MINISTRY OF TRANSPORT

RAILWAY ACCIDENT

Report on the Derailment that occurred on 20th May 1965 at Hest Bank

IN THE
LONDON MIDLAND REGION
BRITISH RAILWAYS

LONDON: HER MAJESTY'S STATIONERY OFFICE
1966

FOUR SHILLINGS NET

MINISTRY OF TRANSPORT,
ST. CHRISTOPHER HOUSE,
SOUTHWARK STREET,
LONDON, S.E.1.

SIR, *20th January*, 1966.

I have the honour to report for the information of the Minister of Transport, in accordance with the Order dated 24th May 1965, the result of my Inquiry into the derailment that occurred at 0220 hrs on Thursday, 20th May 1965, at Hest Bank on the Euston-Carlisle Main line, in the London Midland Region, British Railways.

The 2210 hrs Up sleeping car express from Glasgow Central to Kensington Olympia was approaching Hest Bank Station at about 70 m.p.h. under clear signals when the rear nine coaches of the train became derailed by a broken rail on a section of track containing watertroughs. The train became divided in two places. The diesel locomotive and first three coaches, which were not derailed, came to a stand 746 yards beyond the point where the rail was broken; the second portion, consisting of four coaches including three sleeping cars, came to rest between the platforms of Hest Bank station with the coaches lying on their right-hand sides in the direction of travel, blocking both Up and Down lines; the third portion comprising a further four sleeping cars and a bogie brake van left the track on the Up side where it was on a low embankment and came to rest on the side of the bank tilted away from the line.

Considerable exterior damage was sustained by the derailed coaches but the amount of structural and internal damage to the coach bodies was surprisingly small in view of the speed at which the derailment took place. Extensive damage was caused to the permanent way over a distance of ¼ mile, to the Up side level crossing gates, and to the Up platform at Hest Bank.

Prompt action was taken to stop approaching traffic and to summon emergency assistance, and with the help of the railwaymen at the scene the passengers were quickly extricated from the overturned coaches.

Fortunately only 11 of the 114 passengers on the train sustained injuries or shock, all of a minor nature, and of these only two were detained in hospital, both being discharged within 3 days.

The uninjured passengers were taken to Lancaster by road where an emergency WVS reception centre had been set up to receive them and prompt arrangements were made for them to continue their interrupted journeys.

Breakdown cranes arrived from Lostock Hall and Carlisle at 0536 and 0655 hrs respectively and both the Up and Down lines were re-opened to traffic later the same evening under a temporary speed restriction of 20 m.p.h. During the time that the main line was blocked traffic was diverted over several alternative routes.

The accident took place on a clear moonlit night and there was a sharp ground frost at the time.

DESCRIPTION

The site

1. Hest Bank station lies 3 miles north of Lancaster at a point where the West Coast Main line from Euston to Carlisle runs along the shore of Morecambe Bay. To the north of the station, and distant about 300 yards from it, there are watertroughs in both Up and Down lines. The track over the troughs is straight and level and then, in the Up direction, rises at a gradient of 1 in 467 through the station as far as Morecambe South Junction, the next signalbox towards Lancaster. A single line branch line to Morecambe makes a trailing junction with the Down line at the south end of Hest Bank station and the Up and Down lines are connected by both facing and trailing crossovers. A public level crossing is situated at the north end of the platform with gates operated from the adjacent signalbox which stands on the Down side of the line.

2. Signalling on the main line is by the Absolute Block system between Hest Bank and the adjacent signalboxes. The next signalbox to the north of Hest Bank is Carnforth No. 1, 3 miles distant, and there are intermediate colour-light block signals at Bolton-le-Sands on both Up and Down lines.

3. The maximum permitted speed over this section of line is 90 m.p.h. but trains including sleeping cars are restricted to 80 m.p.h.

The track

4. The Up main line over the watertroughs consisted of 109 lb FB 60 foot rails, rolled at Workington in 1954, flash-butt welded into 300 foot lengths and laid in 1955. The fastenings were elastic spikes and base plates, and each 60 foot length was supported on 26 12 inch by 6 inch wooden sleepers. The weight of the rails had been reduced by wear and corrosion to an average of 103½ lbs per yard. On both Up and Down lines, though more extensively on the latter, the rails had been wheelburnt in a number of places. Some of the more serious wheelburns, where the running surface of the rail had shelled out, had been built up by oxy-acetylene welding and in several places where the development of a transverse fracture in the railhead under a severe railburn had been observed or was suspected the rail had been drilled and fishplated as a precaution until it could be changed.

5. The general state of maintenance of the track was good, despite the difficulties caused by the presence of watertroughs, but the length had been proposed for relaying in view of the deterioration of the rail.

