Chris O'Doherty
RAIB Relationship and Recommendation Handling
Manager
Telephone: 020 7282 3752
E-mail: chris.o'doherty@orr.gsi.gov.uk

13 October 2014

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

Dear Carolyn,

RAIB Report: Near miss incident at Ufton Automatic Half Barrier Crossing, Berkshire, 4 September 2011

I write to provide an update[1] on the action being taken in respect of recommendations 1 - 5 and 7 addressed to ORR in the above report, published on 20 December 2012.

The annex to this letter provides details of the action being taken:

- The status of recommendation 1 is 'Implementation On-going'. ORR will advise RAIB when actions to address this recommendation have been completed.
- The status of recommendation 2 is 'In-progress'. ORR is continuing to engage with Network Rail and will update RAIB by 30 May 2015.
- The status of recommendation 3 is 'Implementation On-going'. We will confirm when the correct indication has been applied as part of the RORI B&H project, due to be commissioned in October 2014.
- The status of recommendation 4 is 'In-progress'. ORR will update RAIB by 27 February 2015.
- The status of recommendation 5 is 'In-progress'. ORR is continuing to engage with Network Rail and will update RAIB by 30 May 2015.
- The status of recommendation 7 is 'Implementation On-going'. ORR will advise RAIB when actions to address this recommendation have been completed.

We will publish this response on the ORR website on 31 October 2014.

Yours Sincerely,

Chris O'Doherty

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[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 ensure that signallers can see appropriate information on the VDU screen when considering whether to remove reminders from signals and points using controls on IECC workstation VDUs. These include reminders on signals that are used to protect an automatic crossing under local control.

Network Rail should identify, and provide a time bound plan to eliminate, all IECC VDU controls which permit a signal or point reminder to be removed in situations where the signaller cannot see sufficient on-screen messages and indications to inform the decision whether to remove the reminder.

Brief Summary on what was previously reported to RAIB on 17 June 2013

A study will be carried out in order to identify all of the cases of IECC signal/point reminder controls being applied to protect access to level crossings, track sections etc. where the requirement to protect the section is shown by an on-screen message or indication. This will then feed into a survey of all current IECC maps to identify where the item of infrastructure and the protecting signal (or set of points) are presented on different screen maps.

With the number of maps identified, the cost of modifying the maps to ensure that the signal is on the same map can then be estimated, allowing for any opportunities afforded by planned infrastructure upgrades or re-controls. To quantify the benefits, this cost of making the change will then be compared against the potential safety benefits. This will form part of the same work programme and risk assessment study as Recommendation 2 and the results will be presented in a single consolidated cost-benefit risk assessment report.

Update

1.   On 23 June 2014, Network Rail provided ORR with an update:

A risk assessment was completed to compare selected mitigation(s) for potential human errors caused by shortcomings in the information presented on the signallers' screens. This examined all occasions when reminders are used, but focused on those occasions where reminders are used to protect infrastructure that has a status displayed, but are not interlocked with the signalling system (as those that are interlocked are already protected).

A survey of all IECC maps was undertaken to identify all cases where an item of infrastructure and the protecting signal (or set of points) are presented on different screens. This identified that the only cases where this risk is relevant on IECC maps is for Automatic Half Barrier Crossings (AHBCs).

Four mitigation options were identified and assessed in response to this recommendation:

1.1   Modifying maps such that the crossing is on the same map as its protecting signals;

1.2   More extensive modification of the maps such that the crossing is on the same map as its protecting signals and also the signal prior to the protecting signals (to eliminate use of isolated exits to set a route over the crossing);

1.3   A change to the software for isolated exits such that they cannot be used to remove reminders from a protecting signal on another map;

1.4   Replicating the level crossing status text ('failed/local control') where the protecting signal is on another map.

The cost of modifying the maps for each of these options was estimated using data provided by the IECC supplier, Delta Rail.   A risk assessment model was then constructed to estimate the risk of the current situation and the revised risk for each of the above mitigating options. This utilised level crossing specific data and calculated human error probabilities were used to derive a risk based on fatality weighted injuries. The monetary value of preventing a fatality was then compared with the cost of implementing each mitigation to determine cost versus benefit over a range of pay-back periods. To be considered for implementation, the value of preventing a fatality (benefit) was required to be at least twice the cost of implementation in accordance with Network Rail investment rules).

The conclusions resulted from the risk assessment for implementation as a result of the assessment:

1.   The most effective option was found to be mitigation 1.4 - a 'failed/local control' message provided on both screens in order to provide appropriate information for signallers on both screens when considering whether to remove reminders.

