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HEALTH AND SAFETY COMMISSION

National ERTMS Programme, Third Year Report: Advice of RIAC

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Issue

1. Further advice to Ministers on implementing full Automatic Train Protection on the mainline network.

Timing

2. The third national ERTMS programme (NEP) report was published on 23 June. There is an expectation that the HSC will make public its views on the report after this meeting. While there is no particular deadline driving the Commission, given the importance of the matter, timely advice is expected.

Recommendation

3. That the Commission:

(a) notes the position as outlined in this paper and the views of its industry advisory committee; and

(b) in the light of the advice, writes to Ministers as outlined in paragraph 11.

Background

4. The Uff-Cullen inquiry recommended in March 2001 that ERTMS should be provided by 2010 for all trains running at speeds above 100 mph in the UK. In February 2003, following an independent review of alternative industry fitment proposals, HSC advised Ministers that the Uff-Cullen timescale was not viable and endorsed the industry's proposals for implementation by 2015. HSC accepted that one consequence of introducing the Train Protection and Warning System (TPWS), required by the Railway Safety Regulations 1999, was that introducing ERTMS was no longer primarily a safety issue. With the reduction of risk derived from TPWS fitment, the main benefits of ERTMS arise from improvements in capacity utilisation and reliability of service.

5. Nevertheless, given the limited effectiveness of TPWS and TPWS+ in preventing higher-speed (above or about 100 mph) ATP-preventable incidents, HSC expressed an intent to monitor the work of the national ERTMS implementation programme. HSE is represented on the NEP and is invited to comment on the year-end reports. The SRA's third annual report is now available for HSC to consider. It suggests significant further

delays in implementing the ERTMS beyond 2015. Currently two implementation plans for the rollout of ERTMS are being considered: an "accelerated natural" plan, still under evaluation, which would deliver ERTMS by 2025; and the "natural" plan which introduces ERTMS route-by-route as part of a programme lasting until at least 2040. DfT now lead on the overall programme. Network Rail is taking over leadership of the Cambrian Coast early deployment site.

6. On 10 May HSC considered and approved a handling strategy for publication of the ERTMS programme third year report (paper HSC/05/68). The paper proposed to invite RIAC to consider the report at its meeting in June and said that HSC would then discuss the report on 26 July in the light of RIAC's advice. The report's Executive Summary is annexed to this paper for information. Copies of the full report are available on request.

Argument

7. RIAC discussed the NEP report at its meeting on 16 June. Key points expressed included:

(a) strong support by industry representatives for the approach outlined, including support for a rollout based on the extended timescales flowing from the proposed "natural plan", (i.e. full implementation of ERTMS would extend to 2040 or later);

(b) concern by others – including workers' representatives – that if practicable, implementation should be brought forward; (RIAC was reminded that at least one rail union still had a strike mandate on the issue);

(c) recognition by all that the duty holders would have to continue to manage the risks on the network in the meantime, and the importance in this context of the reliance on and the reliability of the TPWS system over a number of years.

8. RIAC also noted that:

(a) work was still progressing to test the viability of earlier rollout. ("There remains scope to optimise both the natural and prioritised implementation plans further….").

(b) it was crucial to the validity of the report that the assumptions made about cost, risk reduction attributed to TPWS, the technical progress that would be possible etc., were accurate. (Here, the meeting received assurances from the RSSB representative that the risk reduction assumptions were accurate and the ORR representatives did not question the costings).

9. In the light of RIAC's discussion, the Commission will want to consider whether it now wishes to give new advice to Ministers. The Commission will be conscious that the timescales for implementing full train protection on the mainline network are now likely to be considerably longer than when their previous advice was given (February 2003), and that responsibility for advising on railway safety will transfer to ORR at the turn of the year.

10. The Commission has accepted that fitting ERTMS is not primarily about safety (para 4). However, we believe that as the current safety regulator of the railways, the Commission will want to draw the Government's attention to certain key issues. In particular, Government leadership and willingness to drive this work forward will remain

crucial if both the early deployment work and longer-term realistic and deliverable plans are going to succeed. We believe it is important that the Commission also clearly draws Ministers' attention to the remaining residual risk so that future decisions on implementation are taken transparently.

