March 2001

Draft Railway Safety Regulations 2001: invitation to comment

1 I am writing on behalf of the Health and Safety Commission to invite your views and comments on draft Railway Safety Regulations 2001.

2 The draft Regulations would give effect, with certain amendments, to certain proposals which were included in the Commission's consultative document *Proposals for the Railways (Safety Case) Regulations 2000* last year. These concern the installation of on-train data recorders, and the action to be taken if certain train equipment become defective. The Commission is grateful to all who responded to the earlier consultative exercise.

3 The proposals on on-train data recorders and train equipment failure were removed from the final Railways (Safety Case) Regulations 2000[1] to allow time for them to be considered further. The Commission now wishes to pursue modified proposals on these subjects. In addition, the Commission wishes to correct a number of errors in the 2000 Regulations. Accordingly, we are proposing a set of Regulations to -

a) correct errors in the 2000 Regulations, and

b) set new duties concerning on-train data recorders and the action to be taken in the event of defects occurring in automatic warning systems or train protection equipment.

The proposed Regulations are at **Annex 1**.

Errors in the Railways (Safety Case) Regulations 2000

4 There are several minor drafting or typographical errors in the 2000 Regulations. There is also a more significant error in regulation 9, which requires infrastructure controllers to procure annual audits from an 'assessment body'. ('Assessment body' is defined in regulation 2(1) in a way that is intended to ensure the competence and independence of the body. In the case of Railtrack and London Underground Limited, the new company Railway Safety is expected to fulfil the role of 'assessment body'.)

5 It was intended that the duty to procure audits should extend to all railway operations carried out by the infrastructure controller. Unfortunately, as it stands the duty in regulation 9(1)(a) only covers the infrastructure control and station operations of the infrastructure controller and does not extend to any train operations undertaken by the

[1] The Regulations are reproduced, with supporting guidance, in the HSE Guide *Railways (Safety Case) Regulations 2000*, L52, available from HSE Books.

infrastructure controller. We believe that it is illogical that an infrastructure controller should be required to procure independent audits of its infrastructure control activities and its station operations but not its train operations.

6 We therefore propose to amend regulation 9(1) so that it reads:

> "(1) The infrastructure controller shall procure an assessment body to undertake at intervals of not more than 12 months an audit of -
>
> (a) those operations of the infrastructure controller arising from control railway infrastructure and the operation of trains or stations..."

The draft Regulations at Annex 1 would make this amendment to regulation 9 and also the minor corrections to the regulations referred to above. Your comments are welcomed.

On-train data recorders

7 Although on-train data recorders have been standard in new driving cabs since 1989, three-quarters of existing driving cabs do not have one. As explained in the Commission's 2000 consultative document, on-train data recorders bring significant benefits, not only in accident investigation but also as a means of monitoring the performance of drivers in order to identifying training needs or 'difficult' driving locations. One of the recommendation of the Public Inquiry into the Southall accident was that all existing cabs should be retrofitted with on-train data recorders by 2002.

8 A current Railway Group Standard requires the fitment of data recorders in all cabs operating on Railtrack infrastructure by the end of 2005. Cabs which are due to be withdrawn by the end of 2007 are exempted. The Standard contains a specification for data recorders which we consider satisfactory. It is a condition of their safety case that train operators comply with this and all other relevant Group Standards.

9 Retrofitting data recorders to existing cabs will be a major project for the industry. The data recorders used on new trains cannot be fitted to existing cabs without modification, so some design work is needed. Contract negotiations will also take some time to complete. About three-quarters of the current 5,600 driving cabs have no data recorder. Cabs are of different types, involving different installation methods and wiring, and we understand that one cab may take up to two weeks to fit. Whilst we believe the industry could have been more pro-active in this area, we accept (given where we are now) that it may be difficult for all trains to be fitted much before the end of 2005. By that time, about one-quarter of current cabs are expected to have been replaced by new cabs, reducing the retrofitting programme to about 2,800 cabs - still a very significant project.

10 The industry has recently made important progress towards complying with the Group Standard. The Association of Train Operating Companies (ATOC) has prepared a draft installation programme in liaison with train operators and rolling stock companies, and a specification for data recorders has been agreed. The Commission now proposes to underpin the Group Standard, and to mark the importance of maintaining impetus in this area, by setting a regulatory requirement.