2. The value of implementing this mitigation is heavily dependent on the usage characteristics of the level crossing and when it is operated under local control/failed conditions in a typical year. For one workstation, investing in mitigation 1.4 could be justified based on a pay-back period of seven years, for another workstation the minimum pay-back period was calculated to be fifteen years.

The risk assessment recommends that:

1.   Mitigation 1.4 should be implemented on existing IECC workstations where the residual life provides a positive business case. A risk assessment model is available to assist the Routes in carrying out this assessment.

2.   A requirement to address this risk should be raised with Infrastructure Project teams based on either screen layout changes (mitigation 1.2) or repeated status indications (mitigation 1.4). This would then be applied to all new schemes that modify workstations for all types of VSCS.

Following the risk assessment, the Professional Head of Signalling instructed the affected Route Asset Managers to derive plans for implementing recommendation 1 above. The resulting plans for implementation are included in a time-based plan document (attached). The plans vary according to the specific risks posed by each level crossing and the opportunities presented to remove the risk through planned infrastructure schemes.
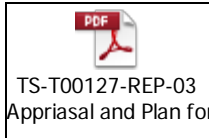
The requirement to address this risk on new schemes has been instructed via publication of a Signal Engineering Noticeboard item (attached).

Supporting evidence:

Recommendations arising from the Investigation into near-miss at Ufton AHB Crossing, 04/09/2011: Risk Assessment Report, Ref: TS-T00129-REP-01, Revision 1 April 2014.

Ufton RAIB Recommendation 1: Time-Based Plan for Modifications to IECC Workstations, Ref: TS-T00127-DOC-03, Issue 1.1, 16 June 2014.

Signalling Control System Design to Mitigate Risks Highlighted by Ufton Level Crossing Incident, Network Rail, Signal Engineering Noticeboard, NB 133, 29/05/2014, Issue 1.

| TS-T00127-REP-03 Appriasal and Plan for | Ufton Rec 1 NR-NB133.pdf | Ufton Rec 1 report Issue 1.pdf |

2.   On 1 September 2014, Network Rail provided ORR with an update:

In June 2014 the following actions had been completed:

1. *A risk assessment was carried out to evaluate a number of options to modify IECC signalling control systems and the cost/risk reduction benefit of implementation;*

2. *It was determined that there could be a positive cost/risk benefit for making changes to IECCs, assuming that other means did not exist to address the hazard (e.g. level crossing closure). Hence, a policy paper was issued to the relevant Route Asset Managers requesting that they determine what action to take on their IECCs;*

3. *The resulting action plans from the Routes were compiled into a single time-bound plan for implementation. It should be noted that dependent on the specific risk at the level crossing, some remedial plans were based on up to a ten year time frame for completion.*

This was deemed to have addressed the intent of the RAIB recommendation and hence a closure statement was issued. However, it has now been determined that this action should be kept open until the following steps have been taken:

1. *Interim mitigating actions have been applied to control the risk where the implementation period is extensive. This is expected to involve some form of awareness briefing or training for affected staff (AMS [Asset Management Services] activity in collaboration with Network Operations);*

2. *Responsibility for completion of the time-bound plan and hence final closure of this action is transferred to Network Operations from AMS (S&SD [Safety & Sustainable Development] activity to propose and agree arrangements)*

A further extension to this timescale for the closure or transfer of this action is therefore requested to complete item 1 and 2 above. It is proposed that the closure date is extended to 31 December 2014 to give adequate time to implement the mitigating actions (develop, agree and implement) and to complete the transfer of a new or extended action to Network Operations.

ORR Decision

3.   Network Rail has still to implement the mitigating actions (develop, agree and implement) and to complete the transfer of a new or extended actions to Network Operations.

4.   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 by 31 December 2014.

Status: _Implementation on-going._ _ORR will advise RAIB when actions to address this recommendation have been completed._

Recommendation 2

The intent of this recommendation is to provide an interface which reduces the likelihood of IECC signallers setting a route over an automatic half barrier level crossing under local control without advising the level crossing attendant and cautioning the train driver.

The intent will be satisfied if a similar message is displayed in other crossing failure conditions and/or if the interface is provided within IECC software in a manner which provides a lower safety integrity level than required for some other signalling applications.

In respect of automatic half barrier level crossings supervised from IECC installations, Network Rail should consider interfacing information about level crossing status with signal controls to reduce the risk of signallers permitting a train to pass over the crossing without applying the rules applicable to local control.

Network Rail should include consideration of a warning or reminder which must be acknowledged on each occasion that a signaller attempts to set a route over a level crossing under local control. If found practical, Network Rail should modify standards and specifications to require this feature in future IECC upgrades and new installations.

