DEPARTMENT OF TRANSPORT

RAILWAY ACCIDENT

Report on the Derailment of a Parcels Train that occurred on 2nd July 1977 between Wolverton and Bletchley

IN THE
LONDON MIDLAND REGION
BRITISH RAILWAYS

LONDON: HER MAJESTY'S STATIONERY OFFICE
RAILWAY INSPECTORATE,
DEPARTMENT OF TRANSPORT,
2 MARSHAM STREET,
LONDON, SW1.
9th June 1978.

Sir,

I have the honour to report for the information of the Secretary of State, in accordance with the Order
dated 11th July 1977, the result of my Inquiry into the derailment of an express Parcels train that occurred
on 2nd July 1977 between Wolverton and Bletchley in the London Midland Region of British Railways.

Saturday, 2nd July was a very warm, sunny day. The derailment occurred at 15.00 on a length of con-
tinuous welded rail track in the Up Fast line that had been left grossly deficient in ballast following main-
tenance work and in which a severe lateral distortion had developed due to the heat. The distortion, which
had evidently been developing for some time, had been the cause of rough riding experienced by the drivers
of two preceding trains, both of whom had stopped out of course to report the occurrence to the signalman
at Bletchley. The first driver located the position of the rough riding in relation to a signal but he under-
estimated the distance between the fault and the signal. In consequence a permanent way supervisor sent to
examine the line went to the wrong place where he found a minor track fault which he assumed to be the
cause of the rough riding. The second train, and subsequently the parcels train, were allowed to pass over
the line at normal running speed so that the supervisor could examine the track fault under traffic. The serious
distortion, however, was developing some 950 yards further to the north and the parcels train became
derailed on it whilst the supervisor was watching its approach.

The accident was quickly reported to the signalman and relevant signals were placed at Danger. All ten
vehicles on the train had become derailed and the leading vehicle was buffer locked with the locomotive,
which had remained on the line and had come to a stand some 550 yards beyond the point of derailment.
The train had divided between the sixth and seventh vehicles and there was a 200 yard gap between the front
and rear portions. Both the Up and Down Fast lines were blocked as a result of the accident, the latter by
derailed vehicles leaning towards it. No one was injured and the emergency services were not called.

The track, which consisted of continuous welded rail (CWR) on concrete sleepers at the point of derail-
ment, was extensively damaged. There was no damage to the 25kv AC overhead line electrification equipment
and it was not necessary for the current to be switched off except during the re-railing and track repair
operations. Re-railing of the derailed vehicles was completed by 00.45 on 4th July but repairs to the track
continued until 7th July when the Up Fast line was re-opened to traffic, subject to a speed restriction. During
the period of the blockage all services were confined to the Up and Down Slow lines between Bletchley and
Hanslope Junction.

DESCRIPTION

The Site

1. In the area of the derailment the line runs approximately north west to south east. There are four
tracks, the Down Fast, Up Fast, Down Slow, and Up Slow in that order reading from the western side of the
line. The line is equipped with 4-aspect colour light signals and train working is in accordance with the Track
Circuit Block System, controlled from Bletchley Signal Box. The general features of the line are shown on
the Plan at the back of the report.

2. Near the point of the initial derailment, at 50 miles 365 yards from Euston, the Up Fast line is
straight and on a rising gradient of 1 in 440. The line is approximately level with the surrounding land at the
point of derailment but to the north and south it lies in shallow cuttings. Signal BY.157 on the Up Fast line,
which was used as a reference point by the drivers of the two trains that preceded the parcels train, is at 49
miles 1,026 yards and the point where the permanent way men were watching the track was at 49 miles 1,176
yards, that is 949 yards to the south of the point of derailment. The maximum permissible speed on the Up
Fast line at the time of the accident was 100 mile/h.

3. The track at the point of derailment consisted of 110 lb/yard flat bottom CWR, manufactured at
Workington in 1965, on EF 25 shallow concrete sleepers at 24 to the 60 ft length and with Pandrol 401
fastenings. The track had been laid in 1965 and adjusted at that time to give a stress free temperature of 23-9°C
(75°F). It had not subsequently been destressed.
4. The weather at the time of the accident was fine and dry with clear visibility. Shade air and ground temperatures recorded at the Royal Air Force Station at Cardington, about 20 miles from the site of the derailment, on 1st and 2nd July were as follows:

<table>
<thead>
<tr>
<th>TIME</th>
<th>FRIDAY 1st JULY</th>
<th>SATURDAY 2nd JULY</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Air</td>
<td>Ground</td>
</tr>
<tr>
<td>10.00</td>
<td>15.7</td>
<td>15.0</td>
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<tr>
<td>11.00</td>
<td>17.5</td>
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<td>12.00</td>
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<td>19.3</td>
<td>17.8</td>
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<td>14.00</td>
<td>19.1</td>
<td></td>
</tr>
<tr>
<td>15.00</td>
<td>18.1</td>
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5. The train was 3M07, the 03.37 Stranraer to Euston Parcels express. It was hauled by electric locomotive No. 86 022 and had a crew of two, the driver and a guard who was travelling in the rear cab of the locomotive. There were 10 vehicles in the train, five of which were loaded, with a total weight, less the locomotive, of 283 tons. The train was vacuum braked and its maximum permissible speed was 90 mile/h. The train was marshalled as follows:

