RAIB

Rail Accident Investigation Branch

# Rail Accident Report


## Cutting of rail from a line that was still open to traffic, near Thirsk station, East Coast Main Line. 11 January 2006

Department for Transport

Report 15/2006
August 2006

This investigation was carried out in accordance with:

- the Railway Safety Directive 2004/49/EC;
- the Railways and Transport Safety Act 2003; and
- the Railways (Accident Investigation and Reporting) Regulations 2005.



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# Cutting of rail from line that was still open to traffic, near Thirsk station, East Coast Main Line. 11 January 2006

## Contents

## Introduction

1 The sole purpose of a Rail Accident Investigation Branch (RAIB) investigation is to prevent future accidents and incidents and improve railway safety.

2 The RAIB does not establish blame, liability or carry out prosecutions.

3 This report contains the findings of the RAIB investigation into the removal of a rail from a line that was still open to traffic, near Thirsk Station, on the *East Coast Main Line* on 11 January 2006.

4 The assistance of all parties in the course of this investigation has been of great value. Information requested by the RAIB has been freely given by all parties.

5 Appendices at the rear of this report contain Glossaries explaining the following:

- acronyms and abbreviations are explained in the Glossary at Appendix A; and
- certain technical terms (shown in *italics* within the body of this report) are explained in the Glossary at Appendix B.

## Summary

6 At 23:35 hrs on the 11 January 2006 a gang of track workers started to remove a rail from the *down slow* on the approach to Y427 signal, just to the North of Thirsk station (Figure 1). As a consequence of this action a *track circuit* was interrupted causing it show as *occupied*. Subsequently, train 1P64, the 21:22 hrs Manchester Airport to Newcastle, was held at signal Y423 which could no longer be cleared due to the track circuit showing occupied. It was then discovered that the rail had been severed on a line that was still open to traffic and was in the process of being removed (ie the worksite had been established outside of an *engineering possession*).

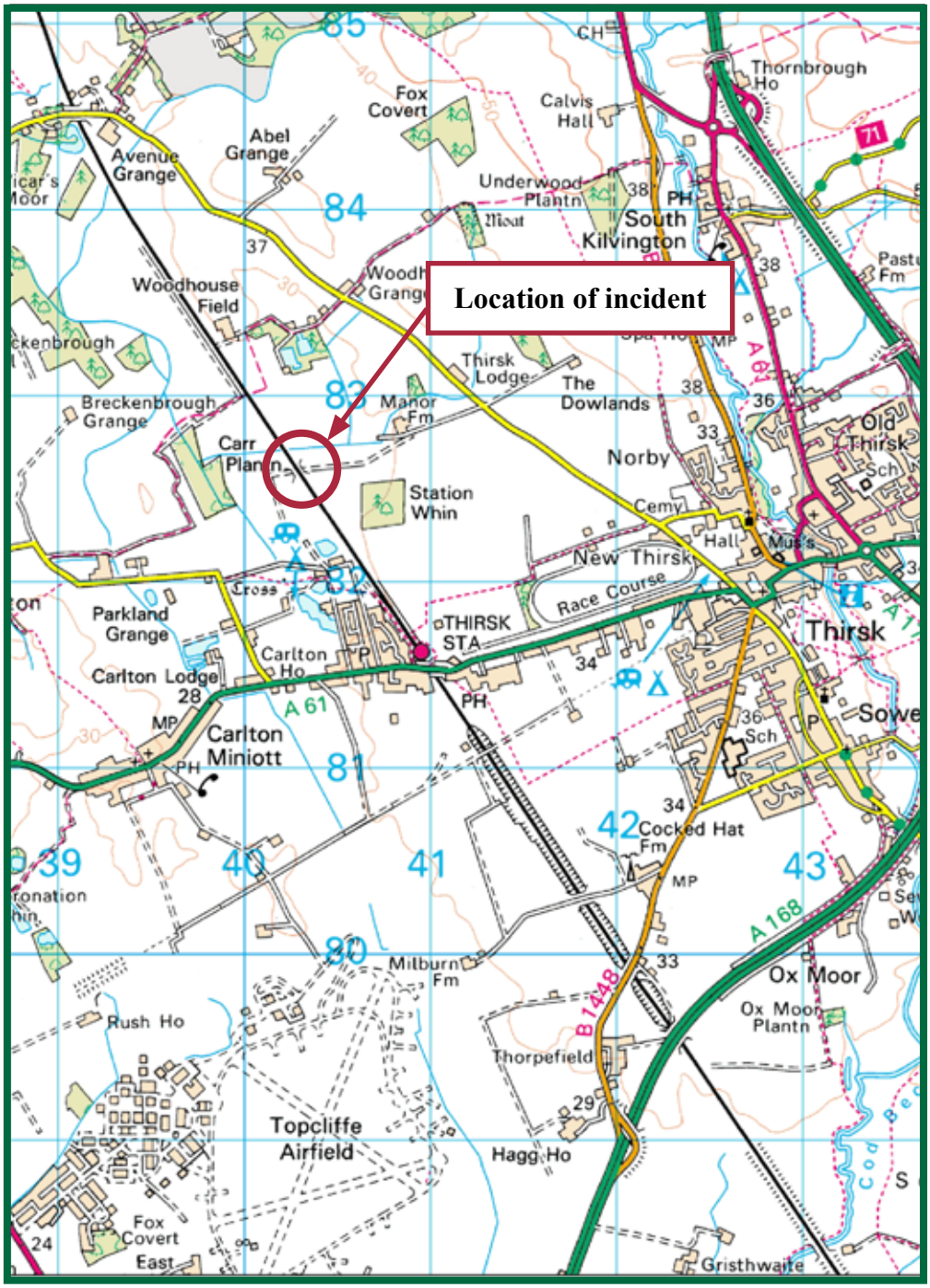


*Figure 1: Map of locality*

7 The range of causal factors has been identified. This is summarised below.

- Non-compliance with the process for the entry of new work items into the *Weekly Operating Notice* (WON)
- Undetected errors in local planning documentation
- The WON was not always referenced when planning and establishing worksites.
- When planning his activities over the week the *Person In Charge Of the Possession* (PICOP) did not identify the discrepancy between the location of the worksite and the limits of the *possession* on the night of the 11/12 January 2006.
- The *pre-possession meeting* did not identify the discrepancy in the local planning documents.
- On the night of the incident, the PICOP and *Engineering Supervisor* (ES) did not communicate with each other the exact location of the worksite.

8 Two contributory factors have been identified:

- Certain managers and staff at the local depot and in the area planning team had an incomplete understanding of the works planning processes and were unclear as to their respective responsibilities.
- Standardised and controlled line diagrams showing key features and the associated *mileages* were not used in the planning process to identify the exact location of the worksite.

9 This report makes eight recommendations for the improvement of safety in the future. These are described at paragraph 108.

# The Incident

## Summary of the incident

10 At 23:35 hrs on the 11 January 2006 a gang of track workers started to remove a rail from the down slow on the approach to Y427 signal, just to the north of Thirsk station. As a consequence of this action a track circuit was interrupted causing it to show as occupied. Consequently, train 1P64, the 21:22 hrs Manchester Airport to Newcastle, was held at signal Y423 which could no longer be cleared due to the track circuit showing occupied. It was then discovered that the rail had been removed on a line that was still open to traffic (ie the worksite had been established outside of an engineering possession).

