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17 August 2012

Ms Carolyn Griffiths  
Chief Inspector of Rail Accidents  
Rail Accident Investigation Branch  
Block A, 2nd Floor  
Dukes Court  
Dukes Street  
Woking GU21 5BH

Dear Carolyn

**Derailment in Summit Tunnel, near Todmorden, West Yorkshire, 28 December 2010**

I write to report<sup>1</sup> on the consideration given and action taken in respect of the recommendations addressed to ORR in the above report, published on 29 September 2011.

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

- Recommendations 1 to 4 are being implemented; and
- Recommendation 5 is in progress.

We do not propose to take any further action in respect of recommendations 1 to 4 unless we become aware that any of the information provided becomes inaccurate, in which case I will write to you again<sup>2</sup>.

We expect to update you on progress with recommendation 5 by 30 November 2012.

We expect to publish this response on the ORR website on 28 August 2012.

Yours Sincerely

Chris O'Doherty

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

<sup>2</sup> In accordance with Regulation 12(2)(c)

## **Initial Consideration by ORR**

All recommendations contained in the report were addressed to ORR when RAIB published its report on 29 September 2011.

After considering the report / recommendations we passed:

- All 5 recommendations to Network Rail who provided its response on 30 November 2011.

Details of measures being taken to implement these recommendations are provided below.

ORR also brought the report and recommendations to the attention of other infrastructure managers: London Overground Infrastructure; Docklands Light Railway Ltd; Nexus; London Underground Ltd; HS1 Ltd; as well as UK Tram Ltd and the Heritage Rail Association, to bring them to the attention of their members. As it was concluded that there were equally important lessons for them.

## **Recommendation 1**

*The intent of this recommendation is to reduce the amount of ice forming in Summit tunnel's ventilation shafts by improving the arrangements for managing the water seeping through the shaft's lining, e.g. by changing the drainage arrangements. These changes should also stop the water from falling directly onto the tracks below.*

Network Rail should review how the arrangements for managing water within Summit tunnel can be improved, decide what actions it is reasonably practicable to take, and implement them. The review should specifically consider what can be done to manage the water seeping through the ventilation shaft linings and reduce the amount of ice forming during periods of freezing temperatures (paragraphs 149a, 149b and 152a).

### **Details of steps taken or being taken to implement the recommendation**

1. Network Rail in its response of 30 November 2011 advised ORR that:

*Temperature monitoring and infra-red cameras have been installed in Shaft 10 of Summit Tunnel to monitor at what temperature and how quickly the ice forms.*

*Design and install of a new cowl to shaft 10 is underway and will be completed as soon as possible. 'Datum' will install additional monitoring in Shaft 10 & 11 as part of the research into the effectiveness of the cowl.*

*Ring-dams and downpipes have been cleaned out, renewed and downpipes and connections secured through Minor Works. This process is being undertaken for all wet tunnels at risk from icicles.*

*In the longer term, one solution is to install a GRP [Glass Reinforced Plastic] liner with drainage pipes which will be connected into the tunnel carrier drains to both shafts 10 & 11.*

*Works currently underway are being done as part of 'business as usual'*

*Development funding will be required for the design and options for 2012/2013, 2013/2014 with a view to implement in CP5 2015/2016. These timelines are to be*

*reviewed based upon the success of the water management improvements currently being implemented.*

*Timescale 30 September 2012*

2. In considering Network Rail's response the ORR concluded that Network Rail had provided some information on short term measures being taken but had not committed to do anything long term. ORR therefore wrote to Network Rail on 20 January 2012 seeking further information.

3. In a further response on 13 March 2012 Network Rail advised ORR that: Network Rail provided ORR with a copy of LNW's detailed action plan to address recommendation 1.

