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11 December 2017



Mr Andrew Hall  
Deputy Chief Inspector of Rail Accidents  
Cullen House  
Berkshire Copse Rd  
Aldershot  
Hampshire GU11 2HP

Dear Andrew,

**RAIB Report: Accident involving a pantograph and the overhead line near Littleport, Cambridgeshire, 5 January 2012**

I write to provide an update<sup>1</sup> on the action taken in respect of recommendation 2 addressed to ORR in the above report, published on 20 May 2013.

The annex to this letter provides details of the action taken regarding this recommendation, the status of which is now '**Implemented**'. We do not propose to take any further action in respect of the recommendation, unless we become aware that any of the information provided becomes inaccurate, in which case I will write to you again.

We will publish this response on the ORR website on 11 December 2017.

Yours sincerely,

Oliver Stewart

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

## Recommendation 2

*The intent of this recommendation is to provide maintenance personnel who are required to check alignment of the overhead line equipment with information that is in a format that can be easily used, and is appropriate for their level of competence.*

Network Rail should review the standards and procedures for the management of overhead line alignment in order to provide maintenance staff with a simple means of relating measurements that are recorded at site to required alignment criteria. The review should include, at least, consideration of:

- providing maintenance staff with information allowing them to determine the acceptable range of contact wire positions at every support; and
- removing the need for maintenance staff to make their own assessment of pantograph movements when determining if adjustments to the overhead line are required

## ORR decision

1. Network Rail has reviewed its OLE standards and has in place arrangements to survey, assess and make alterations to maintain the overhead line geometry in accordance with relevant OLE standards.
2. The assessment of the geometry is carried out by technical staff who have the knowledge to understand the consequences of any alterations on adjacent spans and equipment to bring the geometry into design tolerances using the 'TRAMS' analysis tool 28 days before hands-on maintenance is to be carried out. The output of this work is then provided to the maintenance staff on a 'work arising instruction form' (WAIF). Due to the consequences geometry alterations carried out at one location on other locations, specifically at mid-spans, and the technology presently available ORR accept Network Rail's response as being a reasonably practicable approach to maintaining OLE geometry.
3. ORR does not believe it is possible to provide a range of contact wire positions at every support due to the interactions of the system on adjacent mid-spans with possible alterations at adjacent structures and the consequences on their associated mid-spans. In maintaining the OLE geometry a system approach needs to be taken rather looking at each registration point in isolation.
4. After reviewing the information provided ORR has 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.**

## Previously reported to RAIB

5. On 30 September 2014 ORR reported that all actions by Network Rail would be completed in March 2015 and that we would confirm this in April 2015. See Annex B below for the full response.

## Update

6. On 24 May 2016 (following a number of timescale extensions) Network Rail provided the a closure statement and supporting evidence. ORR wrote back to Network Rail on 1 September 2016 asking for greater clarity on the actions they were taking to address the recommendation:

*'With regard to **recommendation 2**, the outcome of the review of the standards and procedures for the management of OLE was to satisfy the intention of the recommendation '...to provide maintenance staff with a simple means of relating measurements that are recorded at site to required alignment criteria'. However, it is not clear from the closure statement how the review of NR/L2/ELP/21088 and introduction of NR/GN/ELP/27415 achieves this.*

*The closure statement refers to an approach of technical staff measuring the static contact wire geometry relationship with the track (prior to programmed maintenance of the OLE) to assess the geometry and then issue the maintenance staff with alterations to bring the geometry within the OLE design range parameters.*

*Could you explain in more detail how the maintenance staff is to be provided with a simple means of relating measurements that are recorded at site to required alignment criteria (how is this to be done?), and if possible, provide an example Ellipse extract for the Maintenance Scheduled Tasks (MSTs) for a maintenance depot showing the pre-work height and stagger check prior to any planned high level maintenance.*

5. On 26 September 2017 Network Rail sent ORR the following updated response:

*'Further to our discussions and the comments raised against Network Rail's recommendation closure statement I would like to clarify the end-to-end process used within maintenance for assessing and altering Overhead Contact System geometry.*

*The initial closure statement provides details of the calculations used to determine compliance and the required alteration. Below is a step-by-step process of how the process is implemented.*

1. A height and stagger survey is undertaken 28 days before B10 high level maintenance of a wire run. The survey is carried out in accordance with NR/L3/ELP/27237 module B09 and the results are recoded on EPF/OLE/004.
2. The heights and staggers are analysed for compliance and alteration determined by the technical team using the TRAMS analysis tool, EPF/OLE/005. Compliance is based on the acceptance criteria in NR/L2/ELP/21088.
3. The output from TRAMS is then transfer by the technical team on to a WAIF.
4. The WAIF is used during the B10 high level maintenance so there is clarity of the required adjustments.
5. Once the alteration have been made and verified the WAIF can then be closed. Verification is achieved by carrying out a post height and stagger measurement.

Below are examples of the forms used in the process.'