## Background

11 This incident occurred on a four track section of the East Coast Main Line (ECML), in the vicinity of Thirsk. The designation of the lines in this area is shown in Figure 2.

12 The *down fast* and down slow lines are connected by means of two *crossovers*. The more southerly of these, 872 points, is located 500 m to the south of Thirsk station and provides a means for down trains to pass from the down fast onto the down slow line. The more northerly crossover, 875 points, is located 1200 m to the north of Thirsk and provides a means for down trains to pass from the down slow onto the down fast line.

13 There are a number of sidings that are connected to the down slow line through a single set of points located just south of 875 points.

14 The station at Thirsk has platforms that serve the down and *up slow* lines. There are no platforms serving the fast lines. For this reason, any train approaching Thirsk on a fast line that is required to stop at the station would need to be routed onto the slow lines.

15 The signalling in this area is industry standard post mounted colour light signals.

16 All *running lines* in this area are signalled in accordance with module TS2 of the Rule Book (otherwise known as the Track Circuit Block Regulations).

17 The responsibility for the day to day management of track inspection and maintenance in this area lies with the Network Rail Track Maintenance Engineer located at Darlington depot.

18 Key resource and co-ordination planning functions are performed by the Network Rail Maintenance Delivery Unit located at Newcastle. Strategic planning and the translation of work plans into planned possessions are the responsibility of the Area Delivery Planning Manager located at York.

19 An organisation chart showing the management arrangements relevant to this investigation is to be found at Figure 3.

20 At the time of the incident individuals qualified to act as a Person In Charge Of the Possession (PICOP) were often procured through a labour only contract with Bridgeway Consulting (this was in line with a policy that all possessions arranged for renewals works should be covered by professional PICOPs procured from a commercial provider).

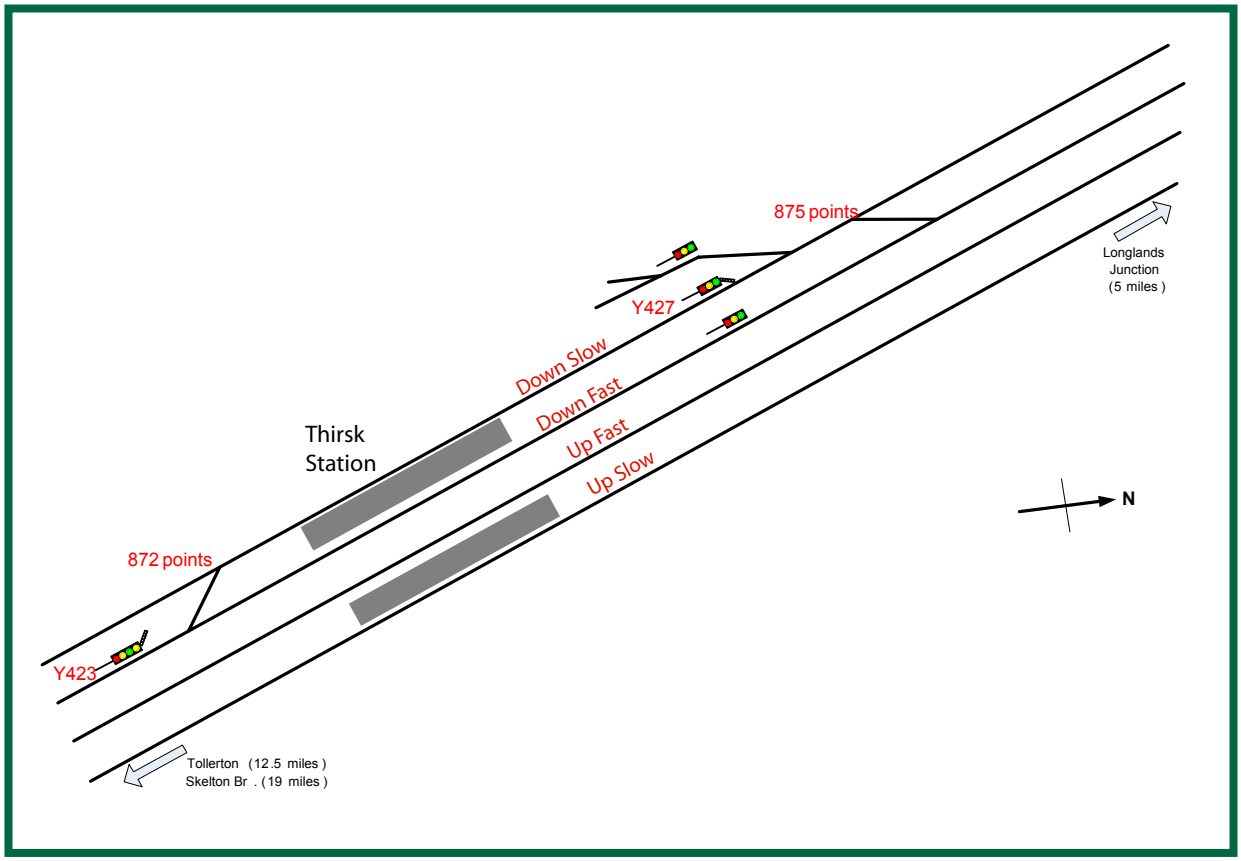


*Figure 2: General view of Thirsk and locality*

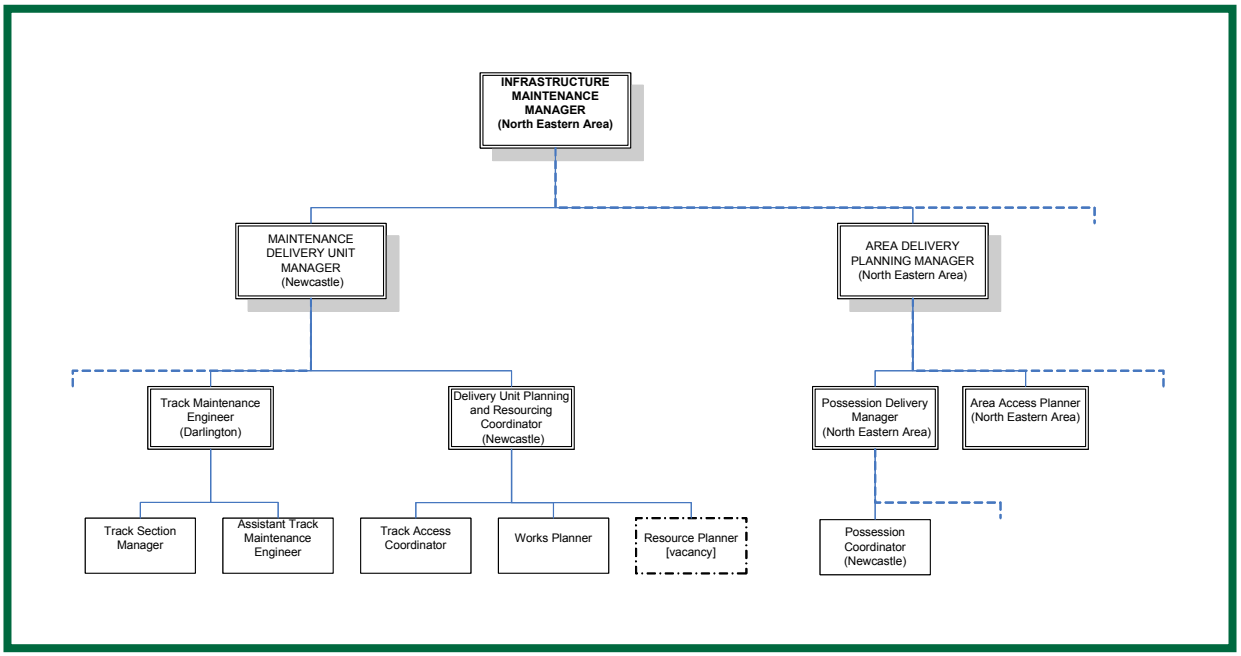


*Figure 3: Organisational chart showing the Network Rail management arrangements that are relevant to this investigation*