The broken rail

6. It was at once apparent to the railway officers when they reached the scene of the accident that the immediate cause of the derailment was a broken rail, a portion of the cess rail of the Up line about 13 feet long having broken away at the point at wh ch the first marks of derailment were visible, adjacent to the more southerly of the two water tanks that fed the troughs. The initial fracture had occurred 15 feet from the nearest weld and had apparently started as a transverse crack through the rail head, underneath an old wheelburn, subsequently turning horizontally in the direction of travel along the web until it had turned down to the foot and up to the head leaving a piece of rail head 4 foot 7 inches long detached. A further 9 feet of rail had been broken into several pieces, probably as a result of the derailment, and was scattered over a considerable area. Almost all the pieces were subsequently recovered and reassembled as shown in the accompanying photographs and diagrams, in the British Railways Engineering Research Laboratory at Derby, where they were taken for a detailed metallurgical examination.

The train

7. The train involved was the 2210 hrs Up sleeping car express from Glasgow Central to Kensington Olympia. It was hauled by a Brush-Sulzer type 4 diesel-electric locomotive and formed of 12 vehicles marshalled as follows:—

1.	Corridor Second Be	M 15207
2.	,, Composit	M 24882
3.	,, Second rake	M 35458
4.	..	M 25380
5.	Second Class Sleeping Car	M 2686
6.	,, ,, ,, ,,	M 600 M
7.	,, ,, ,, ,,	M 605 M
8.	,, ,, ,, ,,	M 2634
9.	First Class Sleeping Car	M 2016
10.	,, ,,	M 440 M
11.	Composite Sleeping Car	M 2457
12.	Bogie Brake Van	M 81553

8. With the exception of the 6th, 7th and 10th vehicles, which were of older design and fitted with side buffers and screw couplings, all the coaches were to British Railways standard designs with Buckeye couplings and Pullman type gangways. The available brake power of the train was 76.6% of its total weight of 575 tons including the locomotive. The length of the train was 872 feet.

The course of the derailment

9. It seems probable that the crack in the rail had already turned horizontally and was starting to advance along the web whilst the locomotive and leading coaches were passing over it, the portion of the head of the rail 4 feet 7 inches long finally becoming detached under the third coach which, however, was not derailed though it was found to have a bruised flange on the trailing left side wheel of the leading bogie, the right hand rocker bar of which had also been displaced by about 6 inches.

10. The gap in the rail must then have quickly lengthened as succeeding wheels struck the broken end causing further disintegration. From the fourth coach onwards each succeeding bogie was derailed to the left, but prevented from moving very far out of line by the heavy steel watertrough in the centre of the track, until the increasing damage to the latter finally allowed the right hand wheels to override it as the tail portion of the train started to diverge to the left. The increasing drag of the rear coaches as they ploughed along the edge of the formation caused the train to become divided between the 7th and 8th vehicles where the trunnion of the screw coupling burst and the thread stripped. The rear portion, consisting of 4 sleeping cars and the brake van then came to rest, still coupled together, on the low embankment on the Up side of the line at varying angles. With the division of the train and the consequent parting of the vacuum train pipe, the brakes were applied automatically as the front portion ran on with the 4th to 7th coaches derailed but still remaining upright, though displaced to the left sufficiently far to demolish the Up side level crossing gates and then, one by one, to mount the platform ramp and overturn towards the Down line.

11. The second division, between the 3rd and 4th coaches, must have occurred as the 4th coach started to run up the platform ramp, the Buckeye couplings parting with both coupling heads in the closed position as a result of the relative vertical and rotational movement between the two coaches. The engine and front 3 coaches then ran on a further 400 yards before coming to a stand 746 yards beyond the point of initial derailment. The attached plan shows the positions of the various portions of the train after the derailment.

Damage to the train

12. When the speed at which this derailment occurred is taken into consideration the amount of structural damage sustained by the derailed vehicles must be regarded as very small. The body side panels were extensively scored, but in two places only was the panelling torn. Considerably damage was done to the underframe equipment and running gear on all the derailed coaches, the bogies becoming detached from the 7th and 9th vehicles.

13. The amount of internal damage was very small indeed, being restricted for the most part to displaced bunks and broken crockery. A number of fixed side lights were broken but in most cases this had been done during the rescue operation to provide a way out for trapped passengers.

Damage to the track and structures

14. The permanent way in the Up line was destroyed from the point of initial derailment as far as the station, a distance of just over ¼ mile, together with the end 100 yards of the watertrough. The Up platform edging and coping was destroyed over most of its length as were both of the Up side crossing gates. Three telegraph poles were broken off and considerable damage done to signal and telecommunication equipment. Fortunately the signalbox itself stands on the Down side of the line and so escaped damage.