<table>
<thead>
<tr>
<th>Locomotive No. 86 022</th>
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<tbody>
<tr>
<td>Siphon G</td>
<td>W 1015</td>
</tr>
<tr>
<td>BG</td>
<td>M 80690</td>
</tr>
<tr>
<td>BG</td>
<td>E 80705</td>
</tr>
<tr>
<td>B</td>
<td>M 31420</td>
</tr>
<tr>
<td>Store B</td>
<td>S 228</td>
</tr>
<tr>
<td>B</td>
<td>M 31079</td>
</tr>
<tr>
<td>B</td>
<td>M 31399</td>
</tr>
<tr>
<td>BG</td>
<td>M 81043</td>
</tr>
<tr>
<td>BG</td>
<td>M 81576</td>
</tr>
<tr>
<td>BG</td>
<td>M 81279</td>
</tr>
</tbody>
</table>

The Course of the Derailment and Damage Caused

6. The train was travelling at a steady 90 mile/h when the driver saw that the track immediately ahead of the locomotive was badly distorted over a distance of about two coach lengths. The distortion was mainly towards the Down Slow line and the driver estimated that the rails were about a foot out of line. He immediately shut off power and made a full emergency brake application. The locomotive lurched to the left and then to the right, throwing the driver out of his seat, but it remained on the rails and did not lose power from the overhead line. Behind it, all ten vehicles became derailed as already described. All vehicles sustained damage, this becoming progressively more serious along the length of the train. Most had damage to buffers, axle boxes, brake gear, and underframe equipment but all remained more or less upright and there was little damage to bodywork. On the track, 2,040 feet of CWR, together with 150 wood and 576 concrete sleepers were so badly damaged as to need replacing. Four track circuit cables were cut.

EVIDENCE

7. On 2nd July 1977 the 07.10 Glasgow to Euston express was hauled by electric locomotive No. 87 002. It was driven from Preston by Driver F. G. Styler who was accompanied by Driver’s Assistant B. Hartshorn. The train left Preston on time and the journey south was uneventful with the locomotive riding well. At about 11.40, having passed Wolverton and running at about 100 mile/h the locomotive suddenly gave a severe jolt, severe enough for the driver’s assistant to be thrown partially out of his seat and towards the driver’s side, that is in the direction of the Down Slow line. Neither man had noticed any sign of a misalignment or obstruction in the line before the jolt. Having gathered themselves together they saw that they were passing Signal BY.157, which was at green. They both looked back out of the cab windows to check that the train was in order and, on being satisfied that it was, Driver Styler made a normal service brake application, bringing the train to a stand with the locomotive opposite Signal BY.153. From there he spoke to the signalman in Bletchley Signal Box and reported the bump. As far as he could remember he had told the signalman that the bump had happened when they were about 400 yards on the approach side of Signal BY.157.
8. Driver Styler, again accompanied by Hartshorn, returned north about two hours later, driving the 13.00 Euston to Holyhead train. North of Bletchley they were travelling on the Down Fast line at about 100 mile/h and were watching the Up Fast line for any signs of what might have caused the bump during their journey south. They passed Signal BY.157 at approximately 13.40 without seeing anything unusual but about three-quarters of a mile further on Hartshorn, who was nearest to the Up Fast line, saw that this line was badly buckled. He described the buckle as "S" shaped, the misalignment being between 6 and 12 inches each way, and he also thought that the track had lifted on the 6-ft side. Styler also saw the buckle, but less clearly. Both men assumed at once that the buckle must have been the cause of their earlier bump although it was further north than they had expected. They had seen no signs of permanent way men and no trains on the Up Fast line since passing Bletchley, but approaching Hanslope Junction they saw a train being diverted from the Up Fast to the Up Slow line. They thus assumed that their earlier report had led to the discovery of the buckle and that the Up Fast line had been blocked to traffic. They continued on their way without stopping.

9. In answer to questions, Driver Styler gave his opinion that the distortion could not have been anything like as severe when they had travelled over it as it was when they passed it two hours later; if it had been, they would almost certainly have seen it as they approached. On the question of identifying points on the line, he said that he always did this by reference to the nearest signal, unless there was some other clear feature such as a neutral section in the overhead line, or a bridge. Regarding the time that might have elapsed between their experiencing the jolt and passing Signal BY.157 Hartshorn thought that it could have been about 8 to 10 seconds, but he could not be sure.

10. Area Supervisor D. E. Hollis was the early turn supervisor in Bletchley Signal Box. At about 11.51 the driver of the 07.10 Glasgow to Euston train (Driver Styler) spoke to him on the telephone from Signal BY.153 and reported having experienced a bad bump on the Up Fast line 200 yards on the approach side of Signal BY.157. Mr. Hollis repeated the message and wrote down the details, including the figure 200 yards, on a pad. The signalman on duty heard the repeated message and immediately sent the 'Obstruction Danger' signal to Rugby. No other train was due on the Up Fast line.

11. Mr. Hollis then telephoned the permanent way supervisor with responsibility for that part of the line, Mr. Walpole, but discovered that he was on annual leave. On checking the signal box records he found no reference to Mr. Walpole being on leave and no indication of who would be standing in for him. He therefore telephoned Mr. Jardine, the Assistant P. W. Section Supervisor at Tring and Jardine agreed to go and examine the line. Hollis told him that the bump had been reported as 200 yards on the approach side of Signal BY.157.