11 The draft regulation in Annex 1 would require the installation of data recorders on all trains (including non-passenger trains) by a specified date. It amends the Commission's original proposal by -

(a) removing the requirement for voice recording. Conversations between drivers and signallers are already recorded at a control centre;

(b) requiring data to be captured on the operation of the automatic warning system and the driver reminder appliance, as well as of train protection systems;

(c) requiring data to be captured not only on the operation of all the systems in (b) but on instances where a driver disables any of them;

(d) moving the deadline for installing data recorders back to the end of 2005; and

(e) requiring train operators to have an installation programme approved by HSE within three months of the regulations coming into force, and to comply with the approved programme.

Your comments on the scope and detail of this proposal are welcomed.

12 A key element of an approved installation programme might be a commitment to fit specified proportions (e.g. 10%, 33%, 75% and 100%) of cabs by specified dates. HSE's aim would be to secure the maximum early benefit from data recorders.

Defects in automatic warning systems and train protection systems

13 As for data recorders, the Commission's proposals on train equipment resulted from recommendations of the Southall Inquiry. The original proposal placed duties on train operators and infrastructure controllers to ensure that -

(a) a train is not put into service with a known defect in its AWS equipment, except in order to run empty to depot for repair; and

(b) if AWS equipment (whether on the track or on the train) becomes defective during a journey, steps are taken to -

(i) mitigate the risks of collision or derailment, and

(ii) detrain passengers at the first reasonable opportunity.

14 Legal requirements similar to (a) and (b)(i) above already exist in relation to defects in train protection systems (regulation 3 of the Railway Safety Regulations 1999).

15 In response to the Southall Inquiry recommendation, Railtrack issued in August 2000 a revised Railway Group Standard on the action to be taken in the event of equipment failure. This Standard goes some of the way towards the regulatory proposal. It makes clear that a train should not enter into passenger service with a

known defect in its automatic warning system (AWS) or train protection system. It requires operators to take 'suitable control measures' when equipment fails in service, and to prepare contingency plans for such events. A supporting non-mandatory guidance note recommends detraining at the first suitable station, but it seems that a failure to do so would not in itself breach the Standard.

16 This is a case where we believe that it would be beneficial to clarify and underpin the Group Standard by a regulation. Our proposals have the effect of -

(a) extending the existing requirements at (a) and (b)(i) above, which apply to defective train protection systems, to defective AWS (see draft regulation 2 where it adds a new regulation 4A to the 1999 Regulations), and

(b) requiring passengers to be detrained at "the first suitable station" if a train's AWS or train protection system becomes defective during a journey (see draft regulation 2 where it adds a new regulation 3A to the 1999 Regulations).

17 The phrase "first suitable station" is the same as that used in the Group Standard and enables account to be taken of a station's capacity and other relevant factors. Under the Group Standard, operators on the main network have to submit a contingency plan to Railtrack, which should amongst other things list the stations considered suitable for detraining. The detraining requirement could be satisfied by detraining at the first station listed for the purpose in the operator's contingency plan (assuming the list has been drawn up according to proper criteria).

18 One change is proposed to the original draft regulation. Trains which have full automatic train protection (ATP) currently also have AWS. When ATP is operational, AWS is not essential because ATP provides full protection against the risks of SPADs and exceeding speed restrictions. Nevertheless, because ATP is a "passive" system - cutting in only if a driver makes a mistake - the additional visual and audible indications which AWS can be helpful to drivers. We judge that where ATP is operational on both train and track, passengers need not be detrained if an AWS fault occurs, provided the train remains on an ATP-fitted route and does not return to service again after completion of its journey until the fault has been rectified. This relaxation, which follows the Group Standard, is reflected in the draft regulation in Annex 1. It would apply only where full ATP is fitted, and not a system such as TPWS which does not provide full protection at higher speeds.

Application to the London Underground and other urban railways

19 The proposal on on-train data recorders applies not only to the main network but to other railways such as the London Underground and other underground or urban light rail systems. Your views on this aspect are welcomed.

