges on existing TGP8 gauges. LOI/284 requires all delivery units to adopt the revised TGP8 gauge by 1st January 2015.

Protractor Gauge

The protractor gauge has been used by welding staff undertaking switch repairs for a number of years. Although approved, details of the gauge and how it was to be used were not included in any of the historical training material or work instructions.

The protractor gauge was not deemed suitable for use during routine inspections, but to be used by grinding and welding staff. A pre-work assessment would determine the extent of the repair, and the appropriate action that was required along with an estimated duration of the repair process. A post work inspection would confirm that the correct contact angle had been achieved during the repair.

Human factors assessment of the protractor gauge has identified a number of improvements that should be made to make the gauges easier to use. A sample gauge has been produced with the required changes and is being assessed. A process for exchanging the plunger, and in some cases the protractor face, is being developed to modify existing gauges where required.

Training material for grinding operatives already includes the use of the protractor gauge. The Welder training material is being updated to include the relevant details. A phased introduction of the improved protractor gauge by welding and grinding staff is included within LOI/284. Details of the use of the gauge are included in the LOI, but more detailed instructions will be produced once the enhanced protractor gauges are available.

Laser Based Measurement

Laser measurement of switch profiles is being actively pursued by Network Rail. A variety of systems, being developed for other European railway authorities, have been subject to initial evaluation, including vehicle and trolley mounted devices along with hand held systems. To meet the specific requirements of the UK rail network the available technology would need to be further developed alongside the associated data collection and analysis software.

Funding is being sought to commence work with suppliers to develop a working solution for laser based switch inspection. The suppliers will be selected via a tender selection process in compliance with European competition legislation.

Whichever solution(s) is selected consideration will need to be given to grease or other contamination on the switch giving an incorrect profile measurement. The chosen solution(s) will also need to identify the switch type, and reference features such as the switch toe so that the correct area of the switch is checked.

Actions taken supporting closure of recommendation

- *Ergonomic assessment of TGP8 gauge undertaken*
- *Changes made to TGP8 gauge & requirements of using gauge briefed as part of LOI/284*
- *Process developed for use of protractor gauge by welders and grinding operatives and briefed as part of LOI/284*
- *Improvements to protractor gauge specified and developed*
- *Initial assessment of laser based profile measurement systems completed*
- *Plan produced for further development working with manufacturers. Investment paper produced to obtain funding*

Implementation Plan

- *Issue and brief LOI/284 detailing changes made to the TGP8 gauge and the use of the protractor gauge by welding and grinding staff [Completed]*
- *Develop specification for enhanced protractor gauge including calibration [May 2014]*
- *Roll out of enhanced protractor gauge to routes, including modification of existing gauges [By December 2014]*
- *Modification of existing TGP8 gauges to new specification [By December 2014]*
- *Secure funding and develop prototype laser based measurement systems for trial and evaluation [Target April 2015]*

Timescale: By December 2014 (Note: The work to secure funding and develop prototype laser based measurement systems for trial and evaluation is goes beyond the requirements of the recommendation.)

ORR Decision

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

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

Status: *In-Progress.* *ORR will update RAIB by 19 December 2014.*

Recommendation 4

The purpose of Recommendation 4 is to extend the criteria for fitting automatic lubricators to high risk switches which may not qualify for automatic lubrication under current standards.

Network Rail should consider whether the criteria specified in NR/L3/TRK/3510/A01 [Lubrication of Plain Line Running Rails, Check Rails and S&C] for the installation of automatic lubricators on switches should be extended to include the high rails of switches subject to side-wear in areas, such as the approaches to busy stations, where access for maintenance is limited, and where automatic lubrication could slow the development of side-wear and mitigate the risk of derailment.

Brief Summary on what was previously reported to RAIB on 5 August 2013

As part of the technical review that was being undertaken to inform Network Rail's response to recommendation 2 the effects of lubrication was also to be considered.

Timescale: 31 September 2013.

Update

14. On 28 November 2013 Network Rail stated that:

High risk switches, either by design or due to wear should be lubricated in line with the current '053 standard. Switches should also be lubricated following repair as specified in the '053 standard.

Switches should be cleaned, as required, during inspections to assess wear and damage and lubricant re-applied after the inspection.

Work on the short term policy has concluded that Network Rail should take no further action, other than reinforcing the above requirements within a letter of instruction (LoI); a draft is currently being reviewed and should be issued by 31 December 2013.

Longer term policy is to undertake research into alternative lubricants and lubrication systems, the results from this will be evaluated for long term performance and compared with the analysis already undertaken to consider Y/Q forces [wheel / rail interface forces] that may lead to a flange climb derailment. Consideration will be given to lubrication applied directly to the switch and lubrication transferred from nearby rail lubricators. The aspiration is to provide adequate lubrication, without obscuring the switch such that it can be inspected.