EVIDENCE OF TRAFFIC STAFF

15. *Driver A. Keatings* was in charge of the diesel locomotive of the sleeping car express. He said that he had a normal run, and after observing a permanent way slack near Carnforth, had a comfortable ride over the troughs at Hest Bank at 70 m.p.h. After passing through the station he was just closing his controller to slow down for Lancaster when he felt a pull and saw that the vacuum had fallen to zero. He thought he was then about 300 yards south of Hest Bank station. As soon as the engine stopped his fireman went back to see what was wrong and returned very soon to report that only three coaches were still attached to the engine. Keatings then sent the fireman forward to protect the Down line whilst he himself went back to find out what had happened. He described the scene as he first saw it, with four coaches lying on their sides between the platforms without a sign of life or movement. He hurried on to the signalbox where he found the signalman unhurt but shaken, who confirmed that all roads had been protected. Keatings then found the guard, who confirmed that he had telephoned for the emergency services, before going back to shut down his engine and help with the passengers.

16. *Fireman D. Johnston* was second man to Driver Keatings. He confirmed the driver's evidence and described how he had gone forward to protect the Down main line before striking across the country to the single line Morecambe branch to protect that as well. He then reported back to his driver before starting to help with the rescue of the passengers.

17. *Passenger Guard D. M. Cook* was in charge of the derailed train. After having observed the Up line signals at Hest Bank at "All Clear" the next thing he knew was that his van started to lurch and the vacuum fell to zero. As soon as it came to rest he had picked himself up and climbed out to find the vehicles ahead leaning over towards the fields. He attracted the attention of the two sleeping car attendants in the rear four sleeping cars and left them to look after their passengers and then ran ahead to the signalbox, where the signalman told him that the line was blocked in both directions but that he could not call the emergency services since his telephone was out of order. Cook therefore went himself to the public telephone box adjacent to the level crossing and called out the police, ambulance and fire services. He then went forward to the four coaches lying on their sides between the platforms to contact the sleeping car attendants who were, by this time, smashing the windows to get passengers out.

18. When asked why he had not gone back to protect his train in rear, because the derailment had occurred outside the protection of the home signal, Cook explained that he had considered that, since the signalman had confirmed that he had blocked the line back to Carnforth, he was adequately protected by the Intermediate Block Home signal at Bolton-le-Sands which was controlled by the signalman at Carnforth.

19. *Signalman B. J. McGuinness* was on duty at Hest Bank. He had watched the train approaching his box and was giving the "Train Entering Section" signal to Morecambe South Junction when he saw sparks flying about and he immediately followed it up by sending "Stop and Examine". Almost before he had done this he realised the train was derailed so he sent "Obstruction Danger" first to Carnforth No. 1 and then to Morecambe South Junction. By this time the wires had been brought down and almost all the circuits interrupted but McGuinness had been able to speak to the signalman at Carnforth on the Morecambe omnibus circuit, tell him what had occurred and ask him to inform Control.

20. When the train register book was examined after the accident it was found to include entries for "Train out of Section" to Carnforth and Morecambe South Junction. McGuinness explained that these signals had not in fact been exchanged, but that he had made the entries in his excitement after having sent the "Obstruction Danger" signals in each direction.

21. *Signalman J. Parrington* was on duty in Carnforth No. 1 signalbox. He confirmed McGuinness's evidence over the exchange of the "Obstruction Danger" signals and said that, although the bell signal had been very weak he had taken it at once as a "6", and had put back his signals. He had then spoken to McGuinness on the Morecambe circuit and, after learning what had occurred, had passed on the information to the Yard Inspector at Carnforth. He had also taken steps to stop the next Up train, which had already passed his Distant signals before they were replaced to Caution, by exhibiting a red hand signal which was acknowledged by the driver.

EVIDENCE OF PERMANENT WAY STAFF

22. The first member of the permanent way staff to reach the scene was *Sub-Ganger T. A. Whittaker* who lived in a cottage at Hest Bank station and was awakened by the noise of the crash. After confirming with the signalman that all lines were protected, he had passed a message via Carnforth to call out the Permanent Way Inspector and the District Engineer. He had then walked back to the rear of the train to see what damage had been caused but had not gone back as far as the broken rail until later.

23. Whittaker had carried out the routine inspection of the length of track over the watertroughs on the previous day. There were a number of wheelburns on both Up and Down lines, but only one on the Up line near the north end of the troughs was suspect and given a specially close examination. When he saw the broken rail later he recognised that the fracture had occurred at a wheelburn but it was one that did not appear to him to be serious, for there were many wheelburns in this length which looked far worse and yet had shown no signs of cracking.