20 Similarly our proposals on the action to be taken in the event of a defect in AWS or a train protection system apply in principle to all railways. A number of railways or parts of railways, including the London Underground, do not have AWS, in which case the provisions on action to be taken in the event of an AWS defect would have no relevance. However, London Underground and certain other railways have "tripcock" or other equipment which is deemed to comply with the requirement to have a "train

protection system" (regulations 3(1) and 3(3) of the Railway Safety Regulations 1999). The existing duties mentioned in paragraph 14 above, and the detraining proposal (proposed new regulation 3A), apply to this equipment. We understand that in the rare event of tripcock equipment failure on a London Underground train, passengers are normally detrained at the next station. Again, your comments are welcomed.

Economic appraisal

21 A regulatory risk assessment, including an assessment of costs and benefits, is at **Annex 2**.

Your views

22 The Commission would welcome your comments on any aspect of these proposals. Please send them by no later than **Friday 15 June 2001** to:

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Railways Directorate
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Health and Safety Executive
Rose Court
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Tel 020 7717 6353
E-mail: michael.madeley@hse.gsi.gov.uk

23 The way in which we will deal with your responses is set out in **Annex 3**. Please note that written responses will be publicly available unless you specify otherwise.

24 I look forward to your comments and thank you for your interest in these important matters.

Yours sincerely

Bill Callaghan

Chair

D R A F T

S T A T U T O R Y I N S T R U M E N T S

No.

HEALTH AND SAFETY

The Railway Safety Regulations 2001

Made- - - -

Laid before Parliament

Coming into force

The Secretary of State, in exercise of the powers conferred on him by section 15(1), (2), (4)(a), 5(b), 6(b), 43(2) and 82(3)(a) of and paragraphs 1(1)(a), 1(1)(c), 8(1), 9, 15(1), and 16 of Schedule 3 to, the Health and Safety at Work etc Act 1974**(a)** ("the 1974 Act") and for the purpose of giving effect without modifications to proposals submitted to him by the Health and Safety Commission under section 11(2)(d) of the 1974 Act after carrying out by the said Commission of consultations in accordance with section 50(3) of that Act, hereby makes the following Regulations: –

Title, commencement and interpretation

1. These Regulations may be cited as the Railway Safety Regulations 2001 and shall come into force on XXX.

Amendment to the Railway Safety Regulations 1999

(a) 1974 c. 37; sections 15 and 50 were amended by the Employment Protection Act 1975 (c. 71) Schedule 15, paragraphs 6 and 16 respectively; the general purposes of Part 1 referred to in section 15(1) were extended by section 117 of the Railways Act 1993 (c.43)

2. The Railway Safety Regulations 1999**(a)** shall be amended by inserting, after regulation 3 of those Regulations, the following regulations:

"3A. Where equipment forming part of the train protection system is fitted to a train (or, where regulation 3(3) is relied on, the equipment referred to therein) and that equipment is defective, the operator of that train shall ensure that any passengers on that train are disembarked at the first suitable station.

Automatic warning system

4A.—(1) This regulation applies to any train which is fitted with equipment forming part of an automatic warning system when that train is operating on a railway or part of a railway which is also fitted with equipment forming part of the automatic warning system.

(2) In this regulation, "automatic warning system" means equipment which—

(a) provides to the driver of that train a warning of each stop signal and warning signal approached by that train;

(b) requires the driver of that train to acknowledge the warning; and

(c) in the absence of such acknowledgement, causes that train to brake automatically.

(3) No person shall operate, and no infrastructure controller shall permit the operation of, a train to which this regulation applies unless the criteria referred to in sub-paragraphs (a), (b) and (c) of paragraph (2) are effective.

(a) S.I. 1999/2244.

(4) In any proceedings against a person for an offence contravening paragraph (3) it shall be a defence for that person to prove that -

(a) in the case where the fault is in equipment on the train, the train had commenced its journey before the discovery of the fault or is being driven without passengers to a place for the purpose of repair;

(b) it was not reasonably practicable to remedy the defect sooner; and

(c) suitable measures had been taken after the discovery of the fault to mitigate the risk of trains colliding or derailing.

(5) Subject to paragraph (6), where equipment forming part of an automatic warning system is fitted to a train and that equipment is defective so that one of the criteria referred to in sub-paragraphs (a), (b) or (c) of paragraph (2) is no longer effective, the operator of that train shall ensure that any passengers on that train are disembarked at the first suitable station.

(6) Paragraph (5) shall not apply where there is in service in relation to a train on a railway the equipment referred to in the exception in the definition of "train protection system" in regulation 2(1).