## Events preceding the incident, the planning of the works

21 The Thirsk to Longlands possession planned for the night of the 11/12 January 2006 was originally programmed to enable the operation the High Output Ballast Cleaner (HOBC) on the up/down slow. Network Rail considers the operation of this on-track machine to be a high priority. For this reason the need for this possession had been identified more than a year in advance and was in accordance with the published *Rules of the Route*.

22 The need for the removal of a defect on the rail on the down slow, north of Thirsk, was first identified following *ultrasonic testing* on the 28 October 2005. This requirement was recorded on a defect report sheet. This showed the target date for replacement of the rail as 27 April 2005. This date was clearly erroneous and should have read 2006 (ie six months from detection of the flaw). The form shows the location of the defect as 22 miles 1220 yds. In mileage, this location is 22 miles 55½ *chains*, which differs from the location as reported elsewhere.

23 This report form was entered into the *MIMS database* on the 11 November 2005, allocated a defect reference code and the need for remedial works identified.

24 On the 20 December 2005 members of the Darlington depot team held a planning meeting. During this meeting a verbal request was made that the above remedial works be included in the Thirsk to Longlands possession planned for the night of the 11/12 January 2006. This was agreed by all concerned on the understanding that the new worksite would be within the booked *possession limits*. The additional work was entered into the planning spreadsheet, known as the 'Darlington Depot Resource Sheet' and marked with the letters 'APP' in red pen. This mark was used as a reminder that a form should be issued and submitted to the area planners. This form, known locally as an 'Appendix A', is in effect an application for the addition of a new worksite into the WON (for further details see paragraph 69).

25 At this stage of the process there was a general expectation that the Appendix A form, would be prepared and submitted to the Track Access Coordinator within the Network Rail Maintenance Delivery Unit (at Newcastle) and then forwarded to the Network Rail Area Delivery Planning Manager's organisation (at York) where the necessary modification to the possession plan would be initiated. There is no evidence that this form was ever generated.

26 Since no Appendix A form was generated to cover the new worksite the Area Delivery Planning Manager's organisation at York remained unaware of what was proposed. Consequently, they made no entry in the WON and performed no routine check of worksite mileage against possession limits. Similarly, no suitable entry was made in the *Weekly Engineering Notice*.

27 At a further depot planning meeting on the 3 January 2006 the Darlington Depot Resource Sheet was used as the agenda. At this stage the sheet showed the new worksite (at 22 miles 58 ch) on the night of the 11/12 January 2006. However, the hand annotation 'APP' had disappeared.

28 There is evidence that the annotation 'APP' was removed in error by a member of staff at Darlington depot.

29 On the 4 January the PICOP attempted to chair the pre-possession meeting. The scope of this meeting included the planned possession on the night of 11/12 January 2006 (shown as item 28 in the WON). This meeting proved difficult to manage and was disrupted due to a range of factors.

- No suitable room was available.
- Key documentation (including the WON) and line diagrams were not available at the meeting.
- There was late inclusion of work items that were not listed in the WON.
- Various conflicts in the weekend possession plan were identified that had to be resolved outside of the main meeting.
- Some of the documentation discussed at the meeting was entirely inconsistent with the WON. In particular, the Engineering Supervisor (ES) had with him a locally generated spreadsheet, entitled 'Weekend Work Summary'. This indicated a Tollerton to Longlands Junction possession on the night of 11/12 January 2006 and a work item at 22 miles 58 ch on that same night.

30 Given the above factors, no one at the meeting realised that there was an inconsistency between the possession limits and the location of the work planned to take place within the planned possession on the night of 11/12 January 2006 (WON item 28).

31 In accordance with normal practice in the area the PICOP recorded the arrangements for the item 28 possession in a document entitled 'Possession Management Work Pack'. The front cover of this document bears the name of the Possession Manager within the Network Rail Infrastructure Maintenance organisation at York. Despite this it is generally understood that it is the responsibility of the PICOP to fill in the particulars of the possession.

32 When making his entries for the possession on the night of 11/12 January in the 'Possession Management Work Pack' the PICOP also included entries for other possessions that he was due to manage during *week 41* (7 to 14 January 2006). The full list of items entered was as follows:

| | | |
|---|---|---|
| a) Item 17 | Mon 9/11/06 | Thirsk to Longlands; |
| b) Item 22 | Tues 10/11/06 | Tollerton to Longlands; |
| c) Item 28 | Weds 11/11/06 | Thirsk to Longlands; |
| d) Item 33 | Thurs 12/11/06 | Tollerton to Longlands. |

33 The PICOP made a single page of entry in the 'Possession Management Work Pack' to cover rail defect works to be carried out on the down fast under WON items 17 **and** 28. In doing so he did not show separate mileages for each of the worksites. Instead he showed a mileage range that covered all work activities on the down slow on both nights (ie Monday and Wednesday). This mileage range was written as 'From 25 74 ….To 22 58'. In doing so he did not realise that this mileage range extended outside of the possession limits for both items.

34 Table 1 summarises the various entries in the engineering planning documents in the week prior to the 11/12 January. None of the errors and inconsistencies contained in these documents were detected in the period of time between the pre-possession meeting on the 4 January 2006 and the night of the 11 January 2006.

| Document | Entries relating to item 28 (night of 11/12 Jan) for Down Slow Line | | Comment |
|---|---|---|---|
| | Possession limits | Worksites | |
| **Weekly Operating Notice for Week 41** | Thirsk to Longlands Junction<br><br>875A pts to (signal) Y469 | None published for the Down Slow (i.e. no mention of worksite at 22miles 58ch) | Southern limit shown as 'Thirsk'. However, Thirsk station was outside the planned possession. |
| **Darlington Depot Resource Sheet** (this document was also known as the 'planned vs. actuals') | As above | 'CHANGE DEF RAIL DOWN SLOW 22M 58C DT120171'<br><br>Name of ES for the above work was also shown | The mileage of the worksite is outside of the possession limits. |
| **Possession Management Work Pack** (as completed by the PICOP) | Thirsk to Longlands Junction<br><br>875A pts to (signal) Y469 | 'FROM 25 74 ….TO 22 58'<br><br>'RAIL DEFECTS' | The mileage of this worksite extends beyond the possession limits. |
| **Weekend Work Summary** (spread sheet prepared by the assistant to the Track Section Manager) | Tollerton to Longlands | 'DT120171 – 22m 58c' | The possession limits are different from those published in the WON (the entry for the night of the 9/10 January is also incorrect).<br><br>The mileage of the worksite is outside of the possession limits.<br><br>Prior to start of work the ES for the work changed the worksite mileage to '22m 54½c'. |

*Table 1: Summary of entries in planning documents*

## Events during the incident

35 On 11 January 2006 two engineer's possessions were taken on the slow lines of the ECML in accordance with the arrangements published in the WON. The first of these (shown as item 27 in the WON) was taken between Skelton Bridge and 872 points. The second (shown as item 28 in the WON) was taken between 875 points and Longlands Junction. Each of these possessions had a separate PICOP. The PICOP for the item 28 possession was located at Longlands Junction.