12. At about 12.37 Mr. Jardine spoke to the signalman on the telephone and reported that he had found a length of track in the area indicated where clay slurry had been pumping during wet weather and where there might be voids under the sleepers. He did not say how much of the line he had examined, but he asked that two trains be sent over the Up Fast line at normal speed so that he could check the condition of the track. Mr. Hollis had misgivings about this but he knew that Jardine was an experienced man and he was prepared to trust his judgment. The first train to be re-routed over the Up Fast line was the 09.16 Llandudno to Euston passenger train but before it passed Mr. Hollis handed over his duties to Area Supervisor Wiffin, who was relieving him at the end of his shift. Mr. Hollis was, however, still in the signal box when, at 12.55, the driver of the Llandudno train telephoned the signalman to report another bump. Mr. Hollis gathered from the telephone conversation that this was "at the same spot" as the previous incident. In handing over his duties Mr. Hollis had briefed Mr. Wiffin about the earlier report and the subsequent events.

13. The driver of the Llandudno to Euston train was Driver F. Fairclough. His locomotive, which was single-manned, was electric locomotive No. 85 018 and the train consisted of nine vacuum braked passenger coaches. The train had been 20 minutes late in leaving Llandudno and was still about the same time late passing Wolverton. Continuing south at about 90 mile/h the locomotive, which Fairclough described as being "rather rough", suddenly gave a quite exceptional lurch. Fairclough at once made a full emergency application of the brake and, as the brakes came on, he glanced up and saw Signal BY.157. Before the lurch he had been looking ahead but had seen nothing wrong with the track. However, with the very warm sunshine there was a heat haze over the line and he could well have missed a small misalignment, although he felt sure that if it had been as much as 6 inches or so he would have seen it. Having brought the locomotive to a stand just past Signal BY.46 he used the signal post telephone to report to the signalman that he had felt a very bad lurch "on the other side of Signal 157." The time by his watch was 12.55. On arrival at Euston several passengers asked him about the bump, or about the emergency stop. After speaking to the engine arranger he telephoned Euston control and asked whether anything had been found as a result of his report. He was told that the permanent way staff had found something and that men were being called out to attend to the track.

14. In the Bletchley Signal Box, Mr. C. V. Wiffin had taken over from Mr. Hollis as Area Supervisor just before 12.55. He confirmed that on taking over he had been briefed about the reported rough riding on the Up Fast line, and that the alleged site of the bad spot was entered in the log as 200 yards on the approach side of Signal BY.157. When Driver Fairclough reported to the signalman, Mr. Wiffin understood that the
bump was in the same area as the one previously reported, although he did not speak personally to Fairclough.

15. Nearly two hours later, at 14.52, Mr. Jardine telephoned. He told Mr. Wiffin that he had been away collecting four men whom he needed to work on the track and that he was back at the “wet spot”. He said that he still needed to assess the behaviour of the track under traffic and asked that one more train be sent over the Up Fast line, at normal speed. Knowing that the drivers of the two previous trains had each stopped specially in order to report unusually rough riding, Mr. Wiffin was reluctant to do this. However, Mr. Jardine assured him that the track was not buckled in any way and, with this assurance, Mr. Wiffin agreed. He contacted Rugby to arrange for the next train to be switched back to the Up Fast line and was told it would be the express parcels train. In answer to my questions, Mr. Wiffin said that his decision would have stood even had the next train been a passenger express. Shortly afterwards a track circuit on the Down Fast line suddenly showed “occupied” in an area where no train was on the line and almost simultaneously a telephone message was received from Signal BY.157 with news that the parcels train had been derailed. Signals on the Fast lines and on the Down Slow line were replaced to Danger and the necessary action taken to call for assistance.

16. The signalman on duty in Bletchley Signal Box, Signalman R. W. V. Holton, confirmed the evidence given by Mr. Hollis and Mr. Wiffin. He had heard Mr. Hollis repeat the message from Driver Styler and was sure that a distance of 200 yards north of Signal BY.157 was mentioned. He was also sure that Mr. Jardine, when he telephoned after his first inspection of the track, had said that he would need to see two trains pass over the “wet spot” at line speed in order to assess the work required on the track. After the driver of the first of these trains, Driver Fairclough, had reported a severe bump “approaching Signal 157” Holton had put out a call for Mr. Jardine; when the latter telephoned, Holton told him about the message from Fairclough and Jardine replied to the effect that the line and the sleepers were going up and down and that he would need to get some men to attend to it. Holton told Jardine that the line was still blocked to trains.

17. The driver of the parcels express train was Driver E. G. S. Owens. He took over the train at Crewe where it departed about 30 minutes late, and was alone in the cab until the accident happened. The run as far as Wolverton was uneventful, with the locomotive running smoothly. South of Wolverton the locomotive was under power and the train travelling at 90 mile/h on straight track when, no more than 50 yards or so ahead, he saw a severe distortion in the line. He described the distortion as going from side to side “like a snake”, first to the left, then to the right, then to the left again, the maximum deviation from the straight being about 12 inches. He immediately made an emergency application of the brakes and as he did so the locomotive went over the distortion. He was flung first to the left, up against the window, and then out of his seat to the right. As he picked himself up, the guard came through from the rear cab. The locomotive came to a stand about a quarter of a mile north of Signal BY.157 and Owens, having applied track circuit clips to the Down Fast line, saw that the locomotive had remained on the line but that behind it all ten vehicles were derailed. He reported the derailment to the signalman at Bletchley, using the telephone at Signal BY.157. Before the train had come to a stand he had seen permanent way staff some distance ahead. These men came towards him after the derailment and told him that they had been looking for the cause of reported rough riding but that they had been sent to the wrong place.