Brief Summary on what was previously reported to RAIB on 17 June 2013

A study will be carried out in order to develop and investigate options for software changes to IECC workstations that either; prevents a signaller from removing a protecting reminder; or which prompts the signaller each time they override a protecting reminder at a level crossing, reminding the signaller that the crossing is under local control.

The cost of making the changes to IECC for future applications can then be estimated, including any additional design and testing costs that will add to the on-going scheme design. To quantify the benefits, this cost of making the changes will then be compared against the potential safety benefits. This will form part of the same work programme and risk assessment study as Recommendation 1 and the results will be presented in a single consolidated cost-benefit risk assessment report.

Timescale: 30 November 2013 for cost-benefit assessment report.

Update

3.   On 8 May 2014 Network Rail provided ORR with a copy of its 'Recommendations Owners' Form' This provided the additional information:

A risk assessment was completed to compare selected mitigation(s) for

potential human errors caused by shortcomings in the information presented on the signallers' screens. This examined all occasions when reminders are used, but focused on those occasions where reminders are used to protect infrastructure that has a status displayed, but are not interlocked with the signalling system (as all those that are interlocked are already protected).

A survey of all IECC maps was undertaken to identify all cases where an item of infrastructure and the protecting signal (or set of points) are presented on different screens. This identified that the only cases where this risk is relevant on IECC maps is for Automatic Half Barrier crossings.

Four mitigation options were identified and assessed in response to RAIB recommendation 2:

2.1 Software prompt requiring signaller to provide confirmation before allowing route to be set over a level crossing in failed state/local mode;

2.2 Protecting reminder prevented from being removed whilst level crossing in failed state/local mode;

2.3 Software prompt requiring signaller to provide confirmation before allowing protecting reminder from being removed whilst level crossing in failed state/local mode;

2.4 Software prompt requiring signaller to provide confirmation before allowing a one-shot override of any reminder protecting a level crossing in failed state/local mode.

The cost of modifying the IECC software for each of these options was extrapolated from data provided by the IECC supplier, Delta Rail. A risk assessment model was then constructed to estimate the risk of the current situation and the revised risk for each of the above mitigating options. This utilised level crossing specific data and calculated human error probabilities to derive a risk based on fatality weighted injuries. The monetary value of preventing a fatality was then compared with the cost of implementing each mitigation to determine cost versus benefit over a range of pay-back periods. To be considered for implementation, the value of preventing a fatality (benefit) was required to be at least twice the cost of implementation (in accordance with Network Rail investment rules).

The following conclusions resulted from the assessment:

1. The most effective option was found to be mitigation 2.1 - a software function that requires a signaller to confirm before allowing a route to be set over an infrastructure item that has failed;

2. It is not clear how this would be applied to an infrastructure item protected by an automatic signal (since a route is not set as such) and this would need to be addressed either in the software design or by converting the protecting signal to a controlled signal;

3. The risk assessment considering the campaign installation of this change on all IECC workstations determined that this would require operation over a fifteen year period to achieve an acceptable pay-back on the initial investment.

The risk assessment report therefore recommends that:

1.   Mitigation 2.1 should not be implemented on existing IECC workstations. The modifications proposed in response to RAIB Recommendation 1 should be applied to address the risk for IECCs

2.   Mitigation 2.1 should be implemented on future control system software platforms. In particular, the traffic management control system.

The risk assessment also includes the following observations:

3.   A systematic study should be carried out of operational practices and experiences in the use of reminders on signalling systems as a means of protecting staff and train movements. This should take into account:

a.   The ability to remove a reminder from a signal using the isolated exit symbol without being necessarily being able to see any detail of the infrastructure being protected on the screen that includes the protecting signal;

b.   The use of a single reminder on a signal to provide protection for multiple activities (such as for a possession and for a level crossing under local control in the Ufton incident), leading to the potential that the reminder is removed when one of the activities is complete, either by error or because the signaller on duty is unaware of all it has been applied to protect.

4.   For the Traffic Management system, a change should be implemented to the way in which inhibits are applied to movements into a track section or over an item of infrastructure that is in a failed state. It is recommended that inhibit controls placed on signals should be replaced by the implementation of a 'track reminder' that prevents routes being set into the protected section such that the inhibit control is specific to the track section at risk. This should also include labelling to clearly identify the reasons it has been applied (which may be for more than one reason).

Requirements to address this recommendation are to be incorporated into Baseline 4 of the Traffic Management specification. This functionality may be implemented as part of the first deployment of Traffic Management (December 2015), or, subject to risk assessment, implemented first in the next tranche of Traffic Management deployments.

