



Rail Accident Investigation Branch

Rail Accident Report



Derailment of a Ballast Plough Brake Van at Carlisle 6 February 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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Derailment of a Ballast Plough Brake Van at Carlisle, 6 February 2006

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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 The investigation did not consider:
 - the detail of the operational irregularities which occurred in connection with the engineering *possession*;
 - all aspects of the engineering work taking place within the renewals possession;
 - the activities relating to the management of the possession, worksites or engineering train control during the works;
 - details of the mechanism of the derailment and the damage to the infrastructure at that location.

These are not relevant to the issues considered or have been investigated by others.

- 4 Network Rail, EWS, First Engineering and WA Developments freely gave access to staff, data and records.
- 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* the first time they appear in the body of this report) are explained in the Glossary at Appendix B.

Summary

- 6 An engineering train, reporting number 6L57, became derailed on 756A *points* at the north end of Carlisle station at 13:20 hrs on 6 February 2006. The train was in transit following its use within an engineering possession near Barrow-in-Furness. There were no injuries and the derailment was limited to all wheels of a plough brake van at the rear of the train. Minor damage occurred to the track and the vehicle. Normal railway operations resumed at 07:56 hrs on 8 February 2006, once track repairs had been completed.
- 7 The immediate cause was the *ballast plough* at the leading end of the brake van coming into contact with an adjacent running rail on the approach to a set of points.
- 8 Causal factors were:
 - that during the stowage of the plough, following the cessation of work on site, the locking keys were not fitted.
 - there was no secondary means, neither mechanical or procedural, that ensures that the locking keys were in place before the plough brake van was moved from site.
- 9 Two recommendations are made to reduce the likelihood of a recurrence of this incident.
- 10 Four recommendations are made to address other non-compliances or poor practices that were observed during the investigation, but did not contribute to the derailment.