*In summary, the actions taken include:*

*The condition of the existing water management measures within the shafts of Summit tunnel were evaluated in April 2011. The evaluation was based on previous inspection reports, Network Rail Engineer site visits and additional inspections undertaken following the incident.*

*Based upon the findings of the above evaluation, maintenance works to the existing water management measures within the shafts of Summit tunnel were carried out in November 2011. These works included remediation of down-pipes.*

*A review into possible short term enhancements to the existing water management system was undertaken in January 2011 to see if the risk of ice formation could be reduced. The review identified no simple short term actions that would reduce water seepage from the shafts. Options for installing additional ring dams into the shafts were discounted due to concern that they would act as an initiator of ice in cold weather. The existing downpipes are considered to be adequate.*

*Interim Mitigation Measures that have been implemented include:*

- *Installation of CCTV cameras to enable remote monitoring*
- *Improved procedures around ice patrols*
- *Improved procedures around EWAT [Emergency Weather Action Team] conference calls*

*A Tunnel Ice Formation Mitigation Project has been commissioned to look into long term solutions for the prevention and/or management of ice within tunnels.*

Network Rail provided ORR with a copy of its Tunnel Ice Formation Mitigation Project - Phase 1 Option Feasibility Report.

*As part of the above project trials are currently underway to determine the effectiveness of cowls over shafts. The progress to date is as follows:*

- *An experimental cowl was constructed at shaft 10 Summit Tunnel during Jan 2012.*
- *Enhanced instrumentation was installed at shaft 10 with the experimental cowl.*

- *The same instrumentation specification has been installed in Summit shaft 11 for a direct comparison between a covered and non-covered shaft.*
- *A cowl has also been installed at Blea Moor tunnel shafts 2 and 3, (shaft 3 with the experimental cowl and 2 without). This is being done to the same specification and timescale as Summit tunnel to have data from two tunnels known to have ice problems. This will give a second data origin allowing us to benchmark readings to mitigate the risk of data scatter.*
- *Data gathering commenced from these trial sites during February 2012.*
- *This experiment will run into spring 2012 and we will gather information on the affect that varying the air flow in the shafts has on temperature in the shafts and therefore raising the temperatures above ice forming thresholds. The experimental cowl has a variable aperture and we will be seeking to determine the optimum air flow within the shaft by incremental adjustment of the cowl aperture. The optimum air flow will be that that restricts air movement to raise temperatures without compromising transient air pressures within the tunnel and having a detrimental affect on aural comfort.*

*The current objective is to use the findings of the trials to develop a standard design for a cowl with a medium level of standardisation allowing for site specific parameters to be incorporated. This is a long term project with an estimated two year development period.*

*Further detailed examinations of the Summit tunnel shafts are planned for 2012 to assist with solution development.*

#### **ORR Decision**

4. After reviewing all the information received from Network Rail 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.

ORR will write to RAIB again if it becomes aware that the information above is inaccurate.

**Status: Network Rail is taking action to implement the recommendation**

#### **Recommendation 2**

*The intent of this recommendation is to prevent the first train, after a cessation of traffic due to extreme weather, from passing at the line's maximum permitted speed through or over an unsafe structure. By identifying which structures on a route are at risk of becoming unsafe due to extreme weather, Network Rail can then check their state prior to reopening the route, e.g. by using the first service train to examine the route, a route proving train or staff on foot.*

Network Rail should identify the structures (as defined in NR/L3/CIV/006/1C [Handbook for the examination of Structures Part 1C - Risk categories and examination intervals]) where passengers or staff might be put at risk when train services are resumed following an extended cessation of traffic during, or following, periods of extreme weather (as defined in NR/L2/OPS/021 [Weather - Managing the operational risks]). Network Rail should then put in place procedures that result in checks that it is safe for trains to operate at the permitted line speed over or through these structures before resuming the train service (paragraphs 149e, 151c and 152c).

### **Details of steps taken or being taken to implement the recommendation**

5. Network Rail in its response of 30 November 2011 advised ORR that:

*The structures (as defined in NR/L3/CIV/006/1C) where passengers or staff might be put at risk when train services are resumed following an extended cessation of traffic during, or following, periods of extreme weather (as defined in NR/L2/OPS/021) are identified in the extreme weather action plan in accordance with standard NR/L1/CIV/032 [Management of Structures].*

*The contents of the extreme weather plan include direction and guidance on management of structures when reopening a line following a period of extreme weather. For an extended period of cessation, existing processes are already in place.*

6. In considering Network Rail's response the ORR concluded that the response:

- does not define what an 'extended cessation to traffic' is;
- does not explicitly require the extreme weather plan to define the arrangements to be taken prior to reopening a line to traffic;
- does not adequately address the risks associated with ice formation as the scope of the extreme weather plan appears to be limited to scour, storms, flooding and high tides;
- the extreme weather plan does not have to contain guidance referred to in NR/L3/TRK/1010 clause 6.1; and requires engineers who may not have the relevant competence in structure related matters to review the plan and identify precautions, intervention levels and actions to be taken.