ORR Decision

4.   Network Rail has still to decide on how the functionality may be implemented either as part of the first deployment of Traffic Management (December 2015), or, subject to risk assessment, implemented first in the next tranche of Traffic Management deployments.

Status: In progress. ORR is continuing to engage with Network Rail and will update RAIB by 30 May 2015.

Recommendation 3

The intent of this recommendation is to ensure that, when automatic half barrier level crossings are under local control, IECC displays provide conspicuous warnings compatible with Network Rail's IECC control and indication specification.

Network Rail should review the local control indications displayed in respect of automatic half barrier level crossings on the Thames Valley Signalling Centre (TVSC) VDUs to identify any inconsistencies with the associated Network Rail specification requirements. If any of these inconsistencies have the potential to have a significant adverse effect on safety, Network Rail should amend the indications displayed at TVSC and/or the Network Rail IECC control and indication specification so that appropriately positioned conspicuous indications are displayed on all IECC VDUs.

Brief Summary on what was previously reported to RAIB on 14 February 2013

Ufton Crossing is the only AHBC currently under the control of Thames Valley Signalling Centre. A review of the nature of the position and message provided and the risk that this poses for the operation took place on 7 March 2013. The review took into account the prominence of the indication and (given that it is recognised that the indication does not conform to section 23.2.2 of NR/SP/SIG/17504) the wording.

At the review it was agreed that there is an opportunity to make alterations to the signallers display when the relocking works take place for this section of line in September 2014. Making alterations at this point would have minimal impact on the other works in this area.

Update

5.   On 9 April 2014 Network Rail provided ORR with an update stating that:

The indications provided on the IECC at TVSC are inconsistent with the standard. However, the indication is directly comparable to the details that were on the old panel at Reading which is where this section of line was formerly controlled from. The signallers and signalling management team were questioned as to their understanding of the meaning of the "Failed" indication and it is clear that, irrespective of the actual wording, they understand that it may be a technical failure or local control. i.e. there is a reason that normal running is not possible over the crossing.

In the short term, this issue is not seen as presenting any risk since the signallers have come from Reading panel or, as was the case when the site visit took place, are trained by those who have, so the meaning is understood. However, in the future, other AHB crossings will be controlled from TVSC and there is the intention for signallers to move between workstations. The remit will therefore be given to the Reading Outer Relock and Immunisation project (RORI) to change the wording to that given in the standard.

It was also noted that the barriers up indication should be shown in RED NR/SP/SIG/17504, section 22.13.2 whereas it is shown in white currently. The standard does not call for BARRIERS DOWN but this is currently provided. This anomaly will also be addressed by RORI.

The requirements here have been included in the work scope for the RORI B&H project and are being incorporated into the design. Network Rail is waiting for the finalised screen layouts showing the correct indication for approval from the display system contractor. The overall project is on schedule for commissioning in October 2014.

ORR Decision

Network Rail has carried out a review and has concluded that the issue is not seen as presenting any risk in the short term, as the meaning is understood. However, the displayed text specified in the standard has been included in the work scope for the RORI B&H project to be implemented October 2014.

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: *Implementation On-going.* *We will confirm when the correct indication has been applied as part of the RORI B&H project, due to be commissioned in October 2014.*

Recommendation 4

The intent of this recommendation is to ensure that the planned arrangements for: setting up, alteration and handing back of possessions, and any planned signalling input to associated activities, does not cause an excessive workload for any signaller.

Network Rail should examine and implement ways in which the workload of signallers can be kept within reasonable levels during engineering possessions, particularly those involving multiple changes to possession limits. This work should aim to avoid, where practical, situations in which signallers must delay engineering work or train services in order to avoid excessive workload.

Brief Summary on what was previously reported to RAIB on 17 June 2013

Network Rail has identified that the workload of a signaller has increased not only due to engineering requests but also in the number of requests for Line Blockages.

The Line Blockage tool is the first of a number of tools to identify and recommend limitations on the workload of Signallers. It is hoped that the line blockage tools will be fully in place by March 2013 with a review and feedback event planned for June 2013 to feedback in to the National Line Blockage Group.

The next step is to look at Engineers Possessions and to understand the planning process so the workload can be managed at this stage rather than when it gets to the signaller.

Update

6.   On 1 September 2014, ORR obtained a verbal update from Network Rail:

Informal feedback up to now suggests a broadly positive reaction to the trialled procedures for assessing possession signaller workload overall, but some pushback from some Operations Managers (OMs) due to the procedure giving OMs some more work.

Network Rail believes the process needs some more development but can't be firmer than this until they have reconvened to properly discuss findings with staff

involved in the 2 month trial – meeting planned by end of September 2014 following summer leave absences.