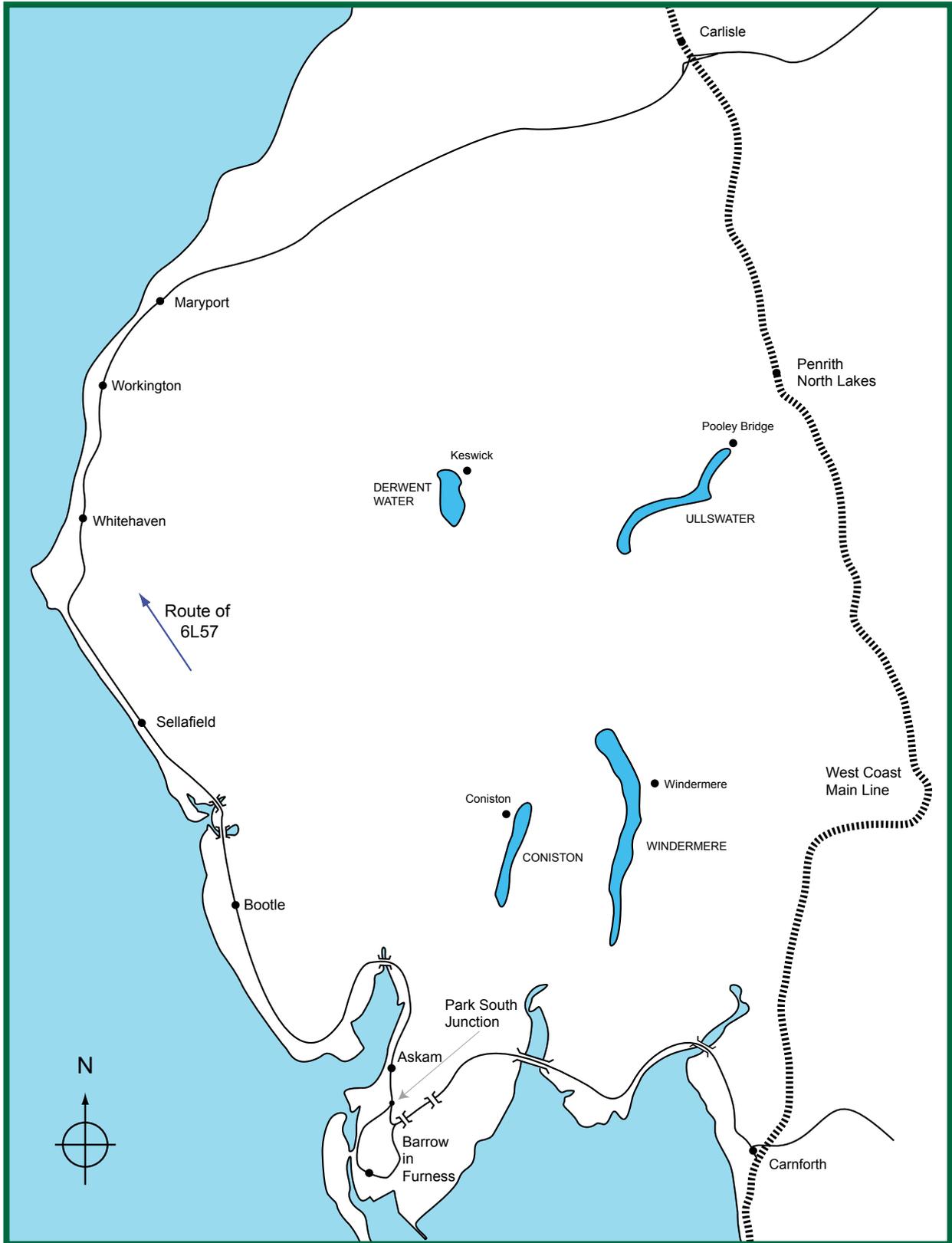


Figure 1: Railway map of the area

The Investigation

Summary of the incident

- 11 An engineering train, reporting number 6L57, became derailed on points at the north end of Carlisle station at 13:20 hrs on 6 February 2006. The train was in transit to Carlisle North Yard following its use within an engineering possession near Barrow-in-Furness. The derailment was limited to all wheels of Shark plough brake van DB993747 at the rear of the train.



Figure 2: Shark Plough van DB993747

Background

- 12 Plough brake vans are used during track renewal and maintenance operations when new track *ballast* is discharged from hopper wagons. Traditional ballast hopper wagons have underside doors in the centre of the *four foot* and to each side of the track. The activity of discharging ballast takes place with a slowly moving train and results in three ridges of ballast lying along the track. To redistribute this material more evenly and to ensure it is placed correctly between sleepers, a steel plough is employed. This has a profiled shape with raised sections over the rails and rail fastenings and is lower in the four-foot and sleeper end areas. Figure 3 shows a detailed view of the ballast plough.
- 13 The operating description of plough brake vans is ‘Shark’. As improvements in the methods of ballast handling have occurred, the number of Shark plough brake vans has reduced and there are currently only 26 in use on the national rail network. A number are in use on heritage railways.



Figure 3: Detailed view of the ballast plough

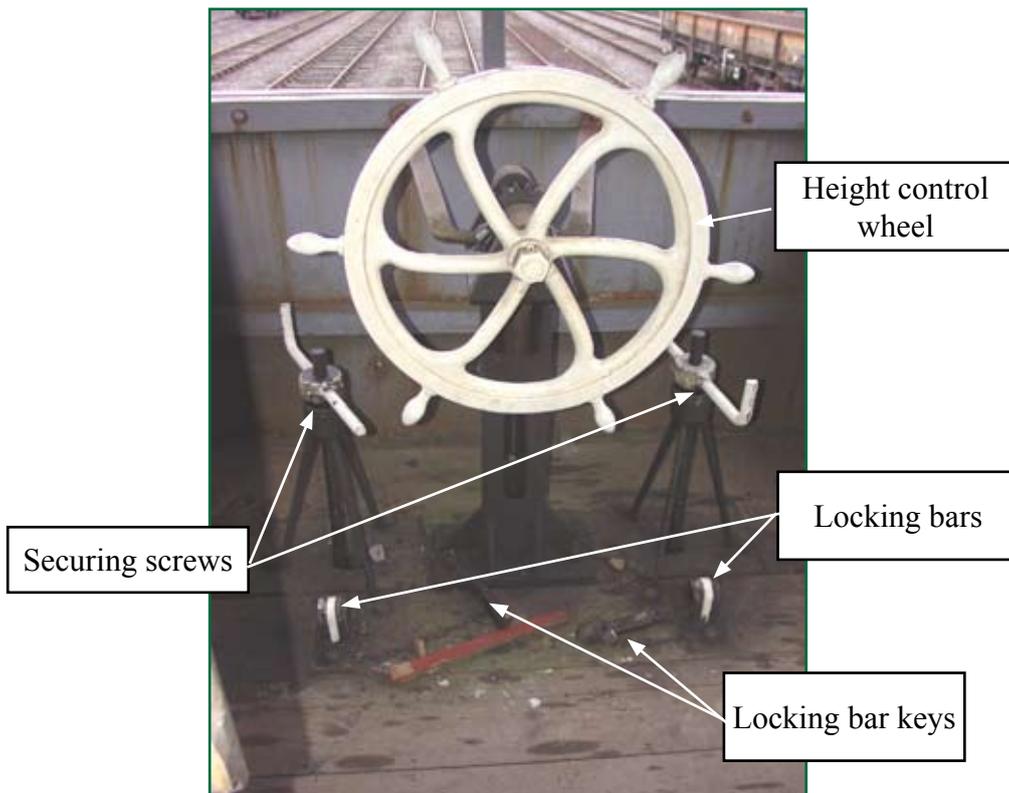


Figure 4: Inside view of a Shark plough brake van showing height control wheel, securing screws and locking bars with plough in working position