It has been recognised that lubrication needs to be considered when introducing any type of automatic or laser based switch measuring system.

15. Network Rail provided ORR with a copy of its general presentation given at the September 2013 Track Standards Briefing.

16. On 5 March 2014 Network Rail stated that:

The LoI has been signed off and briefed.

- *Letter of Instruction: NR/BS/LI/284; Issue date: 20th February 2014 Standard affected: NR/L2/TRK/0053 (Issue 5) Inspection and repair to reduce the risk of derailment at switches. (Annex B)*

17. Network Rail has considered whether to extend the criteria for fitting automatic lubricators to high risk switches and has concluded that the current regime adequately manages the risk of flange climb. However, Network Rail has reinforced the lubricating requirements of switches within a letter of instruction and is undertaking research into alternative lubricants and lubrication systems.

18. On 23 May 2014, Network Rail stated that:

Analysis of friction coefficients

Analysis has confirmed that lubrication reduces the risk of a facing switch derailment. However, once the contact angle is below 55°, as in seen at Shrewsbury where the contact angle was 52°, the effect of lubrication is minimal. The new safety limit is imposed (in LOI/284) in light of this incident:

- *Worn or damage switch blade contact angle of below 55° for a distance of 50mm or more, ban all facing traffic until switch repair work has been carried out or the half set of switches is replaced.*

Balance of Risk

Experience at Shrewsbury has shown that grease on switch, whilst reducing the risk of a flange climb derailment, can mask damage on the switch blade and can make it difficult to assess the level of switch wear and the switch contact angle with a TGP8 gauge.

Given this situation it was decided to re-enforce the requirements of the existing standard, and the routes can make a site specific risk based decision on the benefits of fitting automatic lubricators taking into account local conditions.

Medium and long term strategy

The benefits of automatic lubricators fitted close to switches will continue to be reviewed with the routes.

Alternative lubricants will be considered and evaluated. An ideal situation would be an effective lubricant that did not mask the surface profile of the switch. Experience to date has shown that light oil would not obscure the profile, but is quickly ineffective as it is soon washed away.

Consideration will be given to lubricating new switches, following a suggestion made by one of the route support engineers. The benefits and risks associated with this are currently being evaluated.

Actions taken supporting closure of recommendation

- *Benefits of switch lubrication have been assessed*
- *Risks associated with wear and damage being masked by lubrication have been assessed*

- *Requirements of the exist '053 standard have been re-briefed in the clarification briefing **Ref 003** (February 2014)*
- *LOI/284 mandates the removal of grease before switch inspections are undertaken*

ORR Decision

19. Network Rail has not yet met the intention of the recommendation: *The purpose of Recommendation 4 is to extend the criteria for fitting automatic lubricators to high risk switches which may not qualify for automatic lubrication under current standards.*

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

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

Status: *In-Progress.* *ORR will update RAIB by 19 December 2014.*

Recommendation 5

The purpose of Recommendation 5 is to address factors which were also found in the RAIB's investigation of similar derailments at London Waterloo and Exhibition Centre, Glasgow.

Network Rail should review the actions taken in response to the recommendations in the RAIB report 44/2007 [Two derailments at London Waterloo, 11 September and 24 October 2006] to identify why these were insufficient to prevent the recurrence of issues they were intended to address.

The review should include an assessment of how operational expectations of availability for service influence the implementation the '053 standard and consider the need for a reappraisal of how derailment risks at switches are managed to prevent their recurrence in future.

Brief Summary on what was previously reported to RAIB on 5 August 2013

To address this recommendation a review of the RAIB derailment reports and standards concerning London Waterloo (11/09/06 and 24/10/06) and Exhibition Centre, Glasgow (03/09/07) was to be undertaken.

Timescale: 23 July 2013.

Update

21. On 15 November 2013 Network Rail provided an update stating that:

The review as envisaged by the recommendation is now complete and documented in a supporting report (Provided to ORR).

The report highlights two areas for further consideration; one encompassing the technical and access issues, the other the learning issues.

Technical and access issues

The technical and access issues will be considered by the Principal Engineer [Switches & Crossings] who will:

- *Consider the appropriateness of the access arrangements to conduct '053 inspections.*

  This will include a review with Network Operations of the effectiveness of Timetable Change Risk Assurance Group (TCRAG) to identify barriers to planned access; Engineering Planning Teams considering creating periods within the timetable to be enabled to routinely conduct '053 inspections within pre-planned possessions (This would also require engineering to identify the amount of time required to undertake inspections and repairs).