Data recorders

5A.–(1) No person shall operate a train on a railway unless there is in service on that train a suitable data recorder for the purpose of capturing in respect of that train the following information -

(a) the speed of the train;

(b) the application of the brakes and the application of power (whether such applications are manual or otherwise);

(c) the indications displayed to the driver by any train protection system, automatic warning system and driver reminder appliance;

(d) the actions of the driver to acknowledge and disable any train protection system and any automatic warning system;

(e) the actions of the driver to activate, deactivate and disable any driver reminder appliance;

(f) the time at which any of the data referred to in sub-paragraphs (a) to (e) above is recorded.

(2) In this regulation, "automatic warning system" has the same meaning as in regulation 4A.

(3) In this regulation, "driver reminder appliance" means equipment fitted to a train which, when activated by the driver, prevents the application of power to that train.

(4) Until 31 December 2005 it shall be sufficient compliance with paragraph (1) if a programme for the installation and bringing into use of suitable data recorders has been approved by the Executive and is being implemented.

(5) In any proceedings against a person for an offence for contravening paragraph (1) it shall be a defence for that person to prove that-

(a) at the relevant time the data recorder had become defective; and

(b) the train had commenced its journey before the discovery of the fault or is being driven without passengers to a place for the purpose of repair. "

Amendment to the Railways (Safety Case) Regulations 2000

3. The Railways (Safety Case) Regulations 2000**(a)** shall be amended in accordance with regulations 4 to 10 of these Regulations and any reference in those provisions to any specified provision shall, unless the context requires otherwise, be taken to be a reference to the provision so specified of the Railways (Safety Case) Regulations 2000.

4. In regulation 2(1)–

(a) in the definition of "audit report", for the words "5(b)" there shall be substituted the words "5(d)";

(b) in the definition of "railway", at paragraph (b), for the words "construction work" there shall be substituted the words "a building operation or work of engineering construction".

5. In regulation 5(3)(b)(ii), after the words "with those described in any other safety case" there shall be inserted the words "or revision thereof".

6. In regulation 5(7)(c), after the words "where paragraph", for the word "(3)" there shall be substituted the word "(4)".

7. In regulation 7(7)(a)(iii), after the words "under paragraph", for the word "(2)" there shall be substituted the word "(3)".

(a) S.I. 2000/2688

8. In regulation 8(2), for the word “made” there shall be substituted the word “proposed”.

9. In regulation 9(1)–

(a) after the word “intervals”, for the word “or” there shall be substituted the word “of”;

(b) in sub-paragraph (a), the words “and stations” shall be deleted, and after the words “railway infrastructure” there shall be inserted the words “and the operation of trains or stations”.

10. In Schedule 1–

(a) for paragraph 11 there shall be substituted -

“11. Particulars of the arrangements the duty holder has established, with a view to ensuring the health and safety of persons, for managing work carried out by persons who are not his employees on or in relation to premises or plant which he owns or controls.”;

(b) In paragraph 17(a), after the words “paragraph 5” the word “(d)” shall be omitted.

Signed by the Secretary of State for
The Environment, Transport and the Regions.

DATEXXXX

ANNEX 2

PROPOSALS FOR RAILWAY SAFETY REGULATIONS 2001

SUMMARY REGULATORY IMPACT ASSESSMENT

PURPOSE AND INTENDED EFFECT

Issue and objectives

1. The proposals address the fitment of train data recorders and the action to be taken if a defect occurs in a train's automatic warning system (AWS) or train protection systems (eg TPWS or ATP).

Risk assessment: On Train Data Recorders (OTDRs)

2. OTDRs do not directly influence accident risks. The benefits in terms of using the information gathered to mitigate future risk is discussed below.

Risk assessment: AWS failure

3. The original Regulatory Impact Assessment, supporting the draft Railways (Safety Case) Regulations 2000 which contained these proposals, looked at evidence available at the time and concluded that neither historical data on train accidents or an analysis of SPAD data can quantify the risks associated with AWS failure - in particular that of a train crash caused by a combination of AWS failure and red signal aspect disregard. This is because, if a red signal is disregarded for any reason, there is nothing remaining to brake the train before it passes the signal overrun zone. We argued that the risk of a train accident following a SPAD where AWS was not operating could well be far greater than the risk of a train accident if AWS is operational.