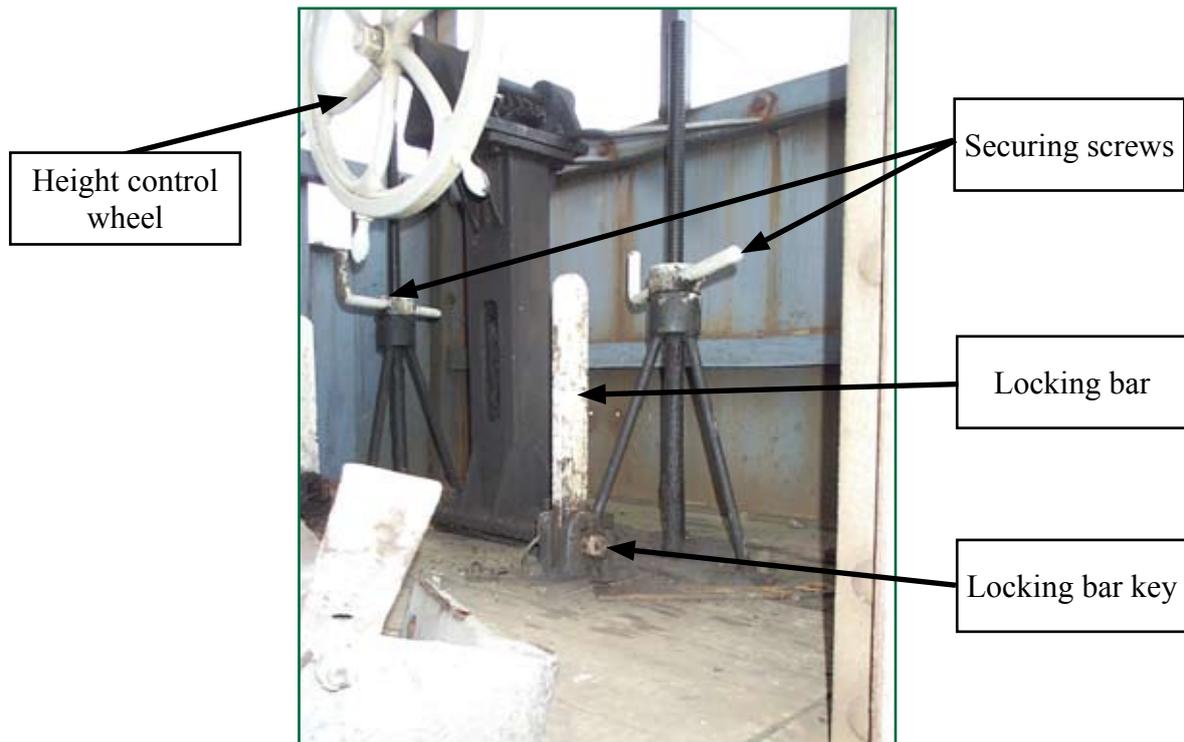


Figure 5: Inside view of a Shark plough brake van, with ballast plough in travelling position, showing securing screws and locking bars with keys inserted.

- 14 Ballast ploughs were originally constructed by converting freight train brake vans. The main additional features are the ballast plough and its supporting framework, a height control mechanism and wheel, two securing screws and two locking bars with keys to retain the plough in the raised position. The plough assembly is duplicated at each end of the vehicle to allow ploughing operations to take place with the vehicle moving in either direction. The height control wheel, two securing screws and locking bars at one end of a plough brake van are shown in Figure 4 and Figure 5.
- 15 Plough brake vans are unpowered and are towed or propelled. When in use the height of the plough is adjusted using the control wheel, shown in Figure 4 and Figure 5, to achieve the desired degree of ballast distribution and level. The plough must be raised above railhead height where obstructions exist in the four foot or on the sleeper ends, eg at points or at *AWS magnets*.
- 16 Shark plough brake vans are owned and maintained by EWS. They are operated on track renewal worksites by the track renewal contractor.
- 17 Train preparation activities within freight yards are carried out by EWS *train preparers* in accordance with the *Rule Book* and Group Standard GC/RM 3056 'Working Manual for Rail Staff – Freight Train Operations' (The *White Pages*). These apply to normal freight trains and engineering trains.
- 18 Rolling stock and train movements are monitored by the *Total Operations Processing System* (TOPS). This records the location, movement, operational status and load condition of all vehicles on the national network. TOPS uses this information to calculate train haulage and braking requirements for assembled trains.
- 19 A schedule of TOPS train information is used by the train preparer. When train preparation procedures have been completed satisfactorily, the train preparer completes and signs a summary document, the '*driver's slip*', which is handed to the train driver as authority to move the train.

- 20 Train preparation duties within possessions, after the end of engineering work activities, are carried out by a site train preparer. If the train has been subject to loading or unloading activities or includes engineering plant or wagon-mounted equipment, which has been used during the works, the site train preparer obtains a Certificate of Readiness (CoR) from the worksite engineering supervisor (ES) before his duties are performed. The CoR is generate by ‘the competent person responsible for the loading or unloading ‘ and handed to the engineering supervisor, who signs it. The White Pages defines those elements for which the competent person is responsible. These include the stowage and security of loose material and equipment. A specimen CoR as specified in The White Pages is included at Appendix C.
- 21 A site train preparer carries out checks, including the assessment of wagon loading, as specified in Sections C1, C2 and C4 of The White Pages and Module TW1 of the Rule Book. A site train preparer then either manually or through the TOPS system generates a driver’s slip in accordance with Module TW3 of the Rule Book.

