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3 April 2014

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

Dear Carolyn,

**RAIB Report: Derailment in Summit tunnel, near Todmorden, West Yorkshire,
28 December 2010**

I write to provide an update¹ on the consideration given and action taken in respect of recommendation 1 which was addressed to ORR in the above report, published on 29 September 2011.

The annex to this letter provides details of the action being taken. The status of this recommendation is now 'In-progress'. ORR will update RAIB by 31 March 2015.

We will publish this response on the ORR website on 25 April 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 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.

Brief Summary of what was previously reported to RAIB

1. Network Rail reported that the ring-dams and downpipes had been cleaned out and, where necessary, renewed.
2. Network Rail commissioned a 'Tunnel Ice Formation Mitigation Project' to look into long term solutions for the prevention and/or management of ice within tunnels. As part of this project trials were arranged to determine the effectiveness of shaft cowls as a means of raising the air temperature within tunnel shafts.
3. Network Rail planned to monitor temperature and air flow in shafts where 'temporary' cowls were installed, and to use their findings to develop a 'standard' cowl design which would allow for the incorporation of site specific parameters.

Update

4. On 30 January 2014, Network Rail stated that:

Completion of Tunnel Ice Formation Mitigation Project data gathering exercise

The Tunnel Ice Formation Mitigation Project was commissioned to look into long term solutions for the prevention and/or management of ice within tunnels. The ice mitigation principle of this study is to keep shaft temperatures above freezing, by reducing the intake of cold external air into shafts without compromising passenger aural comfort and smoke dispersion in the event of a fire.

Temporary cowls were installed to 1 No. shaft at both Summit and Blea Moor Tunnels. Further shafts at both locations were left uncapped but fitted with monitoring equipment to act as a 'control' for the evaluation of the data gathered from the capped shafts.

The findings of the project are summarised below:

- 1) *In very cold periods, the capped shafts remained significantly warmer than the uncapped shafts.*
- 2) *At no point during the trials did any part of a capped shaft drop below zero, therefore there was no risk of ice formation.*
- 3) *For several periods during the trials, parts of the uncapped shafts dropped below zero, which could have facilitated ice formation.*
- 4) *Ventilation control appears to offer significant reduction in the risk of ice formation in shafts, although it was noted that the weather during the trial period was not as*

severe or prolonged as Winter 2010/2011 when the derailment occurred in Summit tunnel

5) The completed monitoring exercise provided the design philosophy for the permanent installation at Summit Tunnel, confirming that the principle that impeding air flow through the shafts viably raises ambient temperature and therefore mitigates against the formation of ice.

6) The design development of the permanent installation will need to consider the long-term impacts of reducing shaft ventilation with regard to smoke evacuation/fire safety, air quality and to satisfy mandated aural comfort criteria.

7) Post-installation monitoring will be undertaken to validate performance of the installed cowl.

Implemented measures to mitigate ice formation

Remedial works to improve water management have been completed as noted above.

A temporary shaft cap has been installed to Summit Tunnel Shaft No.10 as part of the Tunnel Ice Formation Mitigation Project and was found to be effective in mitigating ice formation. This shaft cap will be maintained, and now that monitoring is completed and monitoring equipment removed, a temporary shaft cap can be fitted to Shaft 11. Works to fit this shaft cap will be completed by 31st October 2014. These cowls will ensure ambient temperatures remain above freezing in the applicable shafts.

A CCTV camera was installed beneath shaft 10 as part of the Tunnel Ice Formation Mitigation Project to validate the results of the monitoring undertaken. This was found to have limited value as clear views up the shaft were not possible. The power and communications to support the CCTV remain in place and will be re-activated if prolonged cold weather is forecast.

Installation of Permanent Cowls

A project to undertake renewal works to the Shafts 10 & 11 in Summit Tunnel has been implemented.

This project will address condition issues that are the root cause of significant water ingress; poor brickwork and corroding metallic shaft eye structures, as well as installing permanent cowls to reduce risk of ice formation from residual water ingress.

The current programme for completion of these works is 31st March 2016, subject to consents and development.

The design of the permanent cowl structures will utilise the now validated findings of the Tunnel Ice Formation Mitigation Project. Until the permanent cowls are installed, the temporary cowls, which were found to be effective in mitigating ice formation, will be maintained on shafts 10 & 11 where significant ice formation occurred in the winter of 2010/11.

ORR Decision

5. Network Rail has reviewed the arrangements for managing water and ice within Summit tunnel. It has also taken action to implement the findings of this review:

- Ring-dams and downpipes have been cleaned out and, where necessary, renewed;
- A temporary cowl has been installed on shaft No.10. Another is to be installed on shaft No.11 by 31 October 2014; and
- Permanent cowls are to be installed by 31st March 2016.

6. Network Rail currently anticipates that all 'temporary' works will be complete by 31 October 2014. Following completion of these works, ORR will meet again to consider whether or not the recommendation can be formally closed.

7. After reviewing all the information received, ORR has 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 31 March 2015.