24. Whittaker explained that, once a vertical crack in the rail head had been identified, the normal practice was to drill and fishplate the rail as a precaution, and then to change the rail as soon as an opportunity arose. In his experience such cracks only grew very slowly and often did not seem to move once they were plated.

25. *Ganger J. Sanderson* had not carried out a personal inspection of the track over the troughs since the previous Thursday, 7 days before the derailment. He had been in charge at Hest Bank for 6 years and said wheelburns were generally prevalent in his length but more frequent on the Down line than the Up: in fact, at the time of the accident there were four suspected fractures in the Down line, already plated and waiting for an opportunity to change the rails.

26. Sanderson then explained that, where wheelburns were serious, there was a tendency for a portion of the running surface of the rail to shell out and when this happened the running surface was restored by oxy-acetylene welding. Several wheelburnt rails at Hest Bank had been repaired in this manner but not at the particular place where the rail broke.

27. *Permanent Way Inspector H. S. Wooff* who had been in charge of the main line between Lancaster and Oxenholme since 8th March 1965, had last inspected the length of track where the rail broke on 14th May, 6 days prior to the derailment. He confirmed the evidence of the ganger and sub-ganger with regard to the action taken in respect of wheelburns, the majority of which were not serious and only required to be kept under observation. He was aware that some repairs to wheelburns by gas welding had been done but this was before he assumed responsibility for the area. On the morning of the accident he had arrived at the scene at 03.55 hrs and had gone back in rear of the derailed train until he reached undamaged track near the water tank. Here he had seen the broken rail which in his opinion had caused the derailment.

28. Evidence was also given by an *Audigauge Operator, P. Cottam*, who had carried out examinations of the rails at Hest Bank watertroughs at 6-monthly intervals using an ultrasonic flaw detector. He had made his most recent examination on 17th December 1964, and had found a number of serious cracks in the neighbourhood of wheelburns. He had marked the rail with paint to draw the local ganger's attention to the places concerned and had submitted his report to the District Engineer's Office at Lancaster. Cottam went on to explain that where his instrument indicated a flaw he examined the rail closely after brushing it down with a wire brush. Sometimes he had found cracks in this manner, in which case he reported them at once to the ganger.

29. *Mr. C. L. Parkinson*, the District Engineer, explained the principle on which the "Audigauge" works, which is by reflection of ultrasonic waves from a quartz crystal held on the running surface of the rail by any horizontal surface within the rail. The operator can distinguish by a variation in pitch of an audible signal whether the waves are being reflected from the base of the rail or from a bolt hole or hidden flaw. He also drew attention to the fact that the instrument, by the very manner in which it operates, would be most unlikely to pick up a vertical flaw even of considerable extent.

30. Mr. Parkinson explained the organisation within his office for dealing with the reports submitted by the Audigauge operator. They are scrutinised by a Technical Assistant and one copy is forwarded to the Permanent Way Inspector concerned with instructions either to change the defective rails or to keep them under observation.

31. Mr. Parkinson then went on to describe how, as soon as he saw the broken rail at the scene of the accident he realised that it was the cause of the derailment and had at once got in touch with the Chief Civil Engineer, London Midland Region who had arranged for a metallurgist to proceed to the scene without delay.

Metallurgical Report on the Rail

32. *Mr. J. D. Swindale*, a metallurgist on the staff of the British Railways Research Department at Derby reached Hest Bank at 1300 hrs on the day of the accident. He made a visual examination of the broken rail at the site and then took the pieces to Derby for further examination and metallurgical tests. The results of all the tests made showed that the rail was metallurgically sound, and he reported as follows:—

Visual Examination

33. "When assembled, the broken rail fitted together as shown in the sketch.

The brand marking on the rail web showed that the rail had been rolled at Workington during 1954.

An examination of the fracture showed there to be three distinct phases in its development, and the markings on the fracture faces showed that they had occurred in this order:—

(i) A transverse fatigue flaw in the head, whidh had reached the outer corner of the rail head but not the gauge corner, and which was 1¼" deep at its maximum. (At point "A" in the sketch).