Events preceding the incident

The work

- 22 A track renewal was planned to take place on the *Down line* between Park South Junction and Askham station. The worksite mileage was 33 miles 229 yards to 35 miles 0 yards and the *Engineers Line Reference* (ELR) is CBC1.
- 23 The renewals contractor was First Engineering Track Renewals Division (FETRD). WA Developments (WAD) were subcontractors to FETRD and were providing most of the staff working at the site.
- 24 The weekend of 4 and 5 February 2006 was the first of three planned possessions at the site. The possession was to be taken at 20:30 hrs Saturday 4 February and finish at 05:10 hrs Monday 6 February.

The train

- 25 Three engineering trains were programmed for the works on the first weekend. The trains and the general planned sequence of work was as follows:
 - Train 6L55 was to be used to take away *track panels* lifted from the Down line. When the load was adequately secured and the train had been subjected to a *load examination* a CoR was to be handed to the site train preparer. The site train preparer was then to carry out the train preparation requirements (see paragraph 20) and when assessed as satisfactory, the train would depart the site southwards to Carnforth.
 - Train 6L56 was to be used to take away old ballast and deliver some new ballast. Following a successful load examination, handover of the CoR, the site train preparer’s checks and provision of a driver’s slip, train 6L56 would depart the site to the south.
 - Train 6L57 consisted of a class 66 locomotive at the north end and twenty-seven loaded ballast hoppers with a Shark plough brake van at the rear. This was to arrive on the Down line from the south. It was to discharge ballast to the four foot and sleeper ends.
 - The equipment on the wagons of train 6L57 was then to be secured, a load examination was to take place and a CoR provided to the site train preparer. The locomotive was to *run round* the train, the site train preparer’s duties were to be performed, a driver’s slip produced and the train depart to the south.

Site train preparer's - planning

- 26 EWS train preparation activities for this area of the network are the responsibility of the EWS Scotland and Borders area. Due to local shortage of site-trained staff it is frequently necessary for site train preparers to travel from distant parts of the area.
- 27 Site train preparer 'A', based at Mossend in Glasgow, and allocated to the relevant duties relating to trains departing from this renewal worksite, had been arranged to arrive on site at 05:30 hrs on Sunday 5 February when it was anticipated that train 6L55 would be ready to leave. Site train preparer 'A' was then to take rest at a local hotel, returning to manage the departure of train 6L56 at approximately 23:00 hrs and remaining on site until 03:00 hrs Monday 6 February to manage the departure of train 6L57.

The possession

- 28 A number of incidents occurred in the early part of this programme including a *possession limit board* irregularity and a set of *points run through*. These have been investigated by others and form no part of this report. However they did result in the works running later than scheduled. The delay significantly affected the programme for the remaining renewal works and, due to working hours restrictions, limited the availability of site train preparer 'A' to manage the departure of remaining trains from the possession.
- 29 When site train preparer 'A' arrived on site at 05:30 hrs Sunday 5 February track lifting work was not complete and therefore train 6L55 was not available for departure.
- 30 When activities involving train 6L55 were complete, site train preparer 'A' received a CoR, completed his train preparation procedures and called the EWS TOPS operator at Doncaster. He informed the TOPS operator of the formation and loading of train 6L55 and the TOPS operator responded with the relevant train operations information to enable site train preparer 'A' to produce a driver's slip. Train 6L55 departed site at 13:30 hrs southwards towards Carnforth.
- 31 Site train preparer 'A' then left site to take rest at a local hotel. He returned at 20:30 hrs. The works were still behind schedule and train 6L56 was not ready to leave site at that time. Later site train preparer 'A' obtained a CoR from the engineering supervisor, ES 'A', and having completed his train preparation procedures satisfactorily, called the EWS Doncaster TOPS operator as before and subsequently produced a driver's slip for train 6L56. Train 6L56 left site at 23:30 hrs, departing southwards from the site towards Carnforth.
- 32 At this time train 6L57 was standing to the south of the worksite and had not carried out any work. Site train preparer 'A' realised that his permitted hours of duty would be exceeded if he remained on site until train 6L57 completed all of its activities. He therefore made arrangements via EWS Control at Doncaster for a relief site train preparer to be provided.
- 33 Site train preparer 'A' inspected train 6L57 and listed the wagon numbers and their order, but not the condition of their load; during the ballast unloading process this would alter. He placed this part completed wagon list together with a proforma labelled 'authorisation slip / substitute driver's slip' in the cab of the locomotive on train 6L57. Site train preparer 'A' left site at 00:30 hrs Monday 6 February.