18. At the time of the accident, Assistant Permanent Way Supervisor R. F. Jardine was responsible for a nine mile length of the main line in the Tring Area, about 20 miles south of where the derailment occurred. He had previously worked in the Wolverton–Bletchley area and knew that part of the line well. At about 12.00 on 2nd July he received a telephone call from Mr. Hollis telling him that a driver had reported a “bump” 200 yards on the Wolverton side of Signal BY.157 and asking him to go and examine the site. He went by car and parked alongside the line at a point about 350 yards north of Signal BY.157. He examined the Up Fast line between this point and the signal and found, about 160 yards north of the signal, a section of track where there were dips in each rail associated with welded joints, voids under the sleepers, and signs that in wet conditions clay slurry beneath the sleepers had been “pumping” under the action of trains. The presence of voids and the dips in the rails were consistent, in his view, with the reports of bad riding, especially since they were close to the point to which his attention had been directed. There was no misalignment in the track; on arrival he had taken a reading of rail temperature in the Up Fast line and noted this as 110°F (43.3°C).

19. In Mr. Jardine’s view the condition of the track was not such as to hazard trains travelling at line speed and he therefore asked the signalman to route one train over the Up Fast line so that he could observe the dynamic movement of the track. Soon afterwards the Llandudno to Euston train passed and Jardine was able to judge the extent of the voids under the sleepers. The movement did not seem excessive but he was then called to the telephone and told that the driver of the train had stopped and reported a severe jolt on the approach to Signal BY.157. He accepted without question that the jolt must have been experienced whilst the train was passing over the length of track that he had under observation and he concluded that there must have been more movement in the rail opposite to the one he had been watching. He therefore advised the signalman to keep the line closed to traffic until he could collect some men and repair the track.
20. It took Mr. Jardine just under two hours to collect four men and return to the track. The men were from the local gang but none of them mentioned to him that work had been carried out during the previous week on the Up Fast line not far to the north of Signal BY.157. At about 14.50 he telephoned the signalman, told him that he had now got men to help him observe the bad patch, and asked for one more train to be sent down at line speed. At this point, Mr. Jardine assured me, he remained convinced that the bumps reported by the two drivers were caused by the bad patch he had under observation but that the condition of the track was not such as to put trains at actual risk even at line speed. He added that in his experience drivers not infrequently reported faults in the track when in fact there was nothing seriously wrong with it.

21. Having posted men on both sides of the track to observe its behaviour Mr. Jardine waited for the next train to arrive. He saw it approaching in the distance and then stop in a cloud of dust. He reported this to the signalman by telephone from Signal BY.157 and then went to the train which he found derailed. In looking at the point where derailment had apparently started he saw that the track was seriously deficient of ballast, both between the sleepers and at their ends, and he concluded that the track had distorted due to the high rail temperature and the lack of ballast.

22. During the week ending Saturday 2nd July (the day of the accident) the Up Fast line between Denbigh Hall Junction and Hanslope Junction had been in the engineers' possession each day from Monday to Friday between 11.00 and 16.00 for tamping, lining, cutting out defective welds, and dealing with a length where clay had been pumping in wet weather and where voids existed beneath the sleepers. This "wet spot" extended over some 22 metres of the line near the 50½ mile post and coincided with the point at which derailment of the train subsequently occurred. Work on it was carried out during the week by a direct labour gang, contractors employed by British Railways for track maintenance work, consisting of five men and a ganger. Their work was supervised throughout the week by Leading Trackman E. Szafryk who was himself a member of the Bletchley permanent way gang. On each day they dug out and lifted and packed defective sections of the track, finishing each day's work in time for the line to be handed back to traffic at 16.00. On the Friday they had been dealing with the length near where the derailment subsequently occurred, and Szafryk was with the gang when they finished work shortly before 16.00. At this time, the track had been lifted and packed but the ballast had not been restored to its full profile. Between the sleepers it was generally level with the bottom of the sleepers and at the shoulders Szafryk claimed that it came about half way up the sleeper ends. He said that he was happy to leave the track in that condition even for trains travelling at 100 mile/h since there were no voids; he expected the movement of trains to consolidate the bottom ballast, after which the additional ballast could be added. He told me that he had no knowledge of Civil Engineering Handbook No. 11, dealing with the installation and maintenance of CWR track.

23. During the morning of Saturday 2nd July one of his duties was to patrol the line between the 48⅝ and 51½ mile posts. He commenced near the 51½ mile post and walked south along the Down Fast line and returned north along the Up Slow line. He passed the site near the 51½ mile post where work had been carried out on the Friday at about 10.15. Apart from a broken bolt at Denbigh Hall Junction, which he replaced, he saw nothing wrong with the track. He remembered seeing a "wet spot" in the Up Fast line a short distance north of signal BY.157 but he did not regard this as a serious defect or in any way dangerous.

