

TRAIN DERAILMENT AT HATFIELD, 17 OCTOBER 2000

First HSE interim report

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Summary

The HSE investigation into the derailment at Hatfield on 17 October is still ongoing and it is therefore too early to say with absolute certainty what was the cause of the incident. However, early indications suggest that the likely cause was a broken rail and that this, in turn, was the result of a track defect.

From the evidence so far there is no reason to believe that either the signalling or the rolling stock were at fault, but until all avenues have been thoroughly explored, including underlying root causes, it would be unwise to draw any final conclusions.



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TRAIN DERAILMENT AT HATFIELD, 17 OCTOBER 2000

First HSE interim report

Introduction

1. This is the first interim response to HSC's request to HSE for an investigation and report under section 14(2)(a) of the Health and Safety at Work etc. Act 1974. It is a factual account of progress to date and gives details of current lines of inquiry. Lord Cullen is not inquiring into the derailment at Hatfield. Nevertheless there may be some material from the investigation that could be relevant to part 2 of his Inquiry. If there is any material that HSE consider might be of use to the Ladbroke Grove Inquiry Team, HSE will check with them if it would be helpful for them to have it. We have forewarned the Inquiry Team of this possibility.

2. Further reports will be made public as information becomes available. The timing will

depend on the complexity of the issues involved, which will include both technical assessments and management systems.



The Derailment

3. On 17 October 2000, the 12.10pm train (1E38) Kings Cross to Leeds passenger express train departed from Kings Cross, it was due to arrive at Leeds at 14.33pm. At 12.23pm, the train, operated by Great North Eastern Railway (GNER), and, as far as we can ascertain at present, travelling at approximately the line speed of 115 mph, derailed roughly 0.5 miles south of Hatfield Station (approximately 16.8 miles from Kings Cross). No other trains were involved. Further details will become available once the signalling system's data tapes have been analysed.

4. The train was an Intercity 225 hauled by a Class 91 locomotive. It comprised of one Class 91 locomotive, 8 Mark IV passengers carriages, a buffet car, and Driving Van Trailer (DVT).

5. The train was fitted with Automatic Warning System, but not with a data recorder.

6. There were 10 GNER staff and around 100 passengers on the train. As at 19 October, 4 passengers have been confirmed as dead, and 34 others suffered injuries.

7. The derailment occurred approximately 16.8 miles (27 Kilometres) from Kings Cross station, on curved track between Welham Green and Hatfield in Hertfordshire. There are no points or signals nearby that are relevant to the derailment. Lines are electrified by the 25000 volts overhead line electrification alternating current system. The maximum permitted line speed is 115 mph on the fast line and there were no speed restrictions in place. A greatly simplified diagram at [Appendix 1](#) (for illustrative purposes only) shows the layout of the lines where the derailment occurred.

8. In the area of the incident the railway has four plain running lines, with no junctions or crossovers. The lines are:

- the Up and Down Main lines (the "Up" direction of travel is towards Kings Cross) and
- the Up and Down local lines.

9. The derailment resulted in the locomotive and front two passenger coaches remaining on the track, while the rear eight coaches derailed. The DVT and two coaches were separated from the rest of the train by a distance of approximately 200 yards. Six carriages and the DVT remained upright, two were at almost on their side and the buffet car was on its side with the roof ripped off (apparently on impact with an overhead power lines stanchion). Debris was spread over a wide area and into homes and gardens adjacent to the railway.

HSE investigation of the incident

10. HSE will carry out the investigation under its arrangements for the handling of major incident investigations. The investigation team will draw on a wide range of available HSE and external expertise including inspectors from HMRI, staff from HSE's Health and Safety Laboratory (HSL), and technical support from AEA Technology (Rail). The arrangements entail the setting up of an independent Incident Investigation Board to oversee the investigation. The Board will be chaired by Sandra Caldwell (currently Director of HSE's Health Directorate and previously Chief Inspector of Construction and Member of the Channel Tunnel Rail Authority) and will have members entirely independent of HSE.

11. The aim of the investigation is to answer the following three main questions:

- **why did the derailment occur?** This will include not just the immediate cause and technical issues but also the root causes;
- **what remedial action needs to be taken to prevent a further incidents?** HSE can insist on immediate or longer-term remedial action as appropriate, using wide-ranging powers (but within the limits prescribed) under the Health and Safety at Work etc. Act 1974 (HSWA);
- **Is enforcement action appropriate (including prosecution)?**

12. This interim report sets out the initial findings from the first 48 hours of HSE's investigation. As significant findings come to light, HSE will make them available and will also take action where this is appropriate.

The HSE investigation - progress to date

13. Immediately on being informed of the incident, HSE sent four inspectors to the site. It was not possible for the inspectors to gain full access to the derailment until the police had ruled out the possibility of terrorist action.