- *Revisit the recommendation for any welding repair to Switches & Crossings to be independently reviewed before restoring them to use.*

- *Test the effectiveness of any improvements in skills training supporting these by a series of independent verification checks on work completed to test that training and practice is being universally applied across the Network e.g. verification by an audit of competence that derailment mechanisms are fully understood.*

Learning issues

The learning issues will be considered by the Corporate Investigation Manager who will:

- *Consider applying risk assessment where an alternative strategy to the RAIB recommendation has been applied.*

- *Commission a topic audit of the implementation of the Princess Street Garden recommendations in relation to Waterloo and Exhibition Centre Station to verify that Senior Managers' sign-off has in fact met the intent of the key recommendations given the potential for this issue to be raised again as in the case of Waterloo.*

- *Remind Functional managers to routinely apply self-assurance to test that there has been consistent application of responses to important (RAIB) recommendations.*

- *Review the remit for Recommendations Review Panels (RRPs) to focus on risk control rather than action tracking which could include testing the consistency of the Routes response to recommendations reviewed at National Recommendations Review Panel (NRRP).*

- *Consider expanding the role of RRPs to evaluate RAIB, audit, self-assurance etc. to manage risk rather than recommendations using, for example, elements of the Risk and Assurance Maturity Matrix or a list of questions to test the delivery of recommendations/actions.*

- *The lead manager assigned to deliver a recommendation by NRRP should be involved in a debriefing from the RAIB upon their investigation e.g. to understand to what extent the RAIB investigator envisages changes to the standard and to what extent is re-training necessary etc.*
- *Brief Functions as part of their audit strategy to routinely audit or verify the consistency and application of their departments' response to recommendations to establish whether unforeseen significant latent risks are evident.*

Timescale: 30 April 2014.

22. ORR met with Network Rail, on 11 March 2014. It was agreed that although Network Rail has provided evidence that the review has been carried out and has identified two areas for further consideration it will provide ORR with:

- Evidence of actions it has already taken following its review of previous incidents of a similar nature; and
- A plan, including timescales, for any actions identified from the two work streams.

23. On 21 May 2014, Network Rail provided ORR with a copy of its 'Recommendations Owner's Form'. The closure statement, in part D, states:

Network Rail has undertaken a study and a corporate audit, both of which included within their scope a review of the actions taken in response to the recommendations in the RAIB report 44/2007.

The study resulted in a report titled 'A review of the RAIB derailment reports concerning London Waterloo (11/09/06 and 24/10/06) and Princes Street Gardens, Edinburgh (27/07/11) with reference to Exhibition Centre Station, Glasgow (03/09/07)'.

The study examines the closure statements for the recommendations from the previous derailments and considers their relevance to the Princes Street Gardens derailment. The study concludes that it is not possible to determine whether the effectiveness of the implementation of the recommendations had an impact on the Princes Street Gardens derailment.

The study observes that an immense amount of work was undertaken post Lambrigg and dealt with standards, handbooks, guides and training and that it is not possible to conclude with absolute certainty that Princes Street Gardens would not have occurred had the Waterloo recommendations have been more effectively applied given there was evidence that the capability and competence of the Grinding Supervisor at Princes Street Gardens was a key factor.

Those assigned to deal with the Waterloo recommendations will believe that they have discharged these to their understanding. Likewise the ORR was satisfied that this was the case.

The study identifies the importance of the rigour of testing that the change has been communicated to all involved and continues thereafter which was probably a weakness in delivering the Waterloo recommendations. For example, the Network Rail investigations into the Bescot and Shrewsbury derailments revealed that the TSM [Track Section Manager] (or SM(T)) [Section Manager Track] at Bescot was uncomfortable with undertaking an inspection and the Shrewsbury report indicated that routine inspections had been the subject of a misinterpretation of the standard.

The findings from this study, undertaken by the Network Rail Corporate Investigation team, have influenced the work undertaken on recommendations 1 - 4 and in particular the study findings have been considered in the analysis supporting the closure of Recommendation 2.

A number of the suggested improvements made in the study report have been implemented.

Since the responses to the Waterloo and Exhibition Centre Station RAIB recommendations were produced all RAIB recommendations are reviewed at the Network Rail S&SD [Safety & Sustainable Development] Executive. This body considers whether the response adequately addresses the recommendation and the risk that this is seeking to control. The Executive considers whether any proposed alternative approach meets the intent of the recommendation.

Discussions have been held with the RAIB and it has been agreed that where recommendation Lead Managers have not been included in the investigation report consultation process that a separate briefing will be arranged with the Lead Inspector to improve the understanding of the detail and intent of the recommendation.

The Network Rail recommendations closure process was revised in early 2014 and an additional check has been included prior to a recommendation being accepted as closed. This review by the Corporate Investigation Manager includes a check that there are no outstanding actions identified in the closure statement. Where this is the case the recommendation is not closed and a timescale extension is required from the Lead Manager. This process is separate to the ORR review and closure process.