24. The supervisor responsible for the line between Bletchley and Roade Junction was Permanent Way Supervisor E. Walpole. He confirmed that he had planned the work to be carried out during the daily engineer's possession and that this included attention to a "wet spot" where the clay-impregnated ballast was to be dug out, the track levelled and packed, and clean ballast provided. During the course of the week he and his assistant, Assistant Permanent Way Supervisor R. Gunning, checked the progress of the various jobs over the eight mile length of the possession. Mr. Gunning was absent on the Friday attending a funeral and at no time during the week had he visited the site where the direct labour gang, supervised by Leading Trackman Szafryk, was working. Mr. Walpole, however, paid them a visit on the afternoon of Thursday 30th June. At this stage they had completed the lifting and packing and were replacing the bottom ballast. They had clean ballast on site and extra ballast was available in skips on the Up Slow line. Mr. Walpole was satisfied with the progress of the work and told me that he had no reason to suppose that the track would be left seriously deficient in ballast either at the close of work that day or on the Friday. He did not visit the site again and started his annual holiday after work on Friday 1st July.

25. Mr. Gunning confirmed that daily weather forecasts were sent to his office during the summer months. He had seen the forecast on Thursday 30th June and this had indicated that air temperature would increase during the next two days but not dramatically and that it would continue warm but cloudy. On Saturday 2nd July he was off duty, in Northampton, when the weather became very hot. He was familiar with the requirements of Civil Engineering Handbook No. 11 but he told me that, bearing in mind the nature of the work carried out during the week, he did not think that the sudden rise in temperature would pose any special hazard to the track.

26. Mr. Walpole described the arrangements for patrolling the line, which was normally done on Mondays, Wednesdays, Fridays and Saturdays. His instructions to his patrolmen were that they should do
their patrols in the morning and that if the weather became hot during the afternoon they should do further patrols until the temperature subsided, this being at their own discretion. Commenting on this, the Divisional Civil Engineer, London Division, Mr. C. W. Kendell, pointed out that additional patrolling of lines in hot weather is only an extra precaution and that the main safeguard against distortion is maintenance of the track in a proper condition and observance of the instructions in Handbook No. 11 for dealing with track that has been disturbed. He confirmed that the local patrolman is left to decide whether the air temperature is such as to justify additional patrolling and said that in his experience the patrolman's judgement could normally be trusted.

27. Mr. H. D. Turvey was the Assistant Permanent Way Supervisor, Rugby. On arrival at Rugby on the morning of Friday 1st July he was informed that he would be standing in for Mr. Walpole whilst the latter was on holiday. He had done this on previous occasions and was familiar with the Bletchley Section. He was told that there was to be work that weekend at Castletorpe and that a planning meeting was being held on site at 10.00. He went there and met Mr. Walpole and two technical officers from the Divisional Engineer's Office. The meeting lasted 20 minutes and after it mention was made of work south of Wolverton that was scheduled for the following week. It was suggested that Turvey and Walpole should visit this site together but Walpole said he had something else to do but he agreed to meet Turvey at Bradwell around midday. They met there at 12.10 and discussed the next week's work. Mr. Walpole said that there was "nothing to worry about" concerning his Section and no outstanding correspondence. He made no mention of the work that had been carried out between Denbigh Hall and Hanslope during the course of the week. They parted, Walpole for Bletchley and Turvey to return to Rugby.

28. At 16.30 on the Saturday, Mr. Turvey was telephoned at home and told about the derailment. He went to the site and discussed arrangements for repairing the damage. Later he assisted the technical staff in a detailed examination of the track. He concluded that the derailment had been caused by heat distortion; work had been carried out and the track had been left with insufficient ballast. Whilst he was on site he took a reading of rail temperature, at 18.00: it was 35°C (95°F). Regarding the sudden sharp increase in air temperature during the Saturday Mr. Turvey told me that, had he known the nature and extent of the work carried out on the Up Fast line during the previous week, he would have gone to examine the sites during the Saturday afternoon.

29. Mr. J. B. Ellis, the Assistant (Maintenance) at the Divisional Civil Engineer's Office, Watford arrived at the site of the derailment at about 18.15. He satisfied himself that the track in the vicinity of the point of initial derailment had not been touched since the accident and then proceeded to examine and record its state. His findings are incorporated in the Diagram at the back of the Report. He found that the Up Fast line was distorted over a length of approximately 55 metres on the approach side of the point of initial derailment. The distortion took the form of a curve towards the Down Slow line with a maximum amplitude of 255 mm. Beyond the point of derailment the track was badly damaged, but Mr. Ellis suspected strongly that in this area the distortion would have reversed, giving the classic 'S' shape of a heat buckle. In the distorted length before the point of derailment a "wet spot" had been dug out over a length of approximately 22 metres and the dirty ballast had been dumped in the cess of the Down Fast line. Over this length the track was resting on a level bed of ballast, there being little or no ballast above the bottom level of the sleepers, either between the sleepers or at their ends. Mr. Ellis was quite sure that the track had distorted due to the heat and had done so because it had been left virtually unballasted. Later, he examined the underside of the sleepers in the distorted length of track. They were worn, by ballast attrition, to near the limit of acceptability; this would have reduced the contribution to stability made by their weight.