11. Accordingly, and to ensure that key health and safety issues are properly registered, we think it would be useful for the Chair to write again to Ministers now, reflecting the views of its Advisory Committee on a number of issues for the future. The letter, which would be copied to Chris Bolt as Chairman of the future Safety Regulator, should:

(a) welcome the programme board as a good example of cross industry co-operation;

(b) draw the Secretary of State's attention to the extending timescale, and the presentational implications that this may have in relation to convincing Europe that the UK is taking seriously the development and implementation of ERTMS;

(c) emphasise the need for continued strong government leadership of the programme as it moves from the SRA to DfT;

(d) support the leadership roles of Network Rail in driving forward practical implementation and in doing so, emphasise the importance of the early deployment on the Cambrian Coast Line;

(e) given the uncertain state of the technology etc., stress the need for Ministers to press for a clear, creditable path to implementation with milestones that can be monitored from whatever plan emerges from the optimisation process;

(f) restate the need for a very clear maintenance and renewal strategy for the TPWS and TPWS + system;

(g) remind Ministers that a small residual risk, estimated at one equivalent fatality a year, remains and suggest that Ministers seek a clearer description of the residual risk in both the "natural" rollout plan and the "accelerated natural plan" and seek industry's proposals for managing this risk with clear targets as part of the process;

(h) alert Ministers to sensitive EC concerns in relation to the West Coast Main Line - see paragraph 17;

(i) raise the possibility for the future rail regulator to test public opinion in this area by further social science research of the type undertaken when the Commission's initial advice was given.

Consultation

12. The proposals in this paper have been subject to consultation within HMRI and Communications Directorate. We have also consulted Margaret Burns, HSE senior management and ORR. The final paper will be sent to RIAC members so that their views can be reflected at the meeting on 26 July.

Presentation

13. It is likely that the views of HSC will be of interest to the railway media and to others. While we do not propose to hold a press conference or to issue a press release,

we would expect to make the correspondence with the Secretary of State public. Since the draft advice to Ministers has gone to RIAC, the general line will already be well known in the industry.

Costs and Benefits
14. None associated with this paper.

Financial / Resource Implications for HSE
15. None associated with this paper.

Environmental Implications
16. None associated with this paper.

Other Implications
17. The Commission may wish to be aware that the EC has written to the DfT to query why the West Coast Main Line (WCML) upgrade (paper HSC 02/139 refers) did not include the fitment of ERTMS. Whilst DfT officials are responding to this with a reasonable argument, there remains the issue that the EC state in their letter to DfT that they have not seen an explicit plan for the implementation of ERTMS in the UK, a point that the Commission will wish to stress. In relation to high-speed operation on WCML, they also want to know the basis for using TPWS+ and its related level of safety (bearing in mind its limited ability above about 100 mph). These issues may also have a bearing on future EU funding of the GB rail network.

Action
18. The Commission is invited to consider the report, to note RIAC's views as set out in paragraphs 7-8 and to agree to write to Ministers on the lines outlined in paragraph 11.

ANNEX

ERTMS YEAR 3 PROGRESS REPORT

Executive Summary

What is ERTMS?

ERTMS is the European Rail Traffic Management System, a signalling and train control system promoted by the European Commission (EC) for use throughout Europe, and specified for compliance with the High Speed and Conventional Interoperability Directives.

Its key characteristics are that it provides Automatic Train Protection (ATP), to ensure trains operate within safe limits and speeds at all times; and cab signalling, providing safe movement authority directly and continuously to the driver through the desk display.

ERTMS has three 'Levels' of sophistication. The preferred solution for general application in the UK remains 'Level 2, system D, in which ERTMS-fitted routes operate without line-side signals, reducing infrastructure cost and allowing the signalling system to be optimised to improve network capacity and performance. Such a system requires all the trains on the route to be fitted with ERTMS equipment.