36 An overview of the possessions taken on the night of 11/12 January 2006 is to be found at Figure 4.

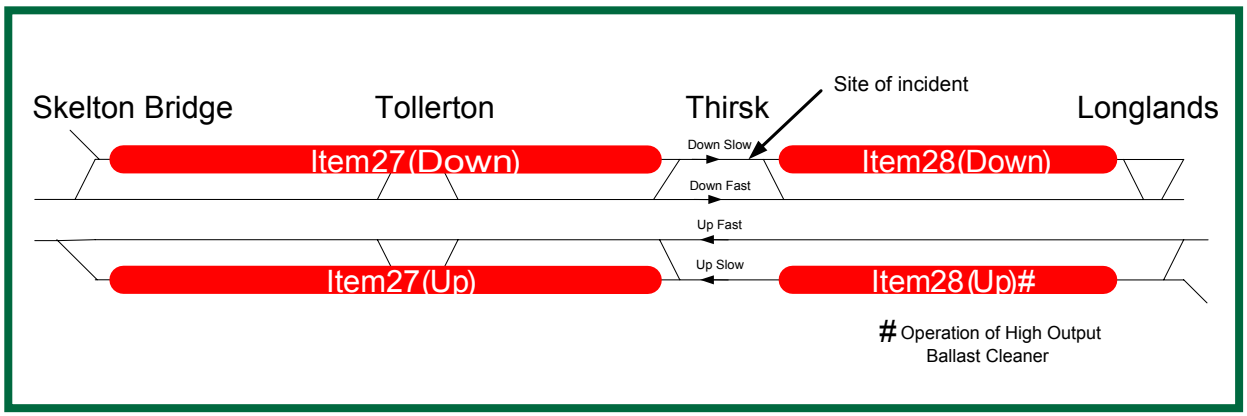


*Figure 4: Overview of possessions in the area of Thirsk on the night of 11/12 January 2006*

37 The PICOP of the item 28 possession was only expecting two worksites to be established within his possession. The first of these was related to the operation of a High Output Ballast Cleaner (an on-track machine) on the up slow. The second worksite was shown in his Possession Management Work Pack as 'defective rails at 22 miles 58 chains' on the down slow.

38 By 22:41 hrs the item 28 possession had been granted and *protection* was in place. At this point the PICOP called the ES for the above item of work and gave permission for work to start. In doing so he confirmed that there was no need to set up *worksite marker boards* on the down slow (since no works trains were planned to operate on the down slow).

39 As part of the above process the PICOP recorded the name of the ES on Part 4 of his *RT3198 form* (as required by the Rule Book). For his part the ES recorded that authority had been granted by the PICOP on his *RT3199 form*. However, since this authority had been communicated by means of dictation, rather than in person, the form lacks the PICOP's signature. Completion of this form by dictation is permitted by the Rule Book provided the ES writes the name of the PICOP in the space provided for the PICOP's signature (in this case the ES filled most of the form correctly but did not record the PICOP's name in the correct part of the form).

40 Once this authority was given the ES established the worksite. Tools were moved to site using a trolley standing on a siding adjacent to the down slow line. Work to remove and replace a section of the rail commenced at 22 miles 54½ ch (not 22 miles 58 ch as shown in the Possession Management Work Pack). The location of the worksite was to the south of signal Y427.

41 The possession arrangements described in paragraph 35 necessitated a short term alteration in the *working timetable* in order that the last train scheduled to call at Thirsk, 1P64 the 21:22 hrs Manchester Airport to Newcastle could be routed from the down fast to the down slow via 872 points. It would therefore be able to call at the down slow platform at Thirsk before being routed back onto the down fast via 875 points. The intended route of the train is illustrated at Figure 5.