7. ORR therefore wrote to Network Rail on 20 January 2012 seeking further information.

8. Network Rail provided a joint response to recommendations 2 and 3 on 13 March 2012. This response is shown under recommendation 3 (to avoid duplication).

### **ORR Decision**

9. After reviewing all the information received from Network Rail 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.

ORR will write to RAIB again if it becomes aware that the information above is inaccurate.

**Status: Network Rail is taking action to implement the recommendation**

### **Recommendation 3**

*The intent of this recommendation is to ensure that the hazards of ice formation on structures and the subsequent hazards during thaw conditions (e.g. ice falls onto the track) are included throughout Network Rail's weather management processes, so that they can be risk assessed and mitigated. For example, extreme cold weather events are not specifically included within NR/L3/TRK/1010 [Management of Response to Extreme Weather Conditions at Structures, Earthworks & other Key Locations] and EWAT [Emergency Weather Action Team] conferences do not consider the hazards that might be present when operating trains once extreme cold weather conditions end and a thaw sets in.*

Network Rail should review and implement changes to its weather management processes to take into account the potential hazards created by extreme cold weather events and subsequent thaw conditions (paragraphs 150a and 151d).

#### **Details of steps taken or being taken to implement the recommendation**

10. Network Rail in its response of 30 November 2011 advised ORR that:

*A guidance document has been produced for the routes and it was provided to them on 29 October 2011, based upon the findings from the Summit Tunnel incident and building upon the principles of the National Safety Alert.*

*This guidance document helps the routes identify tunnels with the highest risk of ice formation and a trigger based warning system informing them of when examinations for ice are required. In addition, it also gives the routes guidance on how these examinations can be completed safely.*

Network Rail provided ORR with copies of:

- Cold Temperature Guidance Note for High Risk Tunnels; and
- LNW – Cold Temperature Instruction for High Risk Tunnels

11. In considering Network Rail's response the ORR concluded that there were inconsistencies in the response and supporting documents provided by Network Rail. In addition the response did not address the safety risk to track workers from potential hazards created from extreme cold weather. ORR therefore wrote to Network Rail on 20 January 2012 seeking further information.

12. In a further response on 13 March 2012 Network Rail advised ORR that:

*To address recommendations 2 and 3:*

*Network Rail has produced an 'At Risk Register' list of structures and earthworks assets which are considered to be particularly vulnerable at times of frost/snowfall.*

*Network Rail plan to re-issue standard NR/L3/TRK/1010. This will include the addition of reference to cold weather in Section 1 and updates to sections 6 and 7 referring to the build-up of ice within tunnels during cold weather. Section 7 will also*

*request that Tunnel Ice Risk Assessments are produced for all 'at risk' structures. Each risk assessment will detail the following:*

- *The name of the structure*
- *The start and end mileages*
- *The controlling signal box*
- *The signals relating to operations through the tunnel*
- *The presence of over head lines*
- *Access point for both vehicular and pedestrian access*
- *Trigger points for ice inspections based on:*
  - *Level of service through the tunnel*
  - *Local low temperatures and durations*
- *Who is to carry out an ice inspection, the regularity of inspections and when the inspections are stopped*
- *Who is responsible for deciding that ice is to be removed*
- *Where ice is expected to form on the tunnel*
- *The local process for removal of ice from the tunnel and by whom it is completed*
- *Management arrangements for 1<sup>st</sup>/subsequent services;*
- *Where the document is to be held within the route*
- *The form's responsible owner, review and approver*

*When an ice patrol is completed as required by the relevant risk assessment, records of what ice was found and what actions were taken will be submitted to the structures team and stored within the appropriate asset management system.*

*Finally, TWI 3G024 [How to manage exceptionally low temperatures] will be revised to provide further information on the risks associated with ice build-up within tunnels and tunnel shafts, (as detailed in response to recommendation 4).*

*Network Rail is targeting the revised issue of NR/L3/TRK/1010 and TWI 3G024 by October 2012.*

## **ORR Decision**

13. After reviewing all the information received from Network Rail 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.