Events during the incident

- 34 An experienced site train preparer was already on duty and working at Carnforth, preparing trains, on the evening of Sunday 5 February. He was rostered for a shift at Carnforth from 22:00 hrs 5 February until 10:00 hrs Monday 6 February.
- 35 At 01:00 hrs on Monday 6 February 2006 he was asked by EWS Control to travel by road transport to the engineering site at Askham and act as relief site train preparer. He was to attend to the locomotive run round and departure from site of train 6L57.
- 36 This relief site train preparer, site train preparer 'B', arrived at Askham station at 02:30 hrs. He went to the *Site Access Control* and signed in. At 03:00 hrs he telephoned the driver of train 6L57. At this time train 6L57 was in the process of discharging ballast.
- 37 The discharge of ballast from train 6L57 was controlled by a technician engineer from WAD, who was located on the Shark plough brake van. He was in radio communication with the engineering supervisor, ES 'B', also from WAD, who was in the locomotive cab of train 6L57 with the driver. WAD staff were positioned on the ballast hopper wagons of the train in order to operate the wheel controls which open and close the hopper doors.
- 38 An initial ballast discharge move was made by train 6L57, travelling from south to north. The ballast plough was not used during this movement. Road rail excavators were then deployed using their *profile buckets* to distribute the discharged ballast.
- 39 The train was propelled back to the south end of the site.
- 40 A second discharge movement was made, again travelling south to north. On this occasion the plough was used, set 75 mm above rail level to ensure that adequate ballast remained throughout the site to allow for the tamping sequence, which was to follow. ES 'B' on the locomotive was not aware that the plough was in use.
- 41 The technician engineer stated over the radio that the discharge of ballast was completed. Two men were sent to assist ES 'B' in clearing any residual ballast from the wagon discharge chutes.
- 42 A competent person had not been formally appointed or identified by WAD or FETRD. The technician engineer carried out those duties of a competent person relevant to the stowage of loose equipment and materials, although he did not personally prepare a CoR or check the state of hopper wagon doors or chutes. The ES carried out those duties of the competent person relating to hopper doors and ballast.
- 43 The technician engineer raised the ballast plough and believed he had secured and locked it.
- 44 During this process a mobile telephone conversation took place between the technician engineer and ES 'B'. The technician engineer assured ES 'B' that the ballast plough was correctly stowed away.
- 45 ES 'B' then took the part completed wagon list together with the proforma labelled 'authorisation slip / substitute driver's slip', previously left by site train preparer 'A', from the locomotive cab. He inspected the train noting the load condition of the wagons on the wagon list and ensuring that the discharge chutes were clear of ballast.
- 46 ES 'B' then signed the upper section of the 'authorisation slip / substitute driver's slip' in the space designated for the ES, and returned the documents to the locomotive cab. ES 'B' had not previously had to sign a CoR. He understood the purpose of CoRs, but had not received any instruction during his ES training.

- 47 Train 6L57 then drew forward and stood at signal 18, south of Askham level crossing. The time was now 04:10 hrs.
- 48 The signaller at Askham signal box advised site train preparer 'B' that a run round of the train would not be possible due to damaged points at Park South Junction incurred during an earlier incident. The use of crossovers further to the north would also not be possible as signal boxes were not in use. A decision was taken for train 6L57 to leave the site northwards to Carlisle and then arrangements could be made for its return to Carnforth via the West Coast Main Line route.
- 49 Site train preparer 'B' inspected train 6L57 as specified in the White Pages. He checked that hopper doors were closed and that there was no ballast remaining on the wagon chutes. He observed that the ballast plough on the Shark was raised, but did not look into the vehicle or climb on-board.
- 50 Site train preparer 'B' then entered the cab of the locomotive of train 6L57. He looked for the TOPS list provided with the train when it arrived at the site of work but did not find it. He collected the hand written wagon list left by site train preparer 'A' and completed by ES 'B', and the 'authorisation slip / substitute driver's slip' left by site train preparer 'A' and signed by ES 'B'.
- 51 Site train preparer 'B' had not previously seen an 'authorisation slip / substitute driver's slip'. However, he had received CoRs from engineering supervisors representing a number of different engineering companies and these had been in a variety of formats. He was therefore not surprised or concerned at receiving another variation. He assumed that the upper section labelled 'authorisation slip' with space for the ES to sign constituted a CoR.
- 52 The driver of train 6L57 would soon exceed his permitted hours of duty and requested relief from his train crew depot at Carnforth. No driver was then available at Carnforth who had *route knowledge* for the journey to Carlisle. It was therefore necessary to wait for a driver to book on duty later in the morning before the train could leave the site for Carlisle.
- 53 Train 6L57 was left, apparently ready to depart, standing at signal 18 with the engine running. Site train preparer 'B' and the driver of train 6L57 left site by road transport to return to Carnforth at 05:30 hrs.
- 54 Upon arrival at Carnforth, site train preparer 'B' faxed the wagon list to the EWS Warrington TOPS office, where it was input to the system and a TOPS train consist and a driver's slip produced. This was faxed to site train preparer 'B' at Carnforth, who checked the data and signed it.
- 55 The new driver booked on duty at Carnforth at 07:50 hrs. Site train preparer 'B' gave him the faxed TOPS train consist and driver's slip. The driver departed by road to Askham, arriving there at approximately 09:10 hrs.
- 56 Train 6L57 departed site at 09:20 hrs. It travelled northwards passing through Whitehaven and Workington.
- 57 At 13:20 hrs train 6L57 was passing through Carlisle station when the brakes were automatically applied. At the same time the driver of a passing train observed the rear of the train derailed and foul of the adjacent line.
- 58 The left hand side of the ballast plough at the leading end of the Shark plough brake van had contacted a converging rail on the approach to 756A points and derailed the vehicle all wheels. This had caused the brake pipe between the brake van and the wagon immediately in front to part and initiate the brake application.