The UK commitment to ERTMS development

The UK railway remains committed to developing ERTMS for application across the network in accordance with European Directives. To this end, the Rail Regulator, in his Final Conclusions of the Access Charges Review 2003, allowed £156m of funding for the programme development phase during Control Period 3 (2004/05 to 2008/09). This funding is to support the Cambrian Early Deployment Scheme (EDS), which will install ERTMS Level 2 System D for the first time on a working UK rail route, together with further work in preparation for national implementation.

During the last year, substantial progress has been made. The Strategic Rail Authority (SRA)-led National ERTMS Programme (NEP) has continued to develop a national implementation strategy for ERTMS with broad industry support. Network Rail has substantially expanded its involvement with the Programme and has developed a new and more practical approach to migrating from conventional signalling to ERTMS, enabling a revised 'renewals-based' strategy to be adopted. The resultant ERTMS implementation plan is now aligned with Network Rail's signalling and telecoms renewal plans, and integrated with the Department for Transport (DfT)/SRA's franchising and national rolling stock renewals strategies. This plan has been labelled the 'natural' implementation plan, because implementation is projected as infrastructure and trains are naturally due for renewal.

A prioritised development of the natural implementation plan could deliver ATP on the UK high-speed lines earlier by around 2025. This would require early resignalling of several sections of the East Coast Main Line (ECML) in addition to overlaying ERTMS on the recently resignalled sections of the West Coast Main Line (WCML). This prioritised implementation plan will require greater upfront investment and represents increased risk

when compared to the natural implementation plan, but would deliver ATP by the earliest practicable date.

Responsibility for delivery of the Cambrian EDS has now been handed over to Network Rail, who are supported by Arriva Trains Wales, Angel Trains and the Railway Safety and Standards Board (RSSB). The objectives, scope and cost have been challenged, and funding is now confirmed. A revised procurement strategy is being agreed in the context of changes to responsibilities associated with the Railway Act 2005. Commencement of revenue service using ERTMS will now be in late 2008, about eight months later than previously planned.

The UK rail industry has also become more involved in European processes to refine ERTMS, through the Community of European Railway and Infrastructure Companies (CER) and the European Rail Infrastructure Managers (EIM) group, and through the participation of the UK rail supply industry in UNIFE (the European association of rail suppliers) and UNISIG (the signalling suppliers' group).

The greater part of the safety reduction sought from ERTMS has already been delivered by other means

The Uff-Cullen Joint Inquiry recommended, in March 2001, that ERTMS, as a modern form of ATP, should be provided by 2010 for all trains running at speeds above 100mph in the UK. The ERTMS Programme Team (EPT) was formed on behalf of Railway safety and the SRA in 2002 to assess the ERTMS recommendation. Following an independent review of the EPT's report, the Health and Safety Commission (HSC) advised the Government in 2002 [N.B. this should read 2003.] that the Uff-Cullen timescale was not achievable, on account of "the time it will take to develop viable technology", and endorsed the rail industry's approach, which showed an earliest possible target of 2015 for high speed lines.

Since the Joint Inquiry, the rail industry has reduced the risk of accidents preventable by ATP, by measures including:

- The Train Protection and Warning System (TPWS)
- Its extension, TPWS+, which is fully effective up to 100mph; and
- Other Signal Passed at Danger (SPAD) Reduction and Mitigation measures (SPADRAM).

These measures have reduced the estimated risk of accidents that could be prevented by ATP to approximately one 'equivalent fatality' per annum.

As a result, ERTMS' potential contribution to risk reduction has become marginal. There are other, more cost-effective means of improving safety on the UK's railway, which are prioritised against risk through a range of industry plans and initiatives.

It is now clear that any realistic implementation plan for ERTMS will require extension of TPWS well beyond its planned 15-year life. While the design of TPWS is such that modern equivalent replacement at subassembly level is inherently practicable, the impact on service performance needs to be substantially improved if TPWS is to be a long-term solution.

The new business case for ERTMS, focused on renewals savings

While the incremental safety benefits that may be attributed to ERTMS have been reduced in comparison to the position in 2001/02, progress has been made in validating ERTMS' other benefits, which include reduction of resignalling costs, and enhancement of network performance and capacity.

In particular, during the last year, Network Rail's work to develop and cost its signalling renewals strategy has clarified the value of ERTMS Level 2 System D as a substitute for 'conventional' signalling renewals, with reduced need for line-side equipment and therefore reduced installation and maintenance cost.