BROKEN 109LB FB RAIL – UP LINE HEST BANK WATERTROUGHS – 20th MAY 1965

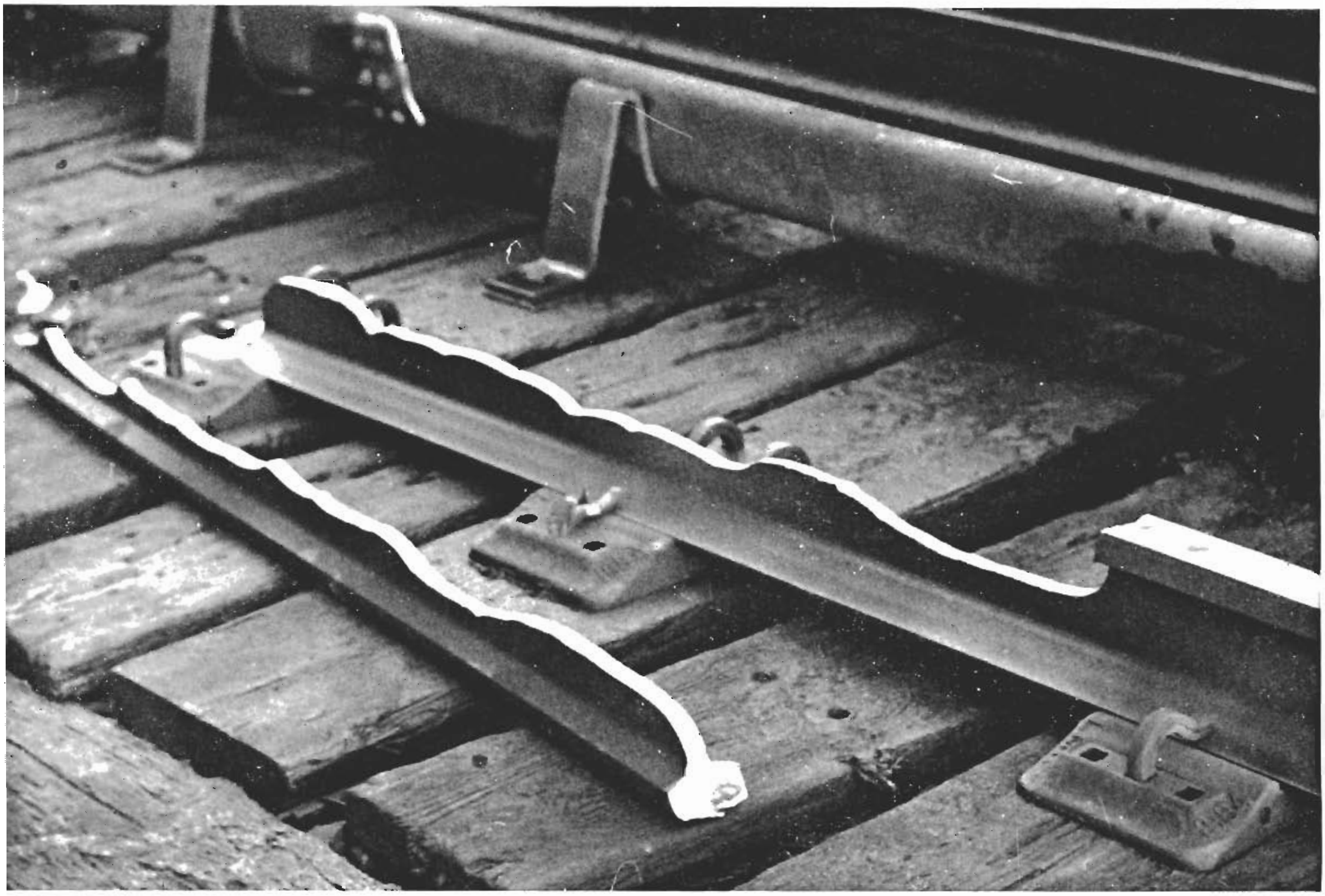
Scale ¾" to 1 foot

DIRECTION OF TRAFFIC →

SIDE VIEW OF RAIL ASSEMBLED IN LABORATORY

SKETCH TO ILLUSTRATE PROGRESS OF FRACTURE

Fatigue crack at origin of failure.



Broken rail before removal from track with detached portion of head lying alongside.

(ii) A brittle fracture, lightly rusted, which had extended in several stages vertically down through the head when it had turned longitudinally in the direction of traffic along the web, and which had been battered under traffic before final severance, reaching a distance of 11 inches horizontally from the fatigue flaw. (Point "B" in the sketch).

(iii) A new brittle fracture covering the remainder of the fracture, reaching a fork where it turned down to the foot and up to the running surface, continuing further on, but now leaving a piece of rail head 4′ 7″ long detached. (Numbered "3" in the sketch.)

Inspection of the running surface showed the presence of numerous wheel burns and there was some evidence of the repair of some of the wheel burns by welding. A wheel burn had occurred at the site of the fatigue flaw".

Metallurgical Examination

34. Two vertical-longitudinal sections were cut from the rail, one from a severe wheel burn 9′ 6″ from the original fracture and one from the fatigue flaw.