Analysis

- 59 Shark plough brake vans have existed for many decades – the design pre-dating World War 2. The SMIS database has no record of a previous occurrence where a lowered plough caused a derailment in normal train running.
- 60 The procedure to be applied in raising the ballast plough is:
- turn the plough height control wheel to lift the plough;
 - tighten both securing screws clockwise to hold the plough;
 - put both keys into the locking bars – these will only fit with the plough fully raised.
- 61 The design of the locking bars and keys is robust and proven. There was no damage to the locking or securing system and therefore a failure of these is discounted. The keys, which are inserted into the locking bars, have a ‘drop end’ latch to prevent keys vibrating or falling out or being displaced unintentionally. They are also retained to the vehicle by short chains, to prevent loss. These are shown fitted in Figure 4. Both keys being properly inserted and subsequently coming adrift is discounted.
- 62 An act of malice in removing the locking keys en route is possible, but is considered unlikely. A person perpetrating this act would need detailed knowledge of the locking system and removal of the locking keys would not appear to be an obvious act.
- 63 A subsequent trial was carried out to establish the securing capability of the plough height control system. The vehicle was static and the locking keys and securing screws released. The height control wheel and its gear mechanism together with the securing screw handles and their screw threads were free to move and adequately lubricated. With the plough in the raised position a small amount of rotational input to the control wheel resulted in the plough descending easily and the wheel continued to rotate for a short period of time. It is considered in a moving train, with the added vibratory input, the plough would descend rapidly to rail level. Because this did not occur in this incident it is reasonable to conclude that the securing screws were wound down before the train left the site.
- 64 At Maryport station a scrape mark was subsequently discovered on a timber foot crossing. The mark was to the left of the rails in the direction of travel and at a dimension equivalent to the left hand edge of the ballast plough.
- 65 The balance of evidence suggests that it was the technician engineer who initiated the call referred to in paragraph 44. The call was made during a period of intense activity by those on site in preparation for the release of the train.
- 66 At the point of derailment, the left hand side tip of the plough was below rail surface sufficiently to strike the rail and not be deflected away. At Maryport, 50 miles into the 75 mile journey, the left hand tip, considered to be the cause of the mark observed on the foot crossing surface, was some 30 mm to 50 mm above rail head surface. Extrapolation of this dimension would suggest that the plough was at its stowed height, 150 mm above railhead, when train 6L57 left the site. It is therefore concluded that the plough was raised and the securing screws wound down at site but the locking keys were not inserted. During the journey the securing screws rotated due to motion and vibration, allowing the plough to gradually lower.
- 67 The provision of indicators for the locking keys or interlocking to prevent movement of the vehicle without ballast ploughs being raised, secured and locked is considered to be impractical due the cost, limited remaining operational life and declining use of these vehicles and the low incidence of occurrence.

Conclusions

- 68 The immediate cause of the accident was the gradual lowering of the plough in transit from Askham, allowing it to contact an adjacent running rail at 756A points at the north of Carlisle station.
- 69 Causal factors were:
- that during the stowage of the plough, following the cessation of work on site, the locking keys were not fitted.
 - there was no secondary means, neither mechanical or procedural, that ensures that the locking keys were in place before the plough brake van was moved from site (Recommendations 1 & 2).

Additional Observations

Certificate of Readiness

- 70 None of the following CoR issues are considered to have contributed to this incident. However, they do not reflect current good practice and should be addressed.

Engineering supervisor training

- 71 The engineering supervisor, ES 'B', who was responsible for the signing of the CoR before the departure of train 6L57 had no previous experience of this procedure. The ES training he had attended had not included the requirements or responsibilities of engineering supervisors with respect to CoRs.
- 72 Subsequent inquiries have revealed that this is a known deficiency. Network Rail have an action from an earlier investigation – 'Churchdown: Irregularity with Rail Delivery Train : 08/08/04'. Recommendation J4.1 'Network Rail should consider ensuring that engineering supervisors supplied for worksite supervision are competent to undertake the duties required in relation to the provision of a Certificate of Readiness of trains for departure from a worksite and the control of train movements within a worksite'. The SMIS reference is QGW/104040.