30. In answer to my questions Mr. Ellis said that, irrespective of the temperature, the track should not have been restored to traffic at line speed whilst so grossly deficient in ballast. He considered that responsibility for seeing that the line was in a satisfactory condition for traffic to be restored after maintenance work lay with the Permanent Way Section Supervisor and in his absence with his nominated deputy. Regarding the programme of work carried out during the week, Mr. Ellis had known that tamping and lining work was being done but he had not known about the digging out of the "wet spot".

31. In subsequent investigation of the track conditions it had not been possible to establish the probable stress free temperature of the track since there was no undisturbed length of track that would be representative of the area where the distortion occurred. It had been established that the track had not been de-stressed since its original de-stressing in 1965; the unusual pattern of welds (shown in the drawing) dated from the original laying of the track.

32. I did not call for evidence at my Inquiry on the mechanical condition of the derailed train. The locomotive and rolling stock were examined in detail after the accident and nothing was found that could have contributed in any way to the derailment.
CONCLUSION

33. The derailment was caused by heat-induced distortion of the continuous welded rail track. Distortion of the track commenced more than 3 hours before the accident occurred and during this period two other trains passed over the distortion without being derailed, their passage no doubt contributing to a worsening in the condition of the track on each occasion.

34. The initial distortion occurred because the track was left grossly deficient of ballast by permanent way maintenance men when they left the site at the end of work on the previous day. The track was left in this condition, and the line handed back to traffic at line speed when it was clearly unfit for such traffic, as a result of serious shortcomings in the supervision of the work.

REMARKS AND RECOMMENDATIONS

35. Apart from the deficiencies in the track that were the direct cause of the accident, a number of other events contributed to the accident and require some comment. For clarity, I shall deal with them under separate headings.

Reporting of Incidents by Train Drivers

36. The evidence has shown that the drivers involved underestimated the distance between the point at which they experienced a jolt or bump and the signal which they used as a reference point. Driver Styler and his Assistant undoubtedly reported the bump as 200 yards on the approach side of Signal BY.157 although later they thought that they had said 400 yards. Driver Fairclough, although not quoting a distance when he telephoned the signalman, also thought that the bump was fairly close to this signal. From the evidence, and from my own visit to the site made not long after the accident, I am satisfied that the cause of the bumps experienced by Styler and Fairclough was a developing distortion at the place where the third train eventually became derailed, and not the 'wet patch' discovered by Mr. Jardine. It is obviously difficult to make an accurate estimate of distance when travelling at speeds of 80 to 100 mile/h and I believe that, at such speeds, most people would tend to underestimate the distance travelled in a given time. Certainly, the permanent way staff questioned during the course of the Inquiry had found that information given by drivers about the location of supposed faults in the track varied widely in accuracy. It was also clear that on lines with colour-light signals, where speeds are generally high and most of the former closely-spaced signal boxes have disappeared, drivers tend to use the signals as reference points rather than the mile posts. In the light of this, and the significance of the underestimation in the present case, I recommend that the staff concerned should be warned of the possibility and the dangers of inaccurate estimation of distance and that, when reports of track faults are given in relation to a subsequent signal, the track should be examined over the whole length between it and the signal in rear, unless the fault when found is such as to leave no doubt that it is the one reported. London Midland Region have already taken action on these lines and I recommend that the Railways Board examine the situation to see whether a standard procedure might be developed.

Action by the Staff on duty in Bletchley Signal Box

37. At the material time the signal box staff apparently did not know that the Bletchley Permanent Way Section Supervisor was absent on leave nor who had been appointed to act in his place. In fact, the Divisional Civil Engineer had correctly notified the office of the Divisional Manager, London, in writing on 27th June of the temporary change in “Call Out” duties between the 1st and the 18th July and that Mr. Turvey would be substituting for Mr. Walpole. Unfortunately the Divisional Control records have been destroyed and it has not been possible to establish whether this information was actually received by the London Divisional Control Office, or passed on to the Area Supervisor in Bletchley Signal Box. However, I have no reason to question the assertion by the Area Supervisor, Mr. Hollis, that he was unaware at the time of Mr. Walpole’s absence on leave. In the circumstances, there can be no criticism of his decision to call out Mr. Jardine. Nor do I criticise the decisions, by Mr. Hollis and Mr. Wiffin, to allow trains to pass over the line at normal speed. To the best of their knowledge the place where the rough riding had been reported had been found, an experienced permanent way supervisor was at the site, and they had his assurance that the condition of the track was not such as to actually endanger trains.

Action by Mr. Jardine

38. It is almost impossible to look at Mr. Jardine’s role in the affair without being influenced by knowledge of the other events and of what subsequently happened. On being called out, on a Saturday afternoon to somewhere outside his own area, Mr. Jardine had no knowledge of the work that had been carried out on the line during the past week. He was told that rough riding had been reported 200 yards on the approach to Signal BY.157 and very close to this point he found a poor, but by no means dangerous, length of track. In the circumstances, his decision to ask for a train to be sent over the line at speed was reasonable, provided he was certain that he had found the place responsible for the reported rough riding.
It was after Driver Fairclough had stopped his train and reported a severe jolt that I believe Mr. Jardine's judgement became at fault. His experience should have told him that there was some inconsistency between what he had seen as the train passed over the suspect length of track and the fact that the driver had felt it necessary to stop the train. Knowing that drivers' estimates of distance are sometimes suspect it should have occurred to him that there might have been another fault, or faults, on the approach to the signal and that, before calling for yet another train, it would be prudent to examine more than the 350 yards of track which was all that he had examined at that stage.