The section through the wheel burn showed that this had been repaired by oxy-acetylene welding and that cracks had extended horizontally and to a maximum depth of ⅛″ suggested that in due course a piece of the rail head would shell out. There was no tendency for any part of the crack to turn vertically down.

The section through the fatigue flaw showed that the crack had originated at the running surface, that the typical horizontal crack associated with wheel burns was present, that the heat effect of the original wheel burn had now been worn off, and that there had been no repair by welding to this wheel burn. In addition there were numerous short horizontal cracks present on the face of the fatigue flaw, typical of corrosion fatigue, and the presence of these, together with the absence now of any heat effect from the wheel burn suggest that this fatigue flaw had been growing slowly for some considerable time, probably not less than one year.

35. Samples were taken from sound rail aproximately 3′ 6″ from the fracture to examine the quality of the rail, and both a sulphur print and a deep etch taken on a transverse section failed to reveal any metallurgical defect.

36. A tensile test piece machined from the standard position in the head gave the results:—

	Failed Rail	B.S.11: Part 2: 1936 Acid Bessemer Rails *
Yield point, tons/sq. in.	30.0	—
Ultimate tensile strength, tons/sq. in.	51.9	44 minimum
Elongation %	21	9† minimum
Reduction in Area %	39	—

* to which this rail would have been manufactured.

† for a U.T.S. in excess of 50 tons/sq. in.

The tensile strength is typical of rails generally, the elongation is well in excess of the minimum required and is one of the higher figures reported for rails manufactured by Workington during 1954, there being only 4% of the rails manufactured that year that had a greater elongation when tested.

37. Chemical analysis, again from the standard position in the head, showed that the rail complied with the requirements of the appropriate British Standard—

	Composition %				
	Carbon	Silicon	Manganese	Sulphur	Phosphorus
Failed Rail	0.44	0.13	1.14	0.043	0.050
Acid Bessemer Rails (Medium Manganese)	0.40/0.50	0.10/0.30	0.90/1.20	0.06 max.	0.06 max.

38. Mr. Swindale stressed the extremely unusual nature of this particular rail failure. He could not recall any previous case where a vertical fatigue flaw had turned into a horizontal fracture, though he had examined all the records of broken rails back to 1949. In the comparatively few cases where a complete failure had occurred as a result of a wheelburn the breakage was always vertical or nearly vertical.

Conclusions

39. There is no doubt that this derailment was directly caused by a broken rail, the flaw in which had originated from a wheelburn which had probably occurred at least a year previously.

40. A wheelburn is caused by the heat developed under a slipping driving wheel of a stationary or slowly moving locomotive. A portion of the rail surface becomes heated to a temperature in excess of 720°C with a very steep temperature gradient. When the source of heat is suddenly removed, the rapid

chilling of the heated area by the mass of cold steel surrounding it causes a change in the structure of the steel from which small cracks may grow. In the majority of cases these cracks turn and run horizontally just below the rail table, sometimes resulting in a portion of the running surface shelling out leaving a shallow saucer shaped depression. In such cases there is no danger of the rail breaking but it is sometimes necessary to repair the running surface by gas welding. In a smaller number of cases a crack arising from a wheelburn continues vertically into the head of the rail. Such a crack may extend to become a typical fatigue flaw which grows very slowly transversely and vertically through the head until its area extends to rather more than half the cross-section of the head of the rail when rapid failure occurs in the form of a transverse brittle fracture extending vertically through to the foot of the rail. Since such a flaw grows very slowly in its early stages and usually becomes visible at the top corner of the railhead, there is normally plenty of time in which to drill and fishplate the rail as a preliminary to changing it when an opportunity arises. Even if total failure takes place before the rail has been plated, there is little likelihood of a derailment being caused.

41. In this instance, when the fatigue flaw had reached a depth of 1¼ inches below the running surface, the brittle fracture which ensued did not continue at once to the foot of the rail causing an immediate transverse fracture, but instead extended in small steps gradually turning towards the horizontal in the direction of traffic, until it had extended a distance of 11 inches horizontally from the original fatigue flaw. It is difficult to be certain how long this took, but from the light rusting of the broken surface which was observed after the accident it seems probable that this part of the fracture had occurred during the 24 hours prior to the final catastrophic failure which must have taken place under the locomotive and leading coaches of the train involved in the derailment, the crack extending in a series of steps as each wheel passed over it until the side thrust was sufficient to break off the piece of railhead 4 ft. 7 ins. long.