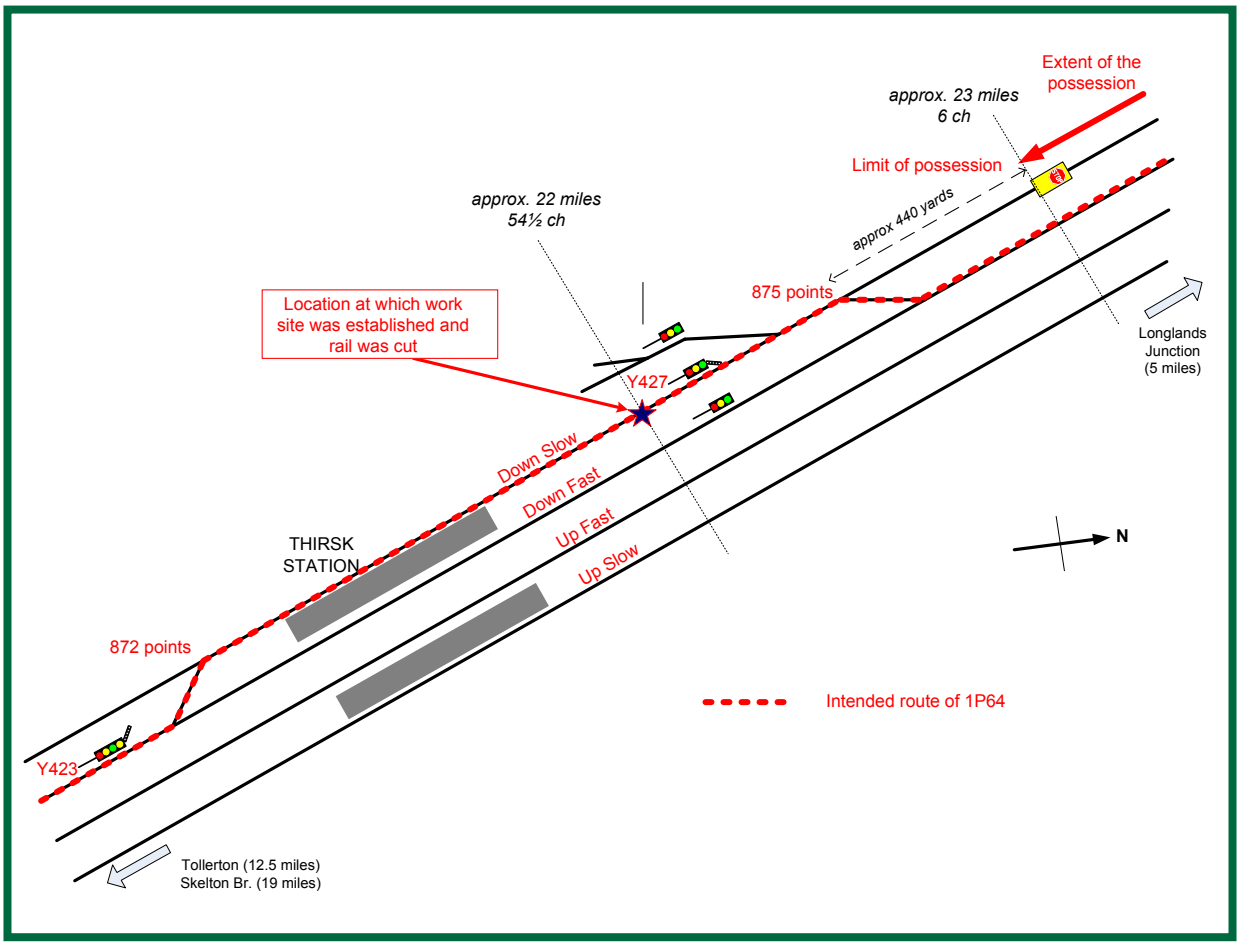


*Figure 5: Overview of the incident*

42 At about 23:35 hrs the track circuit on the approach to signal Y427, 'TT', showed occupied. As a consequence the signaller was unable to set the route between signals Y423 and Y427 for train 1P64. This train was by now on the final approach to the Y423 and within two minutes was at a stand awaiting the route to be set across 872 points. (See Figure 5 for a general overview diagram of the incident).

43 At this point the signaller asked the PICOP of the item 28 possession if there was any work taking place that might have affected track circuit 'TT'. It was at this point that the PICOP realised that the location of the worksite he had previously authorised was outside the possession (at 22 miles 54½ ch).

44 The ES to the north of Thirsk station was immediately contacted by the PICOP. The ES reported that he had set up the worksite and the section of defective rail was in the process of being removed. At the time of this call the suspect rail had been cut and preparations were being made to remove it.

45 Upon receiving the call from the PICOP, the ES looked for the possession limit board. This he saw some 400 m north of 875A points. At this juncture he realised he had set up his worksite outside of the possession.

46 Once this mistake had been realised steps were taken to divert train 1P64 via the down fast (there were no passengers for Thirsk) and to extend the item 27 possession to include the section between 872 points and 875 points.

47 All concerned were relieved of duty for interview and routine medical screening. Medical screening revealed no evidence that those involved in this incident were under the influence of alcohol or drugs.

# Analysis

## Immediate cause

48 This incident occurred because the PICOP and the ES did not appreciate that the proposed site of work was outside the possession.

## Causal and contributory factors

49 The investigation has identified a number of factors that have been causal and/or contributory to this incident. These are described in the paragraphs which follow.

50 For ease of understanding the causal and contributory factors are grouped into one of the following three categories.

- Factors linked to the actions and omissions of the PICOP.
- Factors linked to the actions and omissions of the ES.
- Management processes.

Factors linked to the actions and omissions of the PICOP

51 When planning and implementing his activities for the night of the 11/12 January 2006 the PICOP was reliant on the entries he had previously made in the 'Possession Management Work Pack'.

52 When talking to the ES shortly after the possession had been granted the PICOP did not identify that the worksite was outside of his possession. It is considered that the following factors are likely to have contributed to this:

- The possession limits are defined relative to items of railway equipment (eg points and signals) whilst the location of worksites is identified by mileage (Recommendations 1 and 5).
- There is no explicit requirement in *Module T3* of the Rule Book for the PICOP to confirm that worksites are within the possession. The PICOP's form, RT 3199, does not prompt this check to be undertaken (Recommendation 1).
- Both parties assumed that the information they had with them was both sufficient and correct. For this reason neither party sought to confirm details. At no time did the PICOP ask for confirmation that the worksite was within the possession limits.

53 The PICOP has stated that he assumed that his possession was 'back to back' with the item 27 possession. This assumption was based on the wording used in the WON to describe the item 27 and item 28 possessions. Item 27 is described as 'Skelton Bridge to Thirsk' and item 28 as 'Thirsk to Longlands Junction'.

54 Local engineering staff understand the word 'Thirsk' to mean '872 points' for any possession extending to the south and '875 points' for any possession extending to the north. This interpretation was not understood by the PICOP (Recommendation 5).

55 The potential for confusion is exacerbated by the fact that neither of the above junctions is named in Table A of the Sectional Appendix for the LNE Route nor in locally produced hand drawn line drawings.

56 When managing the item 28 possession the PICOP was heavily dependant on the 'Possession Management Work Pack' that he had compiled earlier. As indicated at paragraph 33, the information contained in this document was incorrect. This error occurred because the PICOP accepted without question the request made by the local engineering team at the pre-possession meeting that this item be included. Furthermore, since this work request appeared routine and was clearly indicated on the Darlington Depot Resource Sheet, it did not occur to him to check that the worksite was within the limits of his possession.

57 A further factor was the way in which information was recorded by the PICOP in the 'Possession Management Work Pack' (Recommendation 3). As indicated at paragraph 32, the PICOP had recorded details of four items, over four nights, in one document. Since the document was only designed for a single possession, the information recorded by the PICOP in the document was presented in a confusing manner. For this reason it is very difficult to work out from the document how the worksites relate to the various possessions. This confusion was exacerbated by the differing lengths of possessions over the four nights in question (see paragraph 32).

58 The layout of the proforma used to generate the 'Possession Management Work Pack' does not facilitate the easy comparison of worksite mileages with possession limits.

59 The disrupted nature of the pre-possession meeting on the 4 January 2006 hampered the discovery of the planning error (Recommendation 6). The reasons for the unsatisfactory meeting are listed at paragraph 29. In particular, it is highly relevant to note that the meeting took place without a white board, copies of the WON or proper line diagrams.

60 The PICOP's training included a briefing on the structure and function of the pre-possession planning meetings. However, this training did not promote or assess the skills required to manage such a meeting in an effective manner.

Factors linked to the actions and omissions of the ES

61 The ES appears not to have referred to the WON on the night of the incident (this is not an explicit requirement of the Rule Book). Instead he relied on information contained in the spreadsheet generated by the local depot entitled 'Weekend Work Summary. This showed the possession running from Tollerton to Longlands with a worksite at 22 miles and 58 ch. It also showed the same possession limits on Monday, Tuesday, Wednesday and Thursday nights.

62 When talking to the PICOP shortly after the possession had been granted the ES did not identify that his worksite was outside of the possession. It is considered that the following factors are likely to have contributed to this:

- the fact that the possession limits are defined relative to items of railway equipment (eg points and signals) whilst the location of worksites is identified by mileage;
- both parties assumed that the information they had with them was both sufficient and correct. For this reason neither party sought to confirm details.

63 Since the ES was under the impression that his worksite was within the possession he felt able to place a trolley on the adjacent siding without first arranging protection in accordance Module T4 of the Rule Book.

64 The ES and his fellow workers did not notice the possession limit warning board some 400 m beyond 875A points (this is nevertheless unsurprising since they had no particular reason to be looking in this direction).

65 It is unclear how the error in the 'Weekend Work Summary' occurred although it is likely that the Tollerton to Longlands possession indicated for Monday to Thursday nights is merely a reflection of the possessions permitted by the Rules of the Route. The 'Weekend Work Summary' is produced for the Track Section Manager and is not intended as an operational document but is intended as a short form summary to assist the planning of resource, rostering and budgeting.