4. Since the initial proposals were consulted on, two reports have been compiled into the safety aspects of AWS failure. Firstly Sedgwick Wharf have looked at evidence from SPAD data[1]. Secondly, Risk Solutions have compiled a cost-benefit assessment of detraining[2] on ATP lines. Both reports were compiled for Railtrack.

5. Sedgwick Wharf (`Sedgwick') were critical of HSE's view, and argued that SPAD data could be used to assess risks. Sedgwick conclude in their report that SPADs in which the AWS was not operational (`without AWS SPADs') are not, on average, more severe than other SPADs, and that risks are very small in absolute terms. They also say that detraining would actually increase overall risk, since injuries in stations (eg from slips and falls) arise more frequently than on trains.

6. The key data driving this conclusion is an analysis of `without AWS' and `with AWS SPADs', by the severity of each SPAD. Sedgwick compare SPADs over the last ten years, and

1. "Defective AWS: Risk Analysis", Sedgwick Wharf, 3 October 2000.
2. "Running ATP fitted and Operational Trains with AWS isolated", Risk Solutions, 17 Nov 2000 (Issue 2).

argue that the distribution of without AWS SPADs by severity is similar to that of the with AWS SPADs [Annex B, Table E of the report].

7. The distributions of the two types of SPAD do look similar. For example, 36% of the without AWS SPADs were of the lowest severity, compared to 41% of the with AWS SPADs. However, SPADs of the very highest severity represented one out of 22 without AWS (the Southall train crash), compared to 5 out of 6408 with AWS. It could be therefore argued that highest severity SPADs are 45 times more likely to occur with AWS not working, although this argument relies on a sample of one (Southall).

8. For this reason, HSE do not support the conclusions of the report. Tests carried out by Statistical analysis shows that the sample of highest severity SPADs is insufficient to either accept or reject that risks are different, so that HSE's initial view (that risks are far higher when running without AWS) cannot be rejected. Furthermore, the fact that one `without AWS' train accident has actually occurred means that risks are automatically higher than the risks of detraining (one equivalent fatality every six years without AWS, compared to one equivalent fatality every fifty years from detraining, using non-SPAD based estimates in the Sedgwick report).

9. The Risk Solutions report uses a completely different approach to estimating increases in risk following AWS failure. The Authors use a human reliability model first developed in the nuclear industry. They conclude that the risks of a driver making an error are 30 times greater when they do not have access to a safety system designed to assist safe driving. The Authors use this factor in directly deriving their risk estimates. However, the Authors fail to take into account the fact that, if an error at a red aspect is made without AWS, there is nothing remaining to brake the train. This would point to risks being far higher than even this 30 fold increase.

10. We believe that neither of these methods in estimating risks is satisfactory, and that *train accident* risks (as opposed to the risk of less severe SPADs) are likely to be far higher if the AWS is not in operation. This would suggest that AWS should continue to be treated as safety critical equipment.

Options considered

Data recorders

11. There are two options, as follows:

a Retain the present position. Under existing Group Standards, as old stock is gradually phased out there will be an increasing proportion of trains which will have data recorders already fitted; and existing trains should be retrofitted with data recorders by the end of 2005, or the end of 2007 in the case cabs due to be withdrawn by then.

b Set a legal duty for the installation of data recorders on all trains with an operating life beyond a given date (we propose the end of 2005).

Automatic Warning System (AWS), and Train Protection and Warning System (TPWS)

12. There are two options:

a Underpin the relevant Group Standard, on the action to be taken in event of failure of train equipment, with regulations requiring detraining at first suitable station if AWS or train protection equipment fails during a journey.

b Alert the industry that we do not consider recent risk-analysis sound, nor would accept a reversal of existing Standards which includes a recommendation to detrain.

Information sources

13. This analysis uses the most recently available information from the industry.

BENEFITS

On-train data-recorders ("OTDRs")

Investigation costs

14. The primary function of OTDRs are as a data log for accident/incident investigation. This is seen as the main use for the data collected, and indeed they have proved a great asset in investigations. They are used to not only in finding out what items of equipment went wrong but also in the elimination of what was working correctly. This makes it easier for the investigator to concentrate on those parts that have shown to be faulty. In addition, the actions of the driver prior to the incident can be monitored.