**Supervision of the Permanent Way Maintenance Work**

39. The daily engineers' possession of the Up Fast line between Denbigh Hall and Hanslope Junctions for tamping and lining was preplanned as part of the annual maintenance programme. The digging out of the “wet spot” was arranged by the P.W. Section Supervisor in order to take full advantage of the possession. The possession terminated each weekday at 16.00 and at this time the line had to be ready for traffic at full line speed. Responsibility for seeing that it was fit for traffic, as defined in Section T, Part III of the Rule Book, rested with the Section Supervisor. In practice, it was clearly impossible for the Section Supervisor to visit each worksite each day at or just before 16.00 over the whole 8 mile length of the possession and so in some cases it was left to subordinate supervisors to see that the track was left in a safe condition. The evidence shows that in the case of the direct labour gang, whose work was being supervised by Leading Trackman Szafryk, the length of track on which they had been working was left in a thoroughly unsatisfactory condition at the close of work on the Friday. In his evidence, Szafryk told me that he considered the track to be safe for 100 mile/h trains even though, over a length of some 20 metres, there was no ballast above the level of the bottom of the sleepers. This was an extraordinary claim for him to make since he had been a leading Trackman since December 1968 and had been involved in the maintenance of CWR on the main line since that date. He had also attended, and passed, a Track Chargeman's course in 1972, the syllabus of which had included instruction on the maintenance of CWR track. If he really believed that CWR track could safely be left in mid-summer with such deficiencies in ballast it can only mean that he had forgotten much of what he had been taught about the factors affecting the stability of CWR and the instructions for its proper maintenance. Alternatively, if he was aware of these factors and the relevant instructions then he must have chosen to ignore them when work finished on the Friday.

40. During the course of the Inquiry I was given copies of detailed instructions aimed at preventing distortion in both CWR and jointed track and issued by the Chief Civil Engineer of London Midland Region in November 1973. They are clear and comprehensive and, in the section dealing with CWR track, there is an item which states:

> “Provide sufficient ballast in the “four-foot” (to top of sleeper), heaped in the “six-foot”, and an adequate shoulder of at least 15 in. covering the sleeper ends and the shoulder at end—see drawing Appendix 1”.

The drawing showed the required ballast profile in a clear and unambiguous way. Another item, under the heading “Places particularly susceptible to Buckling” drew attention to places “where the ballast has been recently disturbed, especially where on-track machines have been working, or relaying has been carried out”. Copies of these instructions were sent to all his Permanent Way Section Supervisors by the Divisional Civil Engineer, Mr. Kendell, under cover of a letter dated 17th March 1975, part of which read:

> “I enclose a copy of the circular entitled ‘Track Buckling Precautions’ issued by the C.C.E. drawing your attention to this important aspect of Track Maintenance. Will you please bring this to the notice of Assistant Supervisors and Track Chargemen and ensure that they are aware of the action it is necessary to take before the onset of hot weather.”

There must be considerable doubt as to whether the Section Supervisor concerned, Mr. Walpole, had ever drawn Leading Trackman Szafryk's attention to these instructions, even though Szafryk was on occasion left in charge of items of work involving CWR and was required to make decisions concerning the safety of the line.

41. As regards the division of responsibility on the ground during the Friday and Saturday, it is clear that proper arrangements were made for the relief of Mr. Walpole during his absence on leave, although it is regrettable that these were apparently not made known to the staff in Bletchley Signal Box. Notification to Mr. Turvey that he was to stand in for Mr. Walpole was made somewhat late in the day but the two Supervisors nevertheless managed to meet on the Friday and discuss the work programmed for the following week. What I find remarkable and reprehensible is that Mr. Walpole should have made no mention of the extensive work that had been carried out on the Up Fast line during the course of the current week. I believe Mr. Turvey when he says that, had he known the nature and the extent of this work, he would have gone to examine the line on the Saturday when it became very hot. In which case he might well have found the unballasted length of track in time to prevent the accident happening.
Safeguarding of CWR Track in hot weather

42. Civil Engineering Handbook No. 11, “General Instructions for the Installation and Maintenance of Ballasted Track with Continuous Welded Rail” is issued by the Chief Civil Engineer, British Railways Board. The revised edition, which was introduced in April 1977, advises that “On routes which carry high speed or intensive traffic, where the imposition of an emergency speed restriction would seriously affect the normal running of traffic, work which may disturb the stability of CWR should be planned wherever practicable during the period September to April (inclusive).” Where work on the track must be carried out during the summer months, additional precautions are specified, one section reading:

“If the rail temperature exceeds 38°C (100°F) during the three days following work which has disturbed the ballast, for example tamping and lining, a watchman/hand signalman must be posted during the period of high rail temperature. Normally this precaution is all that is required, but in special circumstances, at the discretion of the Engineer, it may be necessary to impose an emergency speed restriction in accordance with the Rule Book. Rail temperatures must continue to be taken so that the special precautions may be withdrawn when the rail temperature falls below 32°C (90°F).”