66 The Darlington Depot Resource Sheet had shown the worksite at 22 miles 58 ch since the planning meeting of the 20 December 2005. Since this key planning document also showed this item of work the ES was convinced that the worksite was properly authorised and sitting within a booked possession.

Management processes

67 The existing Network Rail engineering planning process requires that any item of work be submitted to the possession planners for inclusion in the WON (or a supplement for late entries). The only exceptions relate to emergency engineering works.

68 Had the worksite at 22 miles 54½ ch been the subject of an application for inclusion in the WON (or a supplement) it is highly likely that the discrepancy would have been identified. This is because the routine process for the inclusion of worksites within existing possessions includes a check that the mileage is within the possession limits.

69 In order for the new worksite to be included in the item 28 possession the following process should have been followed:

a) need for the works to be agreed at the Maintenance Delivery Unit weekly planning meeting;

b) application submitted to the Track Access Coordinator (TAC) in the Network Rail Maintenance Delivery Unit by means of a form known as 'Appendix A';

c) after checking the application (including a check that the worksite is within the possession) the Track Access Coordinator forwards the application to the Network Rail Area Delivery Planning Manager's team of possession planners;

d) the possession planners check the application and submit the details for inclusion in the relevant WON (or supplement).

70 In this case the above process was not triggered since no 'Appendix A' form was generated following the relevant planning meeting (20 December 2005). Furthermore, no-one checked that the status of the required paperwork at any stage in the process.

71 Interviews with relevant personnel have revealed that the process and responsibilities for the submission of this form were not fully understood. However, most of those involved believed that the responsibility lay with the Track Section Manager.

72 The situation was complicated by the fact that these forms had previously been completed and submitted to the Track Access Coordinator directly by the Maintenance Delivery Unit's Works Planner. This individual spends a great deal of his time at Darlington and has in the past been willing to accept verbal requests and to process the paperwork on behalf of the Track Section Manager's staff. Therefore it is considered likely that the lines of responsibility at Darlington depot had become blurred due to local 'custom and practice'.

73 The responsibility for the submission of this form was not documented at the time of the incident.

74 The staff involved in the incident did not make adequate use of the controlled line diagrams. However, documents of this type were available via the Network Rail intranet. One such document, diagram ECM-43, shows all of the key features in the locality of Thirsk superimposed on a longitudinal scale that permits their location to be determined with reasonable accuracy, although the information contained in this diagram has not been validated since 1998.

75 Had the PICOP marked the position of the planned worksite onto an appropriate line diagram showing the position of key features and their mileage it is likely that he would have spotted that the worksite was outside of his possession limits.

76 There is evidence that the various staff and managers involved in this incident were unclear on their roles and responsibilities in the area of possession and works planning (Recommendations 2). This lack of clarity has arisen in part due to the recent major changes in the way track engineering is being managed by Network Rail. Further to this there appears to some overlap between the roles of the various departments shown at Figure 3. This is exacerbated by the existence of a number of long term vacancies.

77 There was no formal arrangement in place at the depot to check that worksite mileages were correct.

78 A further issue of concern was the lack of integration of the PICOP into the local depot team. His services were procured from Bridgeway Consulting under the terms of a 'labour only' contract. Under this contract Bridgeway was only obliged to provide a qualified individual and they had no contractual responsibility for the provision of facilities such as meeting rooms and documents.

## Consequences

79 The consequences of this incident were benign due to the fact that track circuit TT was interrupted as the rail was severed. This caused the track circuit to show occupied and the associated signal was held at danger

80 However, each of the following circumstances could have led to the train approaching the worksite:

- had the rail been severed after the train passed the signal Y423;
- had the other rail been severed (the track circuit was of the single rail type);

  or

- had the line not been fitted with track circuits.

81 If the train had approached the worksite there would have been a significant risk of serious injuries to the track workers and a possibility that the train would have derailed.

## Other incidents of a similar type

82 It has not been possible to fully quantify the number of incidents in which the arrangements for the protection of engineering activities have failed. However, the data collected from the Network Rail National Control Log indicates that there are still a significant number of incidents in which misunderstandings, miscommunication and planning errors contribute to serious operating irregularities.

83 In the year previous to the incident at Thirsk there were a significant number of incidents in which the arrangements for the protection of engineering activities appear to have failed. These 'protection irregularities' fell into the following six categories:

1. protection applied in the wrong place;
2. train entering a possession without authority;
3. worksite set up outside a possession;
4. renergisation of overhead line equipment before a possession was given up;
5. train left a possession into the path of a passenger train;
6. electric train entered a section of track that was blocked to electric traction.

84 A review of the Network Rail National Control Centre logs for the year 12 January 2005 to the 11 January 2006 has revealed a number of important examples within these categories. This analysis reveals:

- two cases of trains (other than work trains) entering a possession without authority;
- four cases of worksites set up outside a possession;
- one case of a train leaving a possession into the path of a passenger train.

85 In the four months since the incident at Thirsk there have been further incidents in which the arrangements for the protection of engineering activities appear to have failed.

86 A review of the Network Rail National Control Centre logs between January and May 2006 has revealed:

- two cases of trains (other than work trains) entering a possession without authority;
- two cases of worksites set up outside a possession;
- one case of a train leaving a possession into the path of a passenger train.

87 A tabulation of the above data is to be found at Appendices C and D. A general observation by the RAIB following an assessment of this data is found at paragraph 107.

# Conclusions

## Immediate cause

88 This incident occurred because the PICOP did not appreciate that the proposed site of work was outside the possession.

## Causal factors

89 A wide range of causal factors have been identified. These are described in the following paragraphs.

90 No one applied for the entry of the new work item into the WON thereby bypassing the entry into the Possession Planning System and the routine check of mileage against possession limits. Had the process been correctly applied by submitting the Appendix A form it is considered likely that the discrepancy would have been detected by the area's planning team.

91 The entry of incorrect data into the Depot Resource Sheet that was not detected prior to the commencement of the works.

92 Undetected errors in other local planning documentation.

93 There was no formal arrangement in place at the depot to check that worksite mileages were correct.

94 Insufficient checking of information contained in the WON (Recommendation 2).

95 When planning his activities over the week the PICOP did not identify the discrepancy between the location of the worksite and the limits of the possession on the night of the 11/12 January 2006. This omission can be traced to the following factors:

a) the confusing way in which he recorded information within the Possession Management Work Pack (arising from the attempt to record four planned possessions in one proforma) (Recommendation 3);

b) the differing ways in which locations are described for worksites and possession limits (Recommendation 3);

c) the PICOP did not make use of the available line diagrams (Recommendation 4);

d) the sequence of 'short' and 'long' possessions through the week (see paragraph 32) made it difficult for the PICOP to detect the error when preparing the Possession Management Work Pack.

96 No one at the pre-possession meeting identified the discrepancy in the local planning documents. This omission can be traced to a combination of the following factors:

a) the PICOP did not chair the meeting in an effective manner;

b) the lack of a suitable venue;

c) the disruption of the meeting due to the need to resolve programme conflicts;

d) suitable documents and drawings were not available at the meeting;

e) incorrect local planning documents;

f) the general expectation, identified in Network Rail's own investigation and in witness evidence to the RAIB, that local arrangements are able to bypass the formal planning process.