15. Investigation costs following any rail crash can be significant, even for those accidents which are not subject to major inquiry. An examination of accidents where significant (above £350,000) insurance claims were made shows that the average cost of the subsequent inquiry (not necessarily a public enquiry) was around £250,000 (£300,000 in current prices), with a high figure of over £1 million. It should be noted that a number of non-injury accidents would be included in this total. We assume investigation costs of £500,000 on average; for either a very detailed investigation (say £100,000) of an accident involving at least one fatality, or a full public inquiry (say £2m), for an accident involving several or many fatalities (this relates to the accident investigation part of an inquiry, not the full cost of the inquiry).

16. More minor accidents are also subject to investigation. In practice, the level of detail in any particular investigation depends on a number of factors other than actual severity. HMRI would expect to be involved in roughly 300 `minor' investigations each year, and approximately 70 more detailed ones. This latter group would tend to include accidents leading to injury (sometimes in large numbers), but not necessarily so. This work is in addition to the more severe accident in the preceding paragraph. Typically, a `minor' investigation would take HMRI between three and four days to investigate, and a more detailed one between 30 and 40 days. At an average full economic daily rate of £420, this suggests economic costs of around £1,500 for a minor investigation and

£15,000 for a more detailed one. The total cost of work carried out by HMRI on `routine' accident investigation (excluding major investigations and enquires) would therefore be around £1.5 million each year.

17. We should also include industry's costs in accident investigation. British Railway Board's report into ATP allowed £1,000 for interview and accident report costs following derailments not leading to other major consequences (but possibly involving some track damage). This seems reasonable, given that this cost would uprate to £1,500 in 2000 prices. We would expect the time (and cost) spent by industry to be roughly equal to that spent by HMRI.

18. Therefore, we assume the costs to industry are equivalent to those costs incurred by HMRI. We estimate that accidents (excluding major accidents) cost industry and HMRI some £3 million in investigation costs each year. We would expect on average one additional major investigation each year (at an average cost of £0.5 million), so we estimate total annual investigation costs to be £3.5 million each year. It should be re-emphasised that these costs do not represent the full cost of annual accidents, but only that part related to the investigation.

19. There appear to be significant benefits in reduced accident investigation costs from the use of OTDRs, primarily related to movement accidents. The majority of the investigation cost is in more minor accidents. These savings would not necessarily be evident simply in reduced time, since OTDR data can take some considerable time to fully evaluate, however experience shows that the investigation would typically be more thorough, and OTDRs can elicit information that would simply not be available in their absence.

20. We can estimate the economic benefits of OTDRs by envisaging roughly how long an alternative investigation would take in their absence, if the information was obtainable. Based on previous experience, we estimate that an investigation without access to OTDRs would typically take some 50% longer to complete *to the same level* of quality as one with access to OTDR information on all vehicles affected.

21. We therefore estimate the economic benefits of OTDRs to be equivalent to 50% * £3.5 million = £1.75 million each year, compared to a situation in which they were not used at all. The realisable benefit from wider fitment will be proportional to the number of trains retrofitted, and is discussed in the comparisons of costs and benefits section below.

Other benefits of OTDRs

22. In addition to these benefits, there are significant potential safety benefits from the wider use of OTDRs. OTDRs can be used as a significant aid to safer driving and also driver training. For example, a driver can be taken through his actions on train handling in adverse weather conditions. The actions of a driver in the event of a potential accident can also be reviewed and improved.

23. There are also a number of potential operational benefits. Enhanced training can also result in savings in wear and tear to break shoes. With better control of a train less fuel may be used (for example coasting rather than driving under power), and there would be less risk of future equipment failure (for example through over-reliance on the brakes). Finally OTDRs can be used as a

maintenance tool. We would expect significant operational benefits in using data from recordings in maintenance schedules and diagnostics checks.

24. London Underground Limited has carried out an exercise to estimate the logistical benefits of OTDRs. They have estimated that the total *gross* operational benefit of fitting OTDRs to their rolling stock is in the order of 7% of the running cost of the train. We do not know if this figure would be representative of mainline rolling stock. In addition, this is a gross figure, and is only achievable through additional training, which would have it's own resource cost. Nevertheless, it seems reasonable that the *net* operational benefit of OTDRs could be in the region of 3% to 4% of vehicle running costs.