EPF/OLE/004 Issue 2 - TRAMS HEIGHT & STAGGER SURVEY SHEET										
Depot carrying out Survey		Area Surveyed		Track / Line	Line Speed	OLE Equipment	Temperature (celsius)	Date	Reading Taken By :	
Direction of Survey		Wire Run Number		Type of H&S Gauge		H&S Gauge No.	Sheet No.	Readings Recorded By :		
Back to LONDON or LOW Mileage										
Structure Number	C.W Height (mm)	Stagger/Offset		Cent		R.E.F.O.S (mm)	Reg Arm Type	Reg Arm Support L / R	Uplift Stop Fitted?	Comments
Start	Finish	L	R	L	R					
ST R										
M/S										
ST R										
M/S										
ST R										
M/S										
ST R										
M/S										

Figure 1- EPF/OLE/004 Height & stagger survey sheet

**a track design**

Structure No.	Span Length (m)	CW Height (m)	CW Stagger (mm)	Minimum Stagger (mm)	Maximum Stagger (mm)	Gradient	Max difference in lift, mm	Apply greater lift at	Max overall lift, mm	Max slue left, mm	Max slue right, mm
G/09/14	0	4.723	237	0	0	0	-		30	0	15
M.S	46	4.774	238	0	0	1840	77	Either structure			
G/09/13	0	4.698	-334	223	380	0	-		30	15	15
M.S	46	4.659	-100	0	0	754	41	Either structure			
G/09/12	0	4.637	120	220	383	0	-		30	15	1
M.S	45	4.548	-86	0	0	421	100	G/09/12			
G/09/11	0	4.53	-276	215	389	0	-		30	15	15
M.S	37	4.514	-45	0	0	627	23	Either structure			
G/09/10	0	4.471	204	212	393	0	-		30	15	1
M.S	23	4.474	-6	0	0	7667	48	Either structure			
G/09/09	0	4.468	-186	212	393	0	-		30	1	15
M.S	37	4.441	18	0	0	2056	64	Either structure			
G/09/08	0	4.45	246	211	394	0	-		30	15	15
M.S	51	4.466	71	0	0	321	113	G/09/07			
G/09/07	0	4.609	-87	-82	385	0	-		30	15	15
M.S	64	4.648	-97	0	0	1164	87	Either structure			
G/09/05	0	4.664	-9	-17	382	0	-		30	15	15
M.S	61	4.606	-130	0	0	884	67	Either structure			
G/09/04	0	4.595	-220	218	386	0	-		30	2	15
M.S	58	4.505	-75	0	0	1487	90	Either structure			

Figure 2 - Example EPF/OLE/005 Trams sheet

**Site Implementation Sheet Run :** 42448 

**Site:** A134 - North Wembley - Up Slow

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Structure No.	Final C.W Height (m)	Final C.W Stagger (mm)	Height Adjust (mm)	Stagger Adjust (mm)
G/09/14	4.723	237	0	0
M.S	4.711	238		
G/09/13	4.698	-334	0	0
M.S	4.668	-100		
G/09/12	4.637	120	0	0
M.S	4.594	-86		
G/09/11	4.550	-276	20	0
M.S	4.511	-45		
G/09/10	4.471	204	0	0
M.S	4.470	-26		
G/09/09	4.468	-226	0	-40
M.S	4.484	-2		
G/09/08	4.500	246	50	0
M.S	4.555	71		
G/09/07	4.609	-87	0	0
M.S	4.637	-97		
G/09/05	4.664	-9	0	0
M.S	4.630	-130		
G/09/04	4.595	-220	0	0
M.S	4.615	-75		
G/09/03	4.634	87	0	0
M.S	4.579	111		
G/09/02	4.523	129	0	0
M.S	4.505	83		
G/09/01	4.487	45	0	0
M.S	4.476	-45		
G/08/47A	4.464	-148	0	0
M.S	4.447	-198		

**PROPOSED H/S VALUES TAKE PRECEDENCE OVER PROPOSED ADJUSTMENTS ALL FINAL H/S TO BE RECORDED**

Height Adjustment

Lower ↓      Lift ↑

Neg.      Pos.

Stagger Adjustment

To the left ←      To the right →

Figure 3- Site changes required from EPF/OLE/005 sheet

Workgroup	EEOSPKB		Date: 4/10/16						
Location (Structure no)	Track name	Work / Defect Identified				Priority	Std job number	Qty	
G08/37	Up Slow	Lift wires 40mm at G08/37 to achieve 4.488m CW height							
		Work order asset							
Defect code	SR25	Equipment No	7797351	PSD	RFD	6	4724	1	
G08/31	Up Slow	Move wires 30mm left at G08/31 to achieve 165L stagger							
		Work order asset							
Defect code	SR21	Equipment No	7797351	PSD	RFD	6	1460	1	
G08/39	Up Slow	Lower wires 20mm at G08/39 to achieve 4.418m CW height							
		Work order asset							
Defect code		Equipment No	7797351			6	4724	1	
G08/43	Up Slow	Lift wires 30mm at G08/43 to achieve 4.268m CW height							
		Work order asset							
Defect code	SR24	Equipment No	7797351			6	4724	1	
G09/08	Up Slow	Lift wires 50mm at G09/08 to achieve 4.5m CW height							
		Work order asset							
Defect code	SR25	Equipment No	7797351			6	4724	1	
G09/09	Up Slow	Move wires 40mm left at G09/09 to achieve 226L stagger							
		Work order asset							

Figure 4- Multi WAIF to capture the work required in the middle sections