Normally, the likelihood of rising temperatures during the three days following maintenance work can be assessed from the weather forecasts received daily by all Section Supervisors. In the case under inquiry the weather forecasts issued on Thursday, 30th June and Friday, 1st July predicted that air temperatures would rise during the weekend, to a maximum of 23°C on Saturday and 25°C on Sunday, with scattered cloud on each day. In the event the Saturday temperature exceeded 24°C and there was virtually no cloud. By mid-morning on the Saturday it should have been obvious that rail temperatures in excess of 38°C were likely and that the special precautions might need to be implemented; but by this time Mr. Walpole was away on holiday, and Mr. Turvey, his nominated stand-in, did not know that extensive tamping and lining had been carried out. This was known to Mr. Gunning, who was in Northampton and off duty, but he claimed that he did not think that the sudden rise in temperature would be likely to affect the track and he took no action.

43. The question of additional patrolling in hot weather was raised during the Inquiry—see paragraph 26. The British Railways’ Rule Book states, in Section O.1.3:

“Where there is a possibility of distortion of, or damage to, the line owing to exceptional weather or other abnormal conditions, a further inspection or inspections must be made as considered desirable by the Civil Engineer’s man-in-charge.”

This Rule was amplified in the Regional C.C.E.s’ Instruction of November 1973 where it was stated that:

“The Supervisor or Track Chargeman in charge shall have complete freedom to patrol as he judges necessary.”

It was further amplified in a letter sent by Mr. Kendell to all his Section Supervisors on 15th May 1975 in which he stated:

“. . . it is the responsibility of the “man in charge”, generally the A/P.W.S., to make adequate arrangements for patrolling the line in accordance with Rule O.1.3, and during hot weather it is prudent for advance arrangements with your staff to be made before the close of work on Friday for Saturday and Sunday patrolling, using the Friday 3-day forecast as a guide.”

In the event, no additional patrolling was carried out on the Saturday afternoon. Whilst accepting the point made by Mr. Kendell in his evidence (paragraph 26) I am in no doubt that, under the terms of the rules and instructions quoted above, additional patrolling should have been done; had it been, it is quite likely that the distortion, which had been developing for some three hours, would have been found. The fact that it was not done was obviously influenced by the fact that it was a Saturday, that the regular Section Supervisor was on leave, and that the increase in temperature was quicker than forecast. This is a matter which the Railway Officers will wish to examine, together with the contention, made by Mr. Gunning at one point during the Inquiry, that his manpower did not allow for the degree of additional patrolling called for in the instructions even though, during the week which preceded the accident, the gang was up to its authorised strength.

Organisational and Management Matters

44. In my Report on the derailment, on buckled jointed track, of a schools’ excursion train at Tattenhall Junction, near Chester, on 2nd July 1971 (six years to the day before the Bletchley derailment) I commented on the lack of communication that can arise between the permanent way men on the ground and the technical staff in the Divisional Engineer’s Office. It seemed to me then that the centralisation of the technical staff left too wide a gap between the Section Supervisors and the Engineers, and the circumstances of the present accident only reinforce this view. In the London Division, for example, at the time of the accident twelve Permanent Way Section Supervisors reported directly to the Divisional Civil Engineer, through the Assistant
Divisional Engineer (Permanent Way). This in my view is too large a span of control. It limits the degree of knowledge of the track, and of the permanent way staff, possessed by the responsible Engineers, and it places a heavy responsibility on the Section Supervisors, who have to take important decisions affecting the safety of the line and who may on occasion feel the need for technical advice and yet be reluctant to refer their problems to Divisional headquarters.

45. The Chief Civil Engineer of London Midland Region had, prior to this accident, already published his plans for the re-organisation of technical management within the Engineering Divisions. This included the appointment of Area Civil Engineers covering all permanent way maintenance activities. The re-organisation was introduced in September 1977 and all Permanent Way Section Supervisors now report direct to their Area Civil Engineer, who in turn reports to the Assistant Divisional Engineer. I very much welcome this step which should ensure that the Supervisors receive much closer technical management direction than hitherto. At the same time, it will not relieve the Supervisors from their direct responsibility for seeing that work is done safely and efficiently in accordance with instructions; ultimately it is on their training, experience, and judgement that the day-to-day safety of the line depends.

46. On British Railways during the past ten years, 9 trains have been derailed on heat-distorted CWR track and in the same period 11 trains have been derailed on heat-distorted jointed track. Analysis of all the reported distortions in CWR track during this period has shown that about half were the direct result of unsatisfactory ballast conditions or of recent disturbance of the ballast during or just before the onset of hot weather. On many foreign railways great efforts are made to leave CWR track untouched, except in emergency, throughout the summer months, and the same approach is advocated by the Board’s Chief Civil Engineer, as I have quoted in paragraph 42 above. Unfortunately, the difficulties of track maintenance on BRs’ intensively trafficked lines are such as to make it all but impossible to confine maintenance work to the cooler months of the year. As part of the current Inquiry I discussed the scope for further limitations on work that disturbs the track during the summer months with the Board’s Chief Civil Engineer and Chief Operations Manager. I received their assurance that work of this nature is kept to a minimum and that there is no possibility at present of any radical reduction in the amount of machine maintenance carried out in the summer months. This must be accepted but, with disturbance of the ballast being such a major cause of distortion in hot weather and the considerable risk that track buckling represents, especially on the growing mileage of high speed lines, it makes the strictest observance of the instructions relating to the safety of CWR, and the training and supervision of those responsible for implementing the instructions, of literally vital importance.

I have the honour to be,

Sir,

Your obedient Servant,

C. F. ROSSI

Major

The Permanent Secretary,
Department of Transport.