ORR will write to RAIB again if it becomes aware that the information above is inaccurate.

**Status: Network Rail is taking action to implement the recommendation**

## **Recommendation 4**

*The intent of this recommendation is to give Network Rail staff the skills and knowledge to carry out additional inspections to look for ice on structures during periods of extreme cold weather, as Network Rail infrastructure maintenance's routine inspection regime may be too infrequent. Staff need to know what they need to do, where and when they should be doing it and the actions they should take once ice is found. This will support the implementation of NR/L3/TRK/1010 [Management of Response to Extreme Weather Conditions at Structures, Earthworks & other Key Locations] and the extreme weather plan, which require these additional inspections to take place. The staff undertaking these inspections should also know what potential hazards may be present and understand how to do the inspections while maintaining their own safety.*

Network Rail should provide training and information to its staff on carrying out the inspections of those structures which are at risk from ice in extreme cold weather. The training and information should include guidance on managing the hazards to staff while carrying out these inspections (paragraphs 149c and 149d).

### **Details of steps taken or being taken to implement the recommendation**

14. Network Rail in its response of 30 November 2011 advised ORR that:

*An 'at risk' structures register is produced and maintained by Territory Civil Engineer [now Route Asset Manager (Structures)] Document NR/L1/CIV/032 [Management of Structures] details the criteria under which this document should be reviewed and re-issued. In accordance with NR/L2/OPS/021 [Weather - Managing the Operational Risks], Engineering [now Asset Management, which includes Maintenance] has a presence on the Extreme Weather Action Team where this information can be disseminated.*

*In addition to this, and in accordance with NR/L3TRK/1010 [Management of Responses to Extreme Weather Conditions at Structures, Earthworks & Other Key Locations], the Track Maintenance Engineer shall in consultation with Infrastructure Maintenance Engineer review the Extreme Weather Plan and identify precautions, intervention levels and actions for which the need for response may arise. This may or may not include ice patrols/proving trains/etc. These shall be documented locally and briefed to all staff involved with documented weather management and reviewed at least annually. A guidance document and presentation will be issued on Friday 25th November in LNW to highlight cold weather procedures, risks and mitigation measures with regard to ice within tunnels. This will then be disseminated to each route via issue to the Asset Manager (Structures).*

*Local maintenance staff already complete ice patrols, and as such risk assessments and related training linking to Track Work Instruction 3G024 [How to manage exceptionally low temperatures] should already be in place within the routes.*

Network Rail provided ORR with a copy of: TWI 3G024 'How to manage exceptionally low temperatures'

*Additionally guidance is available in Railtrack's 1999 handbook "Working in Cold Weather". The Track Maintenance Engineer shall review the requirements of the Extreme Weather Plan with the Infrastructure Maintenance Delivery Manager and*



*the Section Manager [Track] to confirm that there are appropriate resources at each depot to enable inspections or suitable mitigation should the adverse weather require it.*

*The guidance note and presentation on cold weather management of tunnels will be issued to all routes by the 8th December 2011.*

*Timescale: 8 December 2011*

15. In considering Network Rail's response the ORR concluded that there was not sufficient clarity in the response and supporting documents to provide staff with the necessary information and training to safely carry out inspection of structures at risk from the build-up of ice in cold weather. ORR therefore wrote to Network Rail on 20 January 2012 seeking further information.

16. In a further response on 13 March 2012 Network Rail advised ORR that:

As stated above, Network Rail has produced an 'At Risk Register' list of structures and earthworks assets which are considered to be particularly vulnerable at times of frost/snowfall and distributed this list to all routes.

A 'Managing Risks in Freezing Weather' presentation has been made to Route Maintenance Directors.

Extreme Weather Guidance booklets were issued to patrollers in autumn 2011. This includes tables designed to provide guidance when a problem is found.