The study also suggested that a topic audit of the implementation of the Princess Street Garden and Waterloo and Exhibition Centre Station recommendations be undertaken.

A corporate audit was undertaken during the period 16 September – 14 November 2013 with the purpose of assessing the effectiveness and timeliness of actions taken in response to S&C [switches and crossings] related incident investigation recommendations including the Waterloo and Exhibition Centre Station and Princes Street Garden events. 102 recommendations were reviewed as part of the audit of which 90 had been closed.

It was found that 14 of the 90 closed recommendations reviewed had been closed where there was insufficient evidence in the recommendation tracking

spread-sheet(s) to demonstrate full closure. In a number of cases recommendations had been closed on the basis of work proposed to be undertaken that had, at the time, not been fully delivered. In all but one of these the audit team assessed that the work that had been subsequently undertaken and satisfied the intent of the recommendation but the S&SD Action Tracking Team had not been advised nor had the tracking spread-sheet been updated to reflect this. In one case the assessment identified that the action taken was not adequate to satisfy the intent of the recommendation and as a result the audit team recommend that the recommendation should be re-opened.

The balance of evidence reviewed during the work associated with this recommendation and the other work undertaken as a result of the Princes Street Gardens and Shrewsbury investigations represent a full appraisal of how derailment risks at switches are managed to prevent their recurrence in the future.

ORR Decision

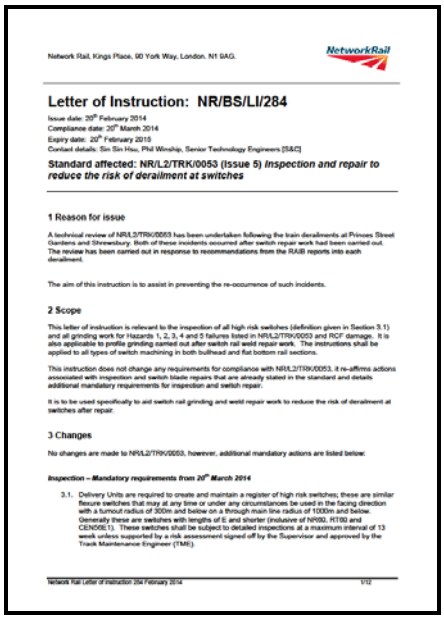
24. After reviewing all the information received ORR concluded that, in accordance with the Railways (Accident Investigation and Reporting) Regulations 2005, Network Rail has:

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

Status: *Implemented*. *ORR will write to RAIB if it becomes aware that the information above is inaccurate.*

Letter of Instruction: NR/BS/LI/284
Issue date: 20th February 2014

Standard affected: NR/L2/TRK/0053 (Issue 5) *Inspection and repair to reduce the risk of derailment at switches*



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Network Rail

Letter of Instruction: NR/BS/LI/284

Issue date: 20th February 2014
Compliance date: 20th March 2014
Expiry date: 20th February 2015
Contact details: Sin Sin Hau, Phil Winship, Senior Technology Engineers [S&C]

Standard affected: NR/L2/TRK/0053 (Issue 5) *Inspection and repair to reduce the risk of derailment at switches*

1 Reason for issue

A technical review of NR/L2/TRK/0053 has been undertaken following the train derailments at Princes Street Gardens and Shrewsbury. Both of these incidents occurred after switch repair work had been carried out. The review has been carried out in response to recommendations from the RAIB reports into each derailment.

The aim of this instruction is to assist in preventing the re-occurrence of such incidents.

2 Scope

This letter of instruction is relevant to the inspection of all high risk switches (definition given in Section 3.1) and all grinding work for Hazards 1, 2, 3, 4 and 5 failures listed in NR/L2/TRK/0053 and RCF damage. It is also applicable to profile grinding carried out after switch rail weld repair work. The instructions shall be applied to all types of switch machining in both bullhead and flat bottom rail sections.

This instruction does not change any requirements for compliance with NR/L2/TRK/0053, it re-affirms actions associated with inspection and switch blade repairs that are already stated in the standard and details additional mandatory requirements for inspection and switch repair.

It is to be used specifically to aid switch rail grinding and weld repair work to reduce the risk of derailment at switches after repair.

3 Changes

No changes are made to NR/L2/TRK/0053, however, additional mandatory actions are listed below:

Inspection – Mandatory requirements from 20th March 2014

3.1. Delivery Units are required to create and maintain a register of high risk switches; these are similar flexure switches that may at any time or under any circumstances be used in the facing direction with a turnout radius of 300m and below on a through main line radius of 1000m and below. Generally these are switches with lengths of E and shorter (inclusive of NR60, RT60 and CENDOE1). These switches shall be subject to detailed inspections at a maximum interval of 13 week unless supported by a risk assessment signed off by the Supervisor and approved by the Track Maintenance Engineer (TME).

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