25. Railway Safety have also carried a cost-benefit assessment of the fitment of OTDRs. They anticipate limited benefits from enhanced driver monitoring, specifically a single annual inspection lasting four hours instead of eight. Translated into global cost-savings, this would be equivalent to cost-saving of around £1m per year. We would however, expect more significant benefits with respect to ongoing monitoring, training on routes the driver may not be familiar with, and irregular inspection following an incident. A cost-saving of double the Railway Safety figure (£2 million) per year would lead to present value savings of around £15 million over a ten year period.

26. In addition, the use of data recorders in performance monitoring will help to improve the competence of drivers and therefore reduce the risk of accidents - an unquantifiable but highly significant benefit.

AWS/TPWS

27. A continuation of the existing Group Standard and associated recommendations (assuming they are retained and complied with), or underpinning the Standard with regulations, would continue to provide significant protection in the event of an in-service failure of AWS or TPWS.

COMPLIANCE COSTS TO BUSINESS, CHARITIES AND VOLUNTARY ORGANISATIONS

Business sectors affected

28. All mainline operators, leasing companies, and infrastructure controllers are affected by the proposals. The effect on heritage and other private railways is discussed in the section on small firms. Light railways are not under scope of the proposed changes.

Costs of mitigating AWS/TPWS failure

29. Existing Railtrack Group Standards address failure of both AWS and ATP/TPWS. These make clear that a train should not enter service with a known fault in those systems, and detraining is recommended where a failure occurs en route although this is not strictly part of the Standard. Regulating to require detraining would not appear to result in additional costs, although this is subject to how the Standards and associated recommendations are applied in practice.

Costs of on-train data recorders (OTDRs)

Number of trains requiring fitment

30. All new rolling stock supplied to mainline railways since 1989 has been fitted with OTDRs. In addition, Railtrack Group Standard GO/RT 3272 requires trains with a life expectation beyond the end of 2007 to have an OTDR retrofitted by the end of 2005. The draft Regulations would require the fitment of OTDRs to all trains by 2005 at the latest, removing the exemption in the Standard for trains due to be retired by the end of 2007. Because the HSE proposal to regulate on this issue prompted the production of this Standard, we attribute the cost to the proposed regulation.

31. The majority of current rolling stock is not fitted with OTDRs. However, a number of these - principally Mark I units - will be replaced by 2005 at the latest. We estimate that of 2,300 single Mark I units currently on the network, around 1,000 are due for withdrawal before 2005 by existing franchise agreement, and the remaining 1,300 will be either withdrawn or modified as a result of the Railway Safety Regulations 1999.

32. The rolling stock companies are currently in the process of agreeing the cab fitment strategy for TPWS. At the same time, they are examining the numbers of trains that will need to be fitted with OTDRs. The majority of the cabs not to be fitted with TPWS are older rolling stock, whilst the remainder are short-life or converted stock performing special functions, some of which would have OTDRs fitted as a result of refurbishment.

33. Figures supplied by the industry suggest that on the basis of completing installation by the end of 2005 a total of some 2,800 driving cabs will need to be retrofitted with an OTDR. This represents one-half of existing cabs: the other half divides evenly between cabs which are already fitted with an OTDR and cabs which are to be withdrawn by 2005.

Cost of fitment

34. A number of different types of systems are available. Given the requirements of the system we propose, we estimate the cost of a single or dual OTDR and the work and materials spent in fitting into pre-1989 rolling stock is estimated £15,000 for a single cab unit and £20,000 for a double cab unit. This includes the economic (not operational) cost of withdrawing the vehicle from service, the labour costs of those involved in fitting the equipment, and the cost of the equipment (which we estimate at no more than £10,000). We do not anticipate significant savings from aligning this fitment programme with that of TPWS, since the leasing industry has advised that the time taken to fit OTDRs is significantly greater than for the trainborne elements of TPWS.

35. Railway Safety have also carried a cost-benefit assessment of the fitment of OTDRs. They estimate the installation costs of OTDRs to be £10,500 (single cab), though it is not clear whether this includes the labour costs of fitment. They also estimate maintenance costs of 3.9% of fitment costs each year, which is significantly lower than our original estimate of 10%. This is based on actual experience with the use of OTDRs, We therefore continue to use initial costs of £15,000 to £20,000, but use recurring costs of 3.9% the initial cost.