42. There was no metallurgical fault in the rail; in fact it was well above specification in some qualities, particularly ductility. This factor may possibly have been the reason for the step by step extension of the brittle fracture instead of the immediate total breakage which usually takes place. It seems probable that when the brittle crack was initiated it grew only a short distance before it was arrested, and that this arrest was due to the high ductility of the steel. As the crack grew in steps, and because it grew in steps, it was diverted towards the horizontal by the shear stresses in the web and contained there by the high moments of inertia of the head and foot, extending horizontally until total failure occurred.

43. That the final failure occurred when it did was no doubt because the low temperature on the night of the accident caused a tensile stress to be set up in the long welded rail, causing an increase in the stress concentration round the edge of the fractured zone. It would not be correct, however, to regard the frost as a cause of the accident, since the fatigue flaw had already grown to such a size that failure could have occurred at any time.

44. From the appearance of the broken surface of the original fatigue flaw the fracture had been very tight and it is probable that where the crack extended to the outer corner of the railhead it would have been very hard indeed to discern on account of the presence of rust on the outside of the rail.

45. I am satisfied that the permanent way staff at all levels were fully aware of the importance of keeping this particular section of track under close observation, and I cannot hold any individual responsible for failing to suspect the presence of a crack at the point where the rail broke since there were many more serious wheelburns in the vicinity. This type of vertical fatigue flaw is almost impossible to locate by means of an ultrasonic flaw detector such as the "Audigauge", particularly when it occurs under a wheelburn with its characteristic horizontal crack the reflection from which tends to mask anything deeper in the rail head.

Remarks and Recommendations

46. The crack in the rail that led to this derailment was originally caused by a wheelburn, and though it would appear that the chances of another derailment happening in exactly the same manner are small, wheelburns are nevertheless the cause of deterioration in rail that could give rise to danger. Of the 426 wheelburnt rails removed from British Railways tracks during 1963/64, 28 were broken and a further 170 were cracked. Wheelburns are liable to arise whenever heavy trains have to restart where rail conditions are poor, such as at Hest Bank, where the overspill from watertroughs and the salt spray from Morecambe Bay combine to make the rails slippery. Anything that can be done to prevent locomotive wheelspin in such places will have the effect of reducing the maintenance effort required to keep the track in safe condition for fast trains, and I have been assured by the British Railways Board that this problem is receiving special attention.

47. Though no serious injuries were sustained by the passengers, a number received bruises or cuts which might not have occurred if the bunks in the sleeping cars had been securely fixed in position. The angle iron frame of each bunk has two small dowels protruding at each end which rest in open sockets secured to the compartment walls. No retaining catches are provided and the bunk is only held in position by its own weight. It would not be difficult to provide a positive form of fastening and I recomend that this be done.

48. I accept Signalman McGuinness's evidence that the "Train out of Section" signals for the express were not exchanged with the neighbouring boxes, but I think it likely that he had, in fact, made the entries in his train register prematurely and not, as he explained, in his excitement after the accident had occurred. This is an example of a fairly common form of irregularity in block working procedure which could in some circumstances give rise to danger. It can best be guarded against by regular comparative checks of train registers from adjacent signalboxes.

49. A strict interpretation of the Rule would have required the guard to go back immediately a distance of $\frac{1}{4}$ mile to protect the rear of the derailed train by placing detonators on the line, since it was outside the protection of signals. In my opinion, however, he was right in this case in going first to the signalbox at Hest Bank which was close at hand and then, having received the signalman's assurance that he had been in contact with the neighbouring signalboxes and that all lines had been blocked, going to call for the assistance of the emergency services, and then helping with the rescue of the passengers. In the opposite direction, where immediate protection was of the greatest importance, the engine crew acted quickly and correctly, the fireman deserving special recognition for his initiative in striking across country to protect the single line Morecambe branch.

I have the honour to be,

Sir,

Your obedient Servant,

I. K. A. McNAUGHTON,

Lieutenant-Colonel.

The Secretary,
Ministry of Transport.