The completion date for this recommendation was originally June 2006. This has been amended to December 2006. Network Rail should complete this recommendation by the revised date.

Use of unofficial proforma

- 73 The 'authorisation slip / substitute driver's slip' provided by site train preparer 'A' was an unofficial form created by EWS staff locally to address other issues. This proforma should be withdrawn from use. Only the correct CoR and Drivers Slips should be used (Recommendation 3).
- 74 Site train preparer 'B' accepted the unofficial 'authorisation slip / substitute driver's slip' as meeting the requirements of a CoR although he had not seen one prior to this occasion. EWS need to rebrief their site train preparers' not to authorise movement of trains from engineering worksites without previously having received a signed CoR from the ES (Recommendation 2).

Signature of receipt

- 75 Site train preparer 'B' arrived at Askham station at 03:00 hrs. Ballast discharging activities finished at 04:10 hrs and site train preparer 'B' left site following his train preparation duties at 05:30 hrs. At no point in this period did the ES and relief site train preparer meet or discuss the situation with regard to train 6L57. The documentation on site was taken and removed from the locomotive cab by these individuals in isolation. The ES did not therefore retain a copy of the CoR as specified in The White Pages. Had the CoR required the ES to obtain a signature of receipt from site train preparer 'B', a face-to-face meeting would have occurred. The current CoR template does not include a section for the site train preparer to acknowledge receipt of the CoR from the ES.
- 76 Examples of good practice exist, where the use of carbonless pads of CoRs enables a copy to be easily provided to the ES as specified in 'The White Pages'.

CoR proforma

- 77 Neither WAD nor FETRD staff on site held blank CoRs. This appears to be a common situation on track renewals sites. Network Rail should ensure that supplies of CoRs are available on all engineering sites.

Competent Persons

- 78 The Group Standards

GO/RT 3400 "The Safe Working of Freight Trains"

GO/RT 3406 "Competence Requirements for Safe Loading of Rail Vehicles"

GC/RT 3506 C "Principles of Safe Freight Train Operation"

contain inconsistency of wording. They variously refer to "Vehicle loading", "...loads carried on rail vehicles are safely loaded and secured." And "...the competent person responsible for loading and unloading...". GO/RT 3406 states that "The infrastructure controller shall determine the vehicle loading and load securing requirements for infrastructure traffic".

WAD understood that the requirement of competent persons as stated in GO/RT 3406 did not apply to ballast discharge activities, and had received advice to that effect. On the basis of this understanding neither the Technician Engineer or ES'B' had been assessed or certificated as competent persons.

This anomaly should be addressed and the requirements for competent persons in regard to the use of ballast hoppers and plough brake vans needs to be clarified

- 79 GO/RT 3406 "Competence requirements for Safe Loading of Rail Vehicles, Issue One" will be withdrawn from February 2007. Network Rail will need to amend or develop their own procedures to achieve the requirements set out in GO/RT 3406. This will ensure that appropriately competent staff are provided to meet the requirements of Network Rail Standards NR/CS/OPS/071 "Loading and Securing of Infrastructure Traffic" and the "Loading Manual for Infrastructure Traffic".

Actions already taken or in progress

- 80 EWS have issued an Operating Digest Advice (Number 121) instructing site train preparers', who prepare trains at the point of departure from engineering worksites, to check that the plough is correctly raised, secured and locked before permitting Shark brake vans to move outside of possessions.
- 81 EWS have withdrawn from use the unofficial 'authorisation slip / substitute driver's slip' (paragraph 73, Recommendation 4).
- 82 EWS have briefed all site train preparers' that they must receive a CoR in the correct format, as shown in The White Pages, before accepting engineering trains following their use in possessions (paragraph 74, Recommendation 3).
- 83 Network Rail are progressing the issue of a revised ES training syllabus, which includes a Certificate of Readiness Module. This is programmed for delivery in December 2006.
- 84 Network Rail have proposed that the 'competent person' should also sign the CoR after preparing it.

Recommendations

85 The RAIB's 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

To prevent a recurrence

- 1 EWS should ensure that the advice and instructions given to site train preparers' in Operating Digest Advice Number 121 (Actions already taken or in progress: paragraph 80) are incorporated into normal working procedures.
- 2 EWS should consider providing further assistance to train preparers in regard to plough stowage by painting locking keys a bright colour and/or placing reminder/warning notices on the exterior of the vehicles.

Arising from observations during this investigation

- 3 EWS should rebrief their site train preparers' that they must receive a CoR in the correct format, as shown in The White Pages, before accepting engineering trains following their use in possessions (Actions already taken or in progress: paragraph 82).
- 4 EWS should ensure that the unofficial 'authorisation slip / substitute driver's slip' is withdrawn from use (Actions already taken or in progress: paragraph 81).
- 5 As a result of observations (paragraphs 75 to 78) and the proposal to withdraw GO/RT 3406 (paragraph 79) Network Rail should review their systems, procedures and documentation to ensure that trains leaving engineering worksites are in a secure and operationally safe state. The review should consider the requirements for competent staff and the competency / training needs.
- 6 WAD and FETRD should review their procedures to ensure that an appropriate competent person is clearly identified to perform the duties required during loading and unloading (paragraph 42).