97 On the night of the incident, it is evident that the PICOP and ES did not communicate with each other the exact location of the worksite. Various factors are relevant in this context:

a) The Rule Book makes no explicit requirement for the PICOP or ES to check that worksites are within the possession;

b) the way that key safety information was presented to the PICOP and ES did not facilitate ease of checking. In particular:

(i) the limits of the possession were referenced from numbered points and signals whilst the location of the worksite was given in miles and chains (Recommendation 5);

(ii) the limits of the item 28 possession were described in the WON as Thirsk to Longlands. This imprecise description may have contributed to the confusion in the PICOP's mind when planning the possession (Recommendation 5);

(iii) neither the PICOP nor the ES had in his possession a line diagram showing the layout and mileage of all key features (Recommendation 4).

## Contributory factors

98 The investigation has identified a number of underlying factors that have contributed to the occurrence of the specific errors and omissions listed in paragraphs 90 to 97. These contributory factors are as follows:

a) certain managers and staff at the local depot and in the area planning team had an incomplete understanding of the works planning processes and were unclear as to their respective responsibilities (Recommendations 2 and 3);

b) available line diagrams showing key features and the associated *mileages* were not used in the planning process to identify the exact location of the worksite (Recommendation 4).

99 The number of recent incidents involving failures of possession protection arrangements (see paragraphs 82-87) suggest that the incident at Thirsk is not an isolated case, but is instead, symptomatic of a more general problem with the procedures and management arrangements for the planning of engineering works. The recommendations at paragraph 108 are therefore designed to address this more general problem. A general observation by the RAIB following a consideration of the more general issues is found at paragraph 107.

## Actions already taken or in progress

100 All the staff involved in the above incident have been re-briefed by Network Rail.

101 Network Rail North Eastern Area and Bridgewater Consulting Limited have worked together to clarify the limits of the authority of the PICOP. The output of this collaboration is an instruction that has been issued to all PICOPs employed by Bridgeway Consulting Limited with the purpose of clarifying their limits of authority when chairing the pre-possession meeting. This reminds them that they are not permitted to authorise any of the following:

- inclusion of additional worksites;
- changes to worksite mileages;
- changes to the contents of work within a worksite;
- changes to possession limits.

102 Local planning documents have been reviewed and appropriate alterations have been made. In particular, the Depot Resource Sheet has been updated to include a reminder to all staff that the sheet is only to be used in conjunction with the WON.

103 Since the investigation commenced Network Rail has implemented a new Company Procedure (NR/PRC/MTC/PL0056). This procedure lays down the structure of meetings supporting the long, medium and short term planning of engineering works on the railway network.

104 More detail on the 'PL56' procedure is given at Appendix E.

105 The 'PL56' procedure has provided much improved clarity on the types of meeting to be held and the role of each. However, it does not define the safety checks that should be carried out during each meeting. Nor does it describe the method by which changes and additions to worksites agreed at the meetings should be processed for approval (Recommendations 7 and 8).

106 Previous to this incident at Thirsk, Network Rail had identified possession irregularities to be a significant risk, both in terms of safety and business disruption. In particular, Network Rail is concerned about the efficiency and complexity of the rules and procedures that relate to the planning and protection of worksites. For this reason Network Rail has implemented a programme of work to review the relevant modules of the Rule Book with the objective of finding ways to improvement the efficiency, safety and clarity of the rules. The methodology adopted by Network Rail includes an analysis of previous incidents and a review of working practices in overseas railway administrations and identification of alternative ways of working. The results of this programme of work are expected to emerge over the next one to three years.

## General observation

107 Network Rail has recently commenced an ongoing review of engineering possession arrangements. The RAIB suggests that Network Rail include in this review an examination of the feasibility, costs and benefits of adopting an engineering planning system based on predefined 'standard' possessions, each with set blocking points and protection arrangements. This examination should also consider the option of recording these arrangements on diagrams to assist ease of understanding.

## Recommendations

108 The RAIB recommendations are directed at those parties who the RAIB believes are best placed to mitigate the identified risks (the implementers). When these parties have considered the recommendations they should establish their own priority and timescale for the necessary work, taking into account their health and safety responsibilities and the safety risk profile and safety priorities within their organisations.[1]

1 The Railway Safety and Standards Board, in consultation with Network Rail and other Railway Group members, to modify forms RT 3198 and 3199 to include a record of the mileage of the possession limits (linked to Recommendation 5). This should be done in such a way that the PICOP and ES are able to easily identify any inconsistency between the location of the worksite and the extent of the possession (see paragraphs 52 and 97).

2 Network Rail, in consultation with contractors, to rebrief track maintenance staff in the London North Eastern Area on their roles and responsibilities in the works planning process and the need for careful examination of the WON during the planning and execution of safety critical activities (see paragraphs 51 and 76). This briefing should include the process and documentation to support late notice changes to planned work activities.

3 Network Rail, in consultation with contractors, to develop and adopt a universal standard process, with associated documents, for use by PICOPs, when planning possession activities. In all cases it should be clear who is responsible for the preparation of documents, submission of forms and approvals of work activities. Documents developed for this purpose should be designed for the avoidance of errors when transposing data from the WON (see paragraphs 56 to 58, 95).

4 Network Rail to take steps to ensure that all track maintenance staff make reference to the definitive line diagrams and signalling plans when planning engineering activities (currently available via the Network Rail intranet) and to ensure that such diagrams feature in possession planning documentation prepared by PICOPs. In consequence Network Rail should ensure that these diagrams are subject to regular validation and updates as appropriate (see paragraph 74).

*Continued*

[1] The RAIB addresses its recommendations to the ORR (HMRI), the safety authority, in accordance with Article 25(2) of the European Railway Safety Directive 2004 (the Directive) and Regulation 12(2)(a) and (b) of the Railways (Accident Investigation and Reporting) Regulations 2005) (RAIR). The RAIB does this to enable the ORR (HMRI) to discharge its responsibilities under Article 25(2) of the Directive and Regulation 12(2)(a) of the Regulations, namely that they must ensure that all RAIB recommendations addressed to it are duly taken into consideration and where appropriate acted upon by the end implementer.

The end implementer is required under Regulation 12(4)(b) of the Regulations, to provide the Safety Authority with the full details of the measures/actions they intend to take to implement the recommendation and the timescales for securing that implementation. The timeliness of this response to the Safety Authority is dictated by the Safety Authority's duty under RAIR Reg 12(2)(b) to report to the RAIB, without undue delay or within such other period as may be agreed with the Chief Inspector.

5 Network Rail to implement a system to ensure that all relevant staff (including PICOPs and Engineering Supervisors) have easy access to accurate mileage information for all published possession limits and to ensure that the written descriptions of possession limits are sufficiently precise to enable staff to identify the actual geographical locations that are referred to (see paragraphs 52, 53, 54 and 97).

6 Network Rail and PICOP service providers to implement formal management arrangements for *PICOP Briefings*. These should include the provision of a suitable venue, definition of required attendees, the specification of key documents to be available and a process for management checks to verify that PICOP Briefing meetings are being conducted in a correct and effective manner (see paragraph 29).