Network Rail intends to update ORR by 30 September 2014.

ORR Decision

7.   Network Rail believes the process needs some more development and has planned a meeting to take place by the end of September 2014.

Status: *In progress.* *ORR will update RAIB by 27 February 2015.*

<u>**Recommendation 5**</u>

The intent of this recommendation is to assist incident investigation and competence management of signallers by recording, and facilitating playback of, all signallers' actions during their work at workstations included in future IECC projects.

Network Rail should modify appropriate standards and specifications so that future IECC installations include a system to fully record signaller's actions. Information recorded should include:

- Reminder appliance override;
- Signaller's selection of VDU view; and
- The view used when controls are operated using a VDU view.

Where practical, the system should incorporate a playback feature.

Brief Summary on what was previously reported to RAIB on 17 June 2013

A specification will be generated for data that can be logged on signaller actions when operating an IECC workstation. The technical feasibility and options for logging the data (with both current IECC architectures) will be explored and alternative solutions such as video capture of screen interactions will also be considered. Estimated costs for adding this functionality for future upgrades and on new IECC workstations will then be established.

A survey will also be carried out, amongst Local Operations Managers and Incident Investigators, in order to review and estimate the benefits of the changes against the costs. Modifications of the standards will be made based on the outcome of the cost-benefit review.

8.   On 23 June 2014, Network Rail provided ORR with a copy of its Recommendation Owners' Form.

Extract; Part D Closure Statement:

This recommendation involved assessing whether there was a case to improve the requirements for recording facilities within Network Rail's IECC so that Network Rail could be clearer about a signaller actions and what screen they were in when they undertook specific actions as a way of enhancing the investigation process.

Research has been undertaken which has involved interviews with Line Managers, Investigators and the Competence team in Operations. This highlighted that as well as benefits to the investigation process, providing full play facilities supported improvements in competence management and had an impact on performance management in being able to provide an accurate and objective account of a

signallers actions quickly thus saving on time resolving performance disputes and time spent undertaking technical investigations.

The recommendations from the work are to include full playback facilities in future systems, specifically traffic management and a set of requirements have been included for first deployment sites of traffic management.

It is also recommended that the requirements are included in any further revisions to the IECC products, although at this stage it is not clear what the strategy is for IECC given the introduction of traffic management.

The case for improving playback facilities for our current IECC systems is less clear cut. This is a function of the remaining life time of the IECC facility and the level of incidents in an area that particularly benefit from having play back facilities (such as wrong side failures). Therefore a set of requirements for play back facilities have been developed together with some guidance on the benefits arising from full play back facilities which the Routes can use to assess and develop a business case on a site by site basis.

ORR Decision

9. Network Rail has still to explain how it is to modify appropriate standards and specifications so that future IECC installations include a system to fully record signaller's actions.

Status: *In progress.* *ORR is continuing to engage with Network Rail and will update RAIB by 30 May 2015.*

Recommendation 7

The intent of this recommendation is to correct a misunderstanding among some engineering supervisors concerning the requirement for red lights or flags to be displayed at level crossings at all times when they are under local control unless the barriers are lowered.

Network Rail should re-brief staff that level crossing attendants' red lamps/ flags must never be removed when level crossings are under local control and the barriers are raised or the gates are open.

Brief Summary on what was previously reported to RAIB on 14 February 2013

A Briefing event is to be cascaded through NCCA Sentinel to all those holding ES [Engineering Supervisor] or AUX LXA [Auxiliary Operating Duties - Level Crossing Attendant] Competences – to provide details of the above incident and act as a reminder of the requirements for red lamps/flags at level crossings under local control.

This will be distributed via an email alert to all sponsors in June 2013, with a timescale of three months to complete the briefing process. Briefing events are to be logged on NCCA Sentinel website.

Timescale: 30 September 2013.

Update

10.   *On 19 March 2013 Network Rail stated why the timescale had been extended to 1 June 2014:*

The briefing was issued as planned and agreed, however in mandating the recording of the briefing, we have identified that not everyone who should have the briefing has been captured. The extension is required to follow up those that have not had the briefing and where necessary, remove their competencies as a result.

Revised timescale: 1 June 2014

11.   On 18 July 2014, Network Rail advised an extension to the timescale:

All work was completed on time. However, business uptake has been patchy with 2565 people in Network Rail not yet recorded as being briefed as well as 1850 sponsored by external sponsors. A reminder will be sent and those not briefed by 14 September 2014 will have their competence removed.

Revised timescale: 30 September 2014.

ORR Decision

12.   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: *Implementation On-going.* *ORR will advise RAIB when actions to address this recommendation have been completed.*