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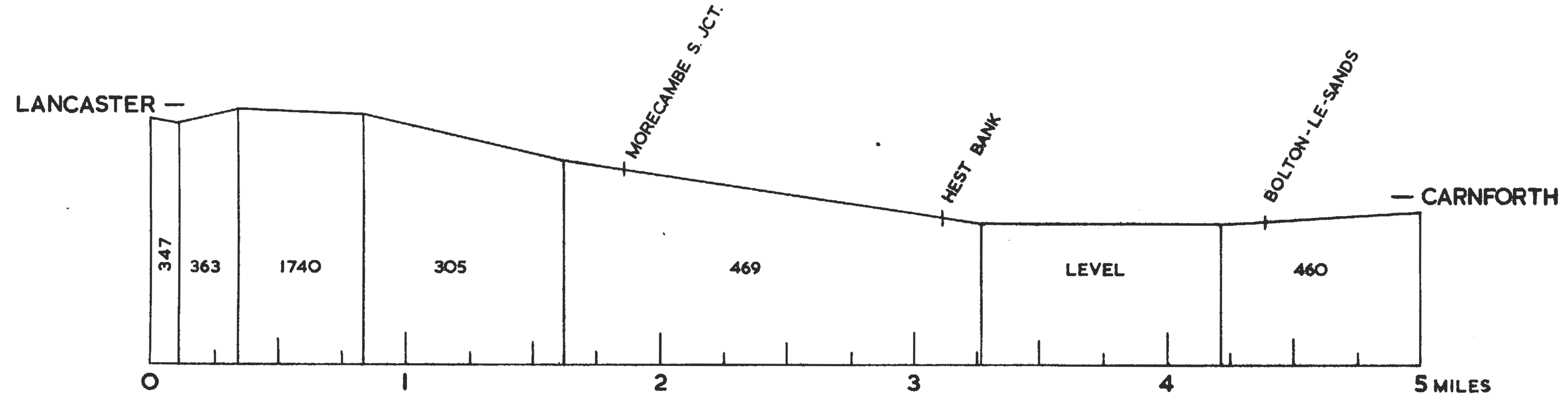
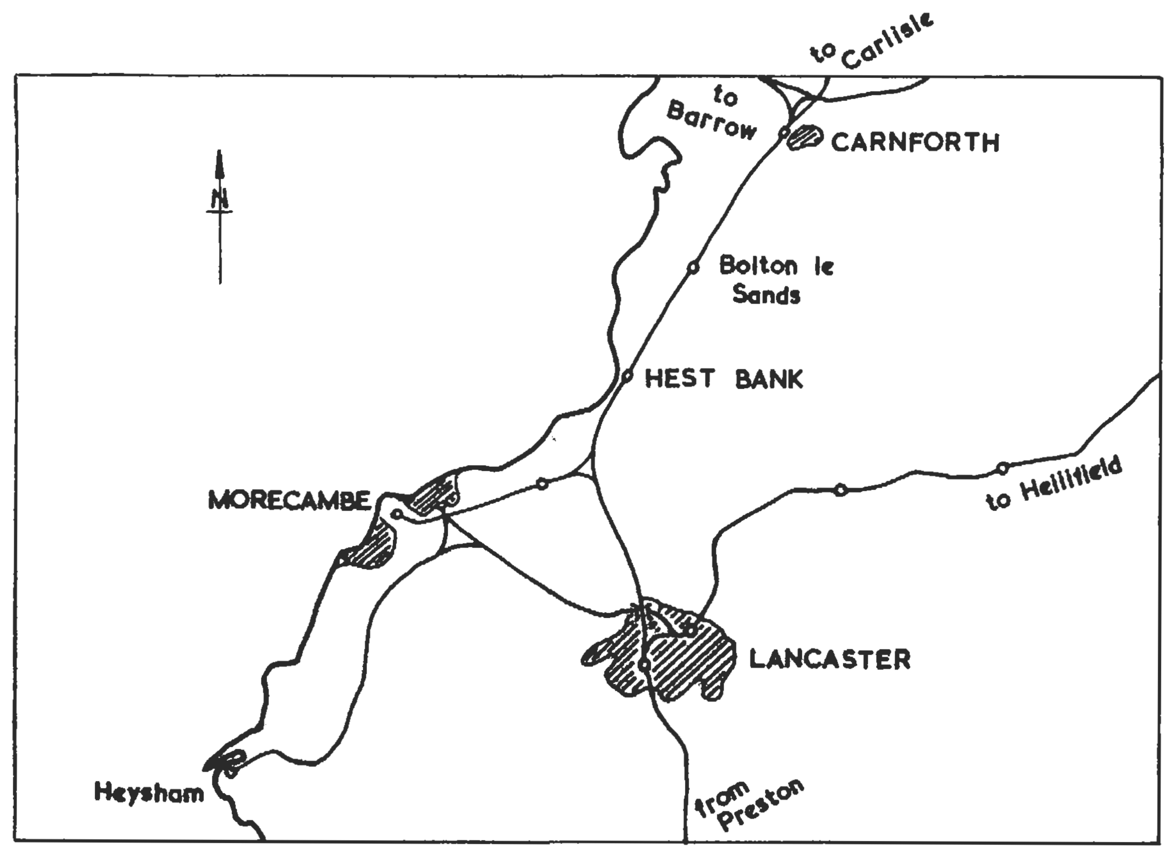
DERAILMENT AT HEST BANK — LONDON MIDLAND REGION 20th MAY 1965



GRADIENT DIAGRAM



LOCATION DIAGRAM