14. HSE inspectors commenced their on site investigation at first light on 18 October. The forensic investigation is being carried out in full co-operation with the British Transport Police (BTP) and Railtrack.

15. HSE's Health and Safety Laboratory (HSL) and AEA Technology (Rail) are providing technical support.

16. HSE is liaising closely with the Office of the Rail Regulator (ORR) and the shadow

Strategic Rail Authority (sSRA), both of whom are being invited to briefing meetings with Railtrack.

17. Up to 14 inspectors have been on site and are conducting a parallel investigation with BTP. In addition, the Chair of the HSE's Incident Investigation Board and the Chief Inspector of Railways visited the site to view it at first hand and to be briefed on the stage the investigation had reached.

18. Almost all of the Investigation work at the site stopped at dusk on 18 October and the site was secured except for work to remove the electrical overhead lines that were creating a potential hazard to investigators. This work was supervised by HSE inspectors.



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Actions to date on the investigation

19. HSE has two primary objectives. The first is to secure evidence, the second is to secure safety on the network (action taken to secure the network is covered in paragraph 25 onwards). Actions to date on the investigation, taken in collaboration with BTP include:

- taking possession of the data tapes for signalling in the Hatfield area from the Kings Cross Control Centre.
- taking possession of maintenance records for all relevant track and rolling stock.
- the examination, by HSE Inspectors, of the train that passed along the line immediately prior to that involved in the incident.



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HSE's findings to date

20. Early indications suggest that the immediate cause of the accident was a broken rail but this cannot be confirmed finally until all other avenues have been explored and eliminated. Findings to date are:

- there is obvious and significant evidence of a rail failure.
- there is evidence of significant metal fatigue damage to the rails in the vicinity of the derailment.
- the only evidence to date of wheel damage is consistent with the wheels hitting defective track.
- there is no evidence, so far, of a prior failure of rolling stock.
- The most extensive damage appears to have been caused by derailed carriages impacting line side structures.
- the signalling system appears to have played no part in the derailment.
- parts of the rail and train components have yet to be recovered.



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HSE's future actions in the investigation

21. Plans for further action:

- HSE will continue to investigate with BTP and assist in the detailed search of the scene (completion expected by end of Friday 20 October).
- searching will continue for missing parts of track and train components.
- a further collection of track and rolling stock maintenance records.
- further examination of train and track when carriages are lifted from the site (not expected before Friday evening).



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Action notified by Railtrack

22. An initial inspection of the track in the vicinity of the derailment site by Railtrack engineers identified some significant deterioration in the condition of the rail. In particular they were concerned about a specific form of rolling contact fatigue (sometimes referred to as gauge corner cracking - see below for further details).

23. As a result, at 22.00 hours on 17 October Railtrack imposed emergency speed restrictions across the railway system. The Railtrack Zones then worked through the night to implement these restrictions. The speed restrictions are:

- a reduction in the speed on passenger and freight trains of one third at all sites where the track was to be renewed due to track gauge corner cracking in the current year's work plan or had been deferred from the previous year.
- imposition of a 20 mph temporary speed limit at sites where there are signs of spalling (small fragments broken off) on the rail surface.
- Railtrack's priorities for imposing the speed limits are:
 - any site where there is a known cant deficiency of over 110mm
 - sites with lines speed over 100mph
 - any sites with 25 tonnes axle loads

24. Railtrack have not imposed any restrictions on specific rolling stock.



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HSE response

25. HSE needs to be satisfied that appropriate action has been taken and that Railtrack's engineering judgement is robust. On 18 October, HSE held two meetings with Railtrack staff to discuss progress to date and in particular the imposition of the speed restriction (representatives from ORR and sSRA were present).

26. As a result of these meetings Railtrack has agreed to:

- commission an independent third party assessment of its actions (HSE will then use HSL to carry out a peer review of this assessment).
- complete the technical investigation at the site before starting any restoration action.
- develop and provide HSE with a recovery plan for restoration of services.



Broken rails

27. The number of broken rails on the main rail network has been a matter of concern to both HSE and the ORR for some time and is an issue that has been raised in HMRI's Annual Railway Safety reports. As recently as 30 June 2000, both the Chief Inspector of Railways and the Rail Regulator wrote to Railtrack's Chief Executive on their continuing concern about the risks from broken rails after Railtrack failed to meet its internal targets. The letters stressed the need for a co-ordinated approach by Railtrack and other duty holders in the railway industry to stewardship of the network and safety.

28. As a result of the concern, in mid 2000, HSE and ORR jointly commissioned a report on Railtrack's arrangements for rail failure assessment from Track Technical Centre Inc. in the USA. This is due in early November.