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 recommendation. 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.

Appendices

Glossary of abbreviations and acronyms

AWS

CoR

ELR

ES

EWS

FETRD

SMIS

TOPS

WAD

Appendix A

Automatic Warning System

Certificate of Readiness

Engineer's Line Reference

Engineering Supervisor

English, Welsh & Scottish Railways Ltd.

First Engineering Track Renewals Division

Safety Management Information System

Total Operations Monitoring System

WA Developments

Glossary of terms

Appendix B

| | |
|--------------------------|--|
| AWS Magnets | Magnets placed 200 yards on the approach side to a signal used to give drivers advance warning (via bell or horn) of a signal aspect. |
| Ballast | Graded stone sub-base used for drainage and support of the track. |
| Ballast Plough | Device fitted to the underframe of a vehicle which is used to redistribute track ballast. |
| Certificate of Readiness | Document detailing status of each vehicle eg loaded, empty or 'carded' for repair. The completed form must be signed by the Engineering Supervisor. |
| Competent person | A person who has been trained, assessed and certificated appropriate to the duties carried out. |
| Down line | Line taking trains away from London (generally). |
| Driver's slip | A document completed by the train preparer stating that preparation procedures have been followed. When signed, this is given to the driver as authority to move the train. |
| Engineering Supervisor | A person who takes control of a worksite within a possession during engineering operations. |
| Engineers Line Reference | A unique alphanumeric code used by railway engineers given to each route on the national network. |
| Four Foot | The area between the inner running faces of a pair of rails. |
| Load examination | Inspection of wagons to check that their load is secure and complies with the relevant clearances. |
| Points | The items of permanent way which may be aligned to one of two positions, normal, or reverse, according to the direction of train movement required. |
| Points run-through | A train or locomotive move through a set of points in the trailing direction when they are lying in the opposite hand. It usually causes some damage to the track components or operating equipment. |
| Possession | A period during which normal service is suspended on a designated section of line for the purposes of maintenance and/or engineering works. |
| Profile buckets | Excavator attachments which are designed to move track ballast and are shaped to fit around the rails and fastenings. |
| Route knowledge | The formal requirement for all drivers to be trained and conversant with all sections of a route to be used by the train of which they are charged. |
| Rule Book | Book documenting the rules by which all personnel working on railway property must abide, also incorporating those for the safe operation of the network. |

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| Run round | The action of a locomotive detaching from its train at a terminal in order to change ends. |
| Safety Management Information System | A national IT system used by all Railway Group members to record all safety related events that occur on Network Rail controlled infrastructure. |
| Site Access Control | A mechanism to record and control who enters the site of work. |
| Total Operations Monitoring System (TOPS) | A system providing a comprehensive system for monitoring a train's complete movement cycle from workshop and maintenance. |
| Track panels | Pre-assembled lengths of track complete with rail, sleepers and fastenings of such size that it can be transported to site 'as is'. |
| Train preparer | A person who is assessed as competent to undertake the duties of preparing trains for service use. |
| White Pages | The working manual for rail staff engaged in freight train operations which sets out the mandatory tasks to ensure safe operation. |

Certificate of Readiness (Engineering Work Site)

| | | | |
|------|--------------------|------|----|
| Date | Train Identity No. | From | To |
| | | | |

The vehicles listed below are ready for movement and: -

- all doors are fully closed and secured
- fixed and loose equipment is properly stowed and secured
- traffic is loaded and secured according to requirements
- loose material and debris has been cleared from the load, vehicle frames and body sides
- self propelled on track machines and power driven rail cranes have been prepared for travel in accordance with GO/RM3056 Working Manual for Rail Staff, Freight Operations Manual, Section E
- vehicles requiring 'Exceptional Load' and / or 'Load Examined' labels have been inspected and labelled by a competent person

| Vehicle Number | Status + |
|----------------|----------|
| | |

| Vehicle Number | Status + |
|----------------|----------|
| | |

| Vehicle Number | Status + |
|----------------|----------|
| | |

+ Indicate whether Loaded = L, Empty = E and if Carded = C
 Where vehicles are not fully discharged they must be shown as Loaded

To be signed by the Engineering Supervisor

| | |
|-------------------|------------------|
| Signature | Print name |
| Designation | Company |
| Time | |

**THE PERSON RESPONSIBLE FOR TRAIN PREPARATION MUST
 CARRY OUT THE REQUIREMENTS CONTAINED IN GO/RM3056
 WORKING MANUAL SECTION C**

This form must be retained by the Train Preparer or other responsible person, and the Engineering Supervisor (copy) and subsequently disposed of according to instructions.

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