The prospective benefits of ERTMS in terms of network performance were reviewed over the last year and confirmed as being of the order of a 20% saving of delay minutes. However, the baseline for calculation of these benefits was reduced to take account of the regulatory target for performance improvement, which Network Rail is committed to achieve by 2012 without support from ERTMS.

The new natural implementation plan is deliverable

This is the third Annual Progress Report from the NEP team, and the final one under SRA's leadership. It describes the NEP's achievements in the past year. Of these, the most important is the development of the natural implementation plan, improving four specific aspects of the ERTMS business case:

- **Deliverability**: The natural implementation plan now directly reflects Network Rail's resignalling strategy, which plans the renewal of each interlocking, and is aligned with the expected delivery of new rolling stock, thus offering a more cost-effective approach to the introduction of ERTMS equipment.
- **Affordability**: The more cost-effective approach significantly reduces up-front investment. Additional investment will still be required in the first 10 to 15 years to fund development and initial train fitment. However, over the appraisal period (to 2042), this investment is almost entirely offset by the overall cost savings – before taking into account performance, safety and environmental benefits.
- **Migration risk**: The natural implementation plan offers a lower risk transition of the national network to ERTMS, since it is based on installation rates that have been achieved in the past and includes a set of early implementation projects that address reliability and functionality proving, prior to a main line application.
- **Industry stakeholder support**: The direct involvement of industry stakeholders in improving deliverability and reducing risk has resulted in a plan that has wide support.

The natural implementation plan, by its nature, proposes a slower rollout of ERTMS than envisaged by the Joint Inquiry or by the indicative industry plans documented in previous reports. The spread of implementation dates over time show broadly how the high speed line implementation could proceed. The first major scheme is for ECML, which remains the priority for ATP implementation, since the Great Western Main Line (GWML) already has ATP, and the WCML has recently been resignalled to modern standards, which include the 'robust train protection measures' introduced by Network Rail.

Planning of the next stages of migration subsequent to the Cambrian EDS has also progressed. Opportunities arise in the Midlands, Great Eastern and Wessex areas to further mitigate risk before starting main line rollout on the East Coast. A set of appropriate schemes will be selected by the end of 2005 on the basis of cost-benefit.

It must be understood that this plan is still being refined in preparation for submissions to DfT and the Office of Rail Regulation (ORR), in line with the regulatory Signalling Review process. It will remain indicative until the Signalling Review has confirmed in detail the funding needs for signalling, including ERTMS, over the period 2009 to 2014, and the long-term strategy has been confirmed by Government. However, the development phase funding already available is sufficient to carry forward all the key activities necessary to support the programme up to 2009.

The original target completion of high speed line fitment by 2015 is no longer considered feasible by the industry. Over the past years, experience in Europe has underlined the scale of programme risk implicit in the rollout over a mixed traffic network, and projected costs remain high. The prioritised implementation plan described earlier, which could deliver ATP on the high speed lines by 2025, is under evaluation.

There remains scope to optimise both the natural and prioritised implementation plans further, particularly in terms of the precise timings of renewals. The NEP has this work in hand, and continues to work on the reduction of the product cost of both the train-borne and infrastructure equipment, which could further improve both affordability and overall Net Present Value (NPV). If substantial decreases in product costs could be achieved, the case for advancing renewals would be improved and ERTMS implementation across the national network could be realised within a shorter time frame.

Transition to Department for Transport/Network Rail leadership is imminent

The structure of a single cross-industry team, staffed from a number of existing organisations, is already relatively well adapted to the institutional changes arising from the Railways Bill. The DfT will take over responsibility from the SRA for strategic direction of ERTMS, and will provide Government-level ownership and Member State representation in the European Union (EU) context.

Industry leadership with regard to ERTMS, including management of the existing NEP and the cross-organisation team, will transfer to Network Rail. Network Rail's leadership role will extend to both engineering, as ERTMS system integrator, and programme management. It will be Network Rail's responsibility to ensure that all industry parties are properly consulted and informed about ERTMS.