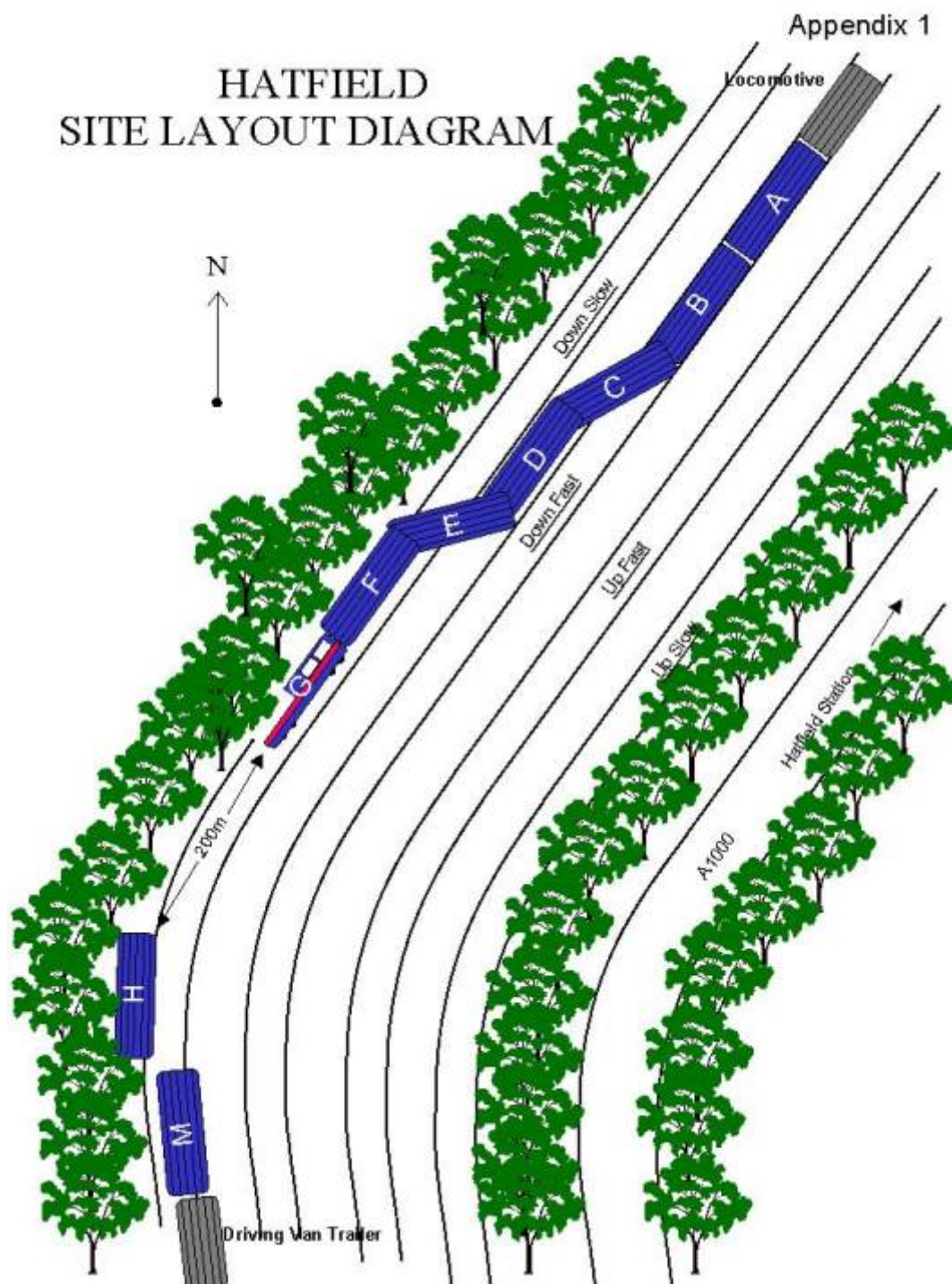
29. HSE understands (subject to documentary verification) that Railtrack had identified that particular section of line for replacement in February this year because of "gauge corner cracking". Work started in Spring but was not completed and was rescheduled for Autumn.

30. "Gauge corner cracking" is a specific form of rolling contact fatigue and is a phenomenon that has been causing Railtrack increasing concern. The fatigue mechanism is not yet fully understood but is believed to be related to the very high stresses at the wheel/ rail contact area.

31. There is some evidence to suggest that this form of rolling contact fatigue has been found in both the UK and on the continent, and has occurred on a number of sites. It has been found predominately on sections of track where there are highly canted curves and vertical switch and crossing work. Railtrack has identified this form of fatigue in rails of various steels and ages and also in rail that has been in service for less than 12 months. The rail in the area of the derailment had originally been laid in 1995, and had already been identified for replacement. Work was already going on north of the incident site and was moving south - no work was in progress at the time of the incident.

32. HSE will need to confirm through documentary evidence, interviews and inspection:

- the exact history of the rail in question;
- the robustness of Railtrack's systems for managing rail maintenance; and
- that Railtrack has audited Railtrack Zones and contractors to ensure that their instructions have been followed.



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