As part of the improved processes under recommendations 2 and 3, the observance of ice accumulations remains as part of the track patrollers' basic ice patrol. Where ice is observed and it is outside the scope of maintenance competency to remove, the issue will be escalated to enable competent 3<sup>rd</sup> party suppliers to be mobilised.

The EWAT conference call serves as the correct forum for other issues to be addressed in respect of ice in tunnels and technical advice. Attendance by Structures Asset Management at these forums now forms part of the new improved processes.

17. ORR queried this response further on 19 March 2012 and in a supplementary response on 30 March 2012 Network Rail advised ORR that:

*There are a number of third party suppliers around the country who have the capability and competence to remove ice from tunnels. These suppliers services are procured through 'Minor Works Contracts'. The selection process for such suppliers includes the following:*

- *Network Rail chooses Contractors for tenders for Minor Works contracts from an approved suppliers list, all of which have a Railway Safety Case.*
- *The sort criteria for the Expressions of Interest for the maintenance contract (which includes Summit tunnel) were all suppliers to be Principal Contractor Licence holders and fully covering Product Code 8 (Building Works) and 12 (Civils) which includes code 1204 Tunnels.*
- *The then B&C North HSQE Manager reviewed both the Tenders and the Pre-Qualification Questionnaires.*

*In terms of the scope the specification: Tunnel works are specifically included in clause 2.01 of Schedule 3-4.3 Specification Workslope. Under Network Rail's contract administration activity: works are audited on site by Site Managers, Scheme*

*Project Managers and Project Managers and the contractors are monitored through KPIs.*

*Following an EWAT decision to remove ice from a tunnel shaft, a Task Briefing Sheet detailing the safe method of working is prepared and approved prior to ice removal. This ranges from hanging icicles being 'knocked off' with a long pole to roped access in the shaft and the use of breakers. Upon completion of the task, the site paper work is uploaded into 'Monitor' (Network Rail's Civils database/remit instruction/payment tool) for payment, audit and close out of the works.*

## **ORR Decision**

18. Network Rail's responses to recommendations 2 and 3 need to be considered along with Network Rail's response to this recommendation to provide a complete response to this recommendation.

19. After reviewing all the information received from Network Rail 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.

ORR will write to RAIB again if it becomes aware that the information above is inaccurate.

**Status: Network Rail is taking action to implement the recommendation**

## **Recommendation 5**

*The intent of this recommendation is for safety actions and safety related information originating from Network Rail's buildings and civils – asset management function to be managed to an appropriate conclusion when it is passed to other parts of Network Rail's organisation.*

Network Rail should put in place processes for the management and distribution of safety actions and safety related information originating from Network Rail's buildings and civils – asset management function. This should include a process for systematically reviewing the resolution of necessary safety actions and a process for passing safety related information to other parts of Network Rail's organisation, including confirmation that it has been received, understood and acted upon (paragraphs 151a and 151b)..

## **Details of steps taken or being taken to implement the recommendation**

20. Network Rail in its response of 30 November 2011 advised ORR that:

*Following devolution, a full review of the dissemination of safety related information between centre and devolved routes and within each devolved route will be undertaken at the beginning of the next financial year.*

*Timescale: 30 October 2012*

21. In considering Network Rail's response the ORR concluded that the timescale given to carry out a review appeared too long with no specific timescale for

completion, in that the review will not be undertaken until the next financial year. ORR therefore wrote to Network Rail on 20 January 2012 seeking details of any interim measures implemented pending completion of its review and for the outcomes and any actions to be taken as a consequence of its review.

22. In a further response on 13 March 2012 Network Rail advised ORR that:

*Network Rail is still in the process of devolution. A full review of the dissemination of safety related information is planned to occur in the summer of 2012. In the interim we are enhancing the Infrastructure Group Safety Bulletins in accordance with the attached flow chart. (Annex B)*

23. In considering Network Rail's response the ORR wrote to Network Rail on 23 April 2012 requiring Network Rail to advise the outcome of its review, including reasoning and conclusions and any actions, including any associated timescales, it will be taking to address this recommendation. ORR asked Network Rail to respond by end of August 2012.

### **ORR Decision**

24. After reviewing all the information received from Network Rail 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 – we expect to update RAIB on the outcome of Network Rail's review by November 2012***