The 'Board-level' oversight currently provided by the Strategic Management Group (SMG) will continue. This group will be chaired by a 'Senior Responsible Owner' from the DfT's new Rail Directorate. It will continue to include cross-industry representation. Wider stakeholder participation will continue to be ensured through a Stakeholder Board.

Progress in the rest of Europe has not been as rapid as hoped

Progress has been made in the rest of Europe in the last year in both testing and implementing ERTMS. 'Cross-exchange tests' of the practical interoperability of different manufacturers' equipment have been successfully conducted in Spain and the Netherlands. A number of commercial (rather than test) installations are due to enter

service during the coming year. However, the pace and spread of commercial projects has been slower than originally hoped, in particular for the application of ERTMS Level 2 to mixed traffic networks, rather than dedicated high speed lines.

Economic analysis in a number of countries has also confirmed the UK view that a single campaign implementation of ERTMS would have a high up front cost, carry delivery and performance risks, and take a long time to pay back the investment made. In particular, for widespread fitment to be economic, the unit costs of ERTMS equipment would have to fall. Expansion of the market and supplier base together with the application of new technologies may all assist in reducing unit costs.

In this context, a revised implementation strategy has been developed by the EC, CER, EIM and UNIFE. This strategy envisages creating a number of 'Interoperable Corridors' (major European railway axes), upon which a more general rollout could subsequently build, once ERTMS' reliability and affordability were sufficiently proven. EC funding may be available to support fitment of some of the corridors. Mixed traffic 'conventional' corridors, as well as dedicated high speed lines, are included.

In recognition of the technical and economic difficulties encountered, the Conventional Command, Control and Signalling Technical Specification for Interoperability (CoCoSig TSI) has been substantially changed, to allow Member States more flexibility to adopt an economically appropriate implementation plan. Similar principles are expected to be adopted in updating the High Speed CoCoSig TSI.

Vision for a cab-signalled railway

Communication-based train control and cab signalling represent a major opportunity to enhance the cost effectiveness and flexibility of the railway and allow for automated driver support, which is in general use on competing modes of transport. There are several such systems in the world, but none has achieved the level of development for main line application reached by ERTMS. ERTMS continues to have the support of the EC, and is being implemented on a range of European railways. The technology is now attracting potential users and suppliers in Asia. ERTMS is capable of providing the most cost-effective signalling option in the years to come, provided that its development is driven by economics through the European railways and the EC. The UK intends to take a full part in this process.

The supporting technology for ERTMS will continue to change and develop on a cycle of around 10 years, whereas signalling equipment life, and therefore the time taken to fit the network, is around 25 to 30 years. This relatively fast pace of change in the technologies upon which ERTMS is based, and the potential for further cost saving, reinforces the logic of making a progressive commitment.

Next Steps

There are four key next steps for the UK ERTMS Programme:

- To transition programme management from the SRA to Network Rail and strategic direction from the SRA to the DfT by the end of June 2005;

- To tender and appoint signalling supply contractors for the Cambrian EDS, in addition to effecting provision for ERTMS (in the form of ERTMS-ready modifications) within a range of near-term resignalling schemes and rolling stock replacements.
- To complete a funding submission to DfT in November 2005, enabling DfT to provide long-term guidance for the review of signalling costs to 2014, now being conducted by the ORR.
- To finalise a UK national implementation plan, for submission to the EC during 2006.

Conclusion

There is now a stable and widespread consensus within the UK rail industry about the merits of the ERTMS and how it can play a useful and cost-effective role in a national signalling strategy, and fit into a prudent, well-evidenced approach to risk reduction. The UK rail industry, working together, has identified a more economic and deliverable approach to implementation, reflecting the change in emphasis from safety to business and economic drivers. Further refinement may improve upon investment requirements. In 2005/06, the NEP, on behalf of the whole rail industry, will put the position to Government and industry regulators, with a view to securing the funds and support to carry this Programme forward through 2014 and beyond.

The initial timeframe for future UK implementation will be dependent upon the success of the Cambrian EDS project and progress with developments in Europe. In the long term, Government and industry need to work together have to decide the scope and rate of ERTMS implementation in the UK.