36. The total initial cost of fitting OTDRs to those trains remaining in service after 2005 is £48 million. The present value of maintenance costs over ten years (which we count from 2003 when the installation programme should be in full swing) is £14 million (it is unlikely that a pre-1989 train would be run past the end of this ten year period). This suggests that the retrofitting of OTDRs would lead to total costs of £62 million up to 2013.

Impact on small and medium sized businesses

37. None.

Costs to HSE

38. There are no significant cost implications for HSE. The development of a programme to address the installation of OTDRs should be able to be absorbed into the current Inspectorate workload at little additional cost.

Other costs

39. We do not believe there are any other significant costs associated with these proposals.

Total costs to society

40. These are the same as the industry costs above.

ENVIRONMENTAL IMPACTS

41. None**.**

BALANCE OF COSTS AND BENEFITS

On-train data recorders (OTDRs)

42. The total cost of fitting OTDRs to the estimated 2,800 unfitted cabs still operating beyond 2005 is estimated to be between £62 million in present values over ten years from the date of fitment, including maintenance costs. The total cost of accident investigation (in present values) over the same period will be roughly £27 million, of which the widespread fitment of OTDRs may save around £13 million. The cabs requiring retrofitment represent around three-quarters of all passenger rolling stock, but even so it is not reasonable to suppose that the costs of fitting OTDRs would be fully balanced by any potential saving in investigation costs alone.

43. However, there may be wider operational savings in the use of OTDRs. These may be very significant, but it has not been possible to fully quantify these. We would expect present value savings of around £7.5 million from more efficient driver monitoring (70% of a £10 million potential saving shown in paragraph 25), even if this only represents eight hours per driver per year. Savings in accident investigation and driver monitoring might therefore offset around one-third of the cost of OTDRs.

44. Hence other operational savings would have to account for the remaining two-thirds of costs, for overall savings to balance costs. We believe that this is entirely possible. For example, a saving of twenty hours maintenance per train each year, through better targeting of rolling-stock maintenance and repair, would result in present term benefits of around £50 million over ten years. This would fully offset the costs of installing and maintaining OTDRs. There is also the unquantifiable but highly significant benefit of improving driver competence, so reducing the risk of accidents.

Proposals to mitigate AWS/TPWS failure

45. Since detraining following AWS failure is an existing recommendation accompanying the Group Standard, it is not appropriate to subject any alternative standard to a cost-benefit test, unless it can be shown that there is no increase in risk (or the existing standard has actually led to an increase in risks). The duty-holder has an absolute duty to reduce risks as low as reasonably practicable (ALARP). HSE would not agree any changes in existing control measures, or standards, that result in a significant increase in risk[3].

46. Advisers to the industry have argued that there are no (or no significant) increase in risks following AWS failure, and that the practice of detraining would actually increase overall risk because detraining involves people waiting in stations where people sometimes injure themselves (by slipping or falling). HSE does not agree with this view. We consider that the risks of continued operation of a train once AWS has failed leads to a significantly higher risk, and that this risk *could well* be many times higher than the risk of detraining. Whilst there is insufficient evidence to decide the issue either way, we consider the continuation of the existing standards to be necessary.

Uncertainties

47. These are as detailed in the text.

Contact

48. In case of queries or if you wish to comment on this assessment, please contact Michael Madeley at:

Health and Safety Executive
Railways Directorate
5th Floor, Rose Court
2 Southwark Bridge
London, SE1 9HS
Tel: 020 7717 6353
Fax: 020 7717 6670
Email: michael.madeley@hse.gsi.gov.uk

3. “Reducing risks, protecting people”, HSC discussion document, DDE11, from HSE Books

Annex 3

Notes on the handling of responses

1 We will acknowledge your response and consider it carefully. We may contact you if we have a question about your response or if we would like you to expand on it.

2 To make our consultation process as thorough and as open as possible, we make the comments we receive available to the public at our Information Centres in Sheffield and London. Copies are available at a small charge to cover our costs. However if you state clearly that you do not want your views to be made public, we will respect your wishes.

3 If you respond in a personal capacity, rather than as a postholder of an organisation, you should be aware that information you provide may constitute 'personal data' in the terms of the Data Protection Act 1998. For the purposes of this Act, HSE is the 'data controller' and will process the data for health, safety and environmental purposes. HSE may disclose these data to any person or organisation for the purposes for which it was collected, or where the Act allows disclosure. You have the right to ask for a copy of the data and to ask for inaccurate data to be corrected.