7 Network Rail procedure NR/PRC/MTC/PL0056 should be enhanced by a review of safety critical information at each meeting. These should include an explicit requirement to check that the mileage of each worksite is consistent with the published limits of the possession (see paragraph 105).

8 Network Rail procedure NR/PRC/MTC/PL0056 should be enhanced by providing clear guidance on who is responsible for processing the requests for any changes and additions to worksites that are agreed at each meeting (ie how to ensure that minuted agreements are correctly processed for inclusion in the WON) (see paragraph 105).

# Appendices

## Glossary of abbreviations and acronyms — Appendix A

| | |
|---|---|
| ch | Chains |
| ECML | East Coast Main Line |
| ES | Engineering Supervisor |
| m | metres |
| PICOP | Person In Charge Of the Possession |
| pt(s) | Point(s) |
| RAIB | Rail Accident Investigation Branch |
| WON | Weekly Operating Notice |
| yds | Yards |

## Glossary of terms — Appendix B

| | |
|---|---|
| Chain | Measure of distance (1/80$^{th}$ of a mile = 22 yards ≈ 20 metres) |
| Crossover | Connection between two tracks which allow trains to pass from one to another |
| Down fast (at Thirsk) | The designation of the running line that normally conveys fast trains in the northbound direction |
| Down slow (at Thirsk) | The designation of the running line that normally conveys slow trains in the northbound direction |
| East Coast Main Line | The main line railway route linking London Kings Cross and Edinburgh, via York and Newcastle |
| Engineering possession | A section of the line which is under exclusive occupation of an engineer for maintenance or repairs. |
| Engineering Supervisor | The person responsible for the safe operation of a worksite within an engineering possession |
| Maintenance Delivery Unit Weekly Planning Meeting | A weekly meeting at which staff in the Maintenance Delivery Unit are required to plan work activities within planned possessions (as defined in NR Standard Maintenance Procedure NR/PRC/MTC/PL0056) |
| Mileage | A means of expressing a location on the railway network using units of miles and *chains* |
| MIMS database | A database used by the railway industry to record maintenance requirements and work performed |
| Module T3 (of the Rule Book) | The section of the Rule Book concerned with Engineering Possession*s* |
| Occupied | Status of a track circuit when it detects the presence of a train |
| Person In Charge Of the Possession | The person responsible for establishing an engineering possession in accordance with Module T3 of the Rule Book. The PICOP can authorise the establishment of a worksite within his/her engineering possession. |
| PICOP Briefing | See pre-possession meeting |
| Possession | see Engineering Possession |
| Possession limits | The locations at which an engineering possession is deemed to start and finish |
| Pre-possession meeting (now described as the PICOP Briefing) | The final planning meeting designed to confirm the working arrangements to apply within an engineering possession |

| | |
|---|---|
| Protection | The measures taken to mark the limits of a *possession*. Consists of a lit board and the placing of three detonators on the rail. |
| Rules of the Route | Rules agree with the train operators under which temporary speed restrictions and line blockages can be imposed for maintenance purposes |
| RT3198 form | A record of possession arrangements prepared by the PICOP |
| RT3199 form | A record of worksite arrangements prepared by the ES |
| Running line | Line that is used for the passage of trains |
| Track circuit | An electrical device using rails in an electric circuit which detects the absence of trains on a defined section of line. |
| Ultrasonic testing | The use of ultrasonic equipment to detect rail flaws |
| Up fast (at Thirsk) | The designation of the *running line* that normally conveys fast trains in the southbound direction |
| Up slow (at Thirsk) | The designation of the *running line* that normally conveys slow trains in the southbound direction |
| Week 41 | The designation of the week in which the incident occurred (07 to 14 January 2006) |
| Weekly Engineering Notice | A publication containing information about engineering works that were notified too late for inclusion in the *Weekly Operating Notice* |
| Weekly Operating Notice | A weekly notice issued by Network Rail. Section B contains details of planned engineering work |
| Worksite marker boards | A lit board used to mark the limits of a worksite |
| Working timetable | The base timetable published by Network Rail |

## Review of possession protection irregularities in the year previous to the incident at Thirsk

**Appendix C**

| Type of irregularity | Date | Place | Note |
|---|---|---|---|
| **Protection applied in the wrong place** | 08 May 2005<br>31 Oct 2005<br>01 Nov 2005 | Bow<br>Whitmore<br>Stapleford | There are known to be many more examples of this type of irregularity |
| **Train entering possession without authority (other than works train)** | 03 July 2005<br>23 July 2005 | Selhurst<br>Slough West | |
| **Work site set up outside possession** | 23 April 2005<br>26 July 2005<br>28 Aug 2005<br>13 Nov 2005 | Bletchley<br>Gresty Lane<br>Drumlanrig<br>Willesden | |
| **Regenerisation of the overhead line equipment before possession given up** | 11 Oct 2005 | Poplar | |
| **Train left possession into the path of a passenger train** | 20 March 2005 | Standish Junction | |
| **Electric train entered section of line that was blocked to electric traction** | 06 Feb 2005 | Kentish Town | |

## Review of possession protection irregularities since the incident at Thirsk

**Appendix D**

| Type of irregularity | Date | Place | Note |
|---|---|---|---|
| **Protection applied in the wrong place** | 30 March 2005 | Slade Lane Jct. | There are known to be many more examples of this type of irregularity |
| **Train entering a possession without authority (other than works train)** | 19 Feb 2006<br>30 April 2006 | Bletchley<br>Clapham | |
| **Work site set up outside a possession** | 26 Jan 2006<br>19 March 2006 | Lazonby<br>Manor Park | Subject of RAIB investigation |
| **Regenerisation of the overhead line equipment before a possession was given up** | | | |
| **Train left a possession into the path of a passenger train** | 14 Jan 2006 | Haymarket | Subject of RAIB investigation |
| **Electric train entered a section of line that was blocked to electric traction** | | | |

## Overview of short term planning meetings described in Network Rail procedure NR/PRC/MTC/PL0056

**Appendix E**

The above procedure states that the review of planned work and worksites against the possessions plan should be carried out at the *Maintenance Delivery Unit Weekly Planning Meeting*. The attendees at this meeting should include:

- Maintenance Delivery Manager (or nominated representative) as Chair
- Delivery Unit Planning and Resourcing Coordinator
- Track Section Manager (or nominated representative)
- Track Access Coordinator
- Works Planner
- Resource Planner
- Possession Coordinator

The PL56 procedure is clear that any requests for changes/additions/cancellations to worksites can be reviewed at this meeting provided the extent or duration of possessions is not altered. However, any changes later than six weeks prior to the date of planned possession are subject to special approval in accordance with a change control procedure.

Two other meetings are also defined in the above document. The first is the Area Weekly Planning Meeting. This meeting is designed to enable higher level strategic planning. For this reason it is intended that this meetings attendance should include members of the Area Delivery Planning Manager's team and the Track Access Co-ordinator. This meeting is also empowered to consider any requests for changes/additions/cancellations to worksites within existing possessions.

Secondly, the PL56 procedure defines the nature of the PICOPs Briefing. The procedure is clear that this meeting should be Chaired by the PICOP. Attendees will include the Engineering Supervisors who are due to work in the possession and the Possession Delivery Manager. This meeting is designed to enable the detailed planning of site activities. It is not empowered to consider applications for any changes to planned worksites.

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