

Do rules keep track workers safe?

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This paper concerns management of the risk of track workers being struck by trains. It identifies issues associated with work in possessions and on the open line which, if addressed, would reduce risk and improve efficiency. It concludes that these issues are a function of organisational culture and the way that risk controls are produced. These present barriers to improvement that must be addressed if necessary improvements are to be obtained. The following abbreviations are used:-

CDM Regulations	Construction (Design and Management) Regulations
COSS	Controller of Site Safety
ES	Engineering Supervisor
MHASAW Regulations	Management of Health & Safety at Work Regulations
OTP	On Track Plant that can only be operated in a possession, this includes Road Rail Vehicles
PICOP	Person in Charge of Possession
RSSB	Rail Safety & Standards Board
SSoW	Safe System of Work

Risk of track workers being struck by trains

The RSSB safety risk model shows that the fatality risk to an individual track worker from all causes is 1 in 9860 and that being struck by a train accounts for 63% of this risk. Thus the probability of an individual track worker being killed by a train is 1 in 15850. This is an average figure with certain groups of workers are exposed to a significantly higher levels of risk. The HSE consider unacceptable risk levels for members of the public and employees to be respectively 1 in 10,000 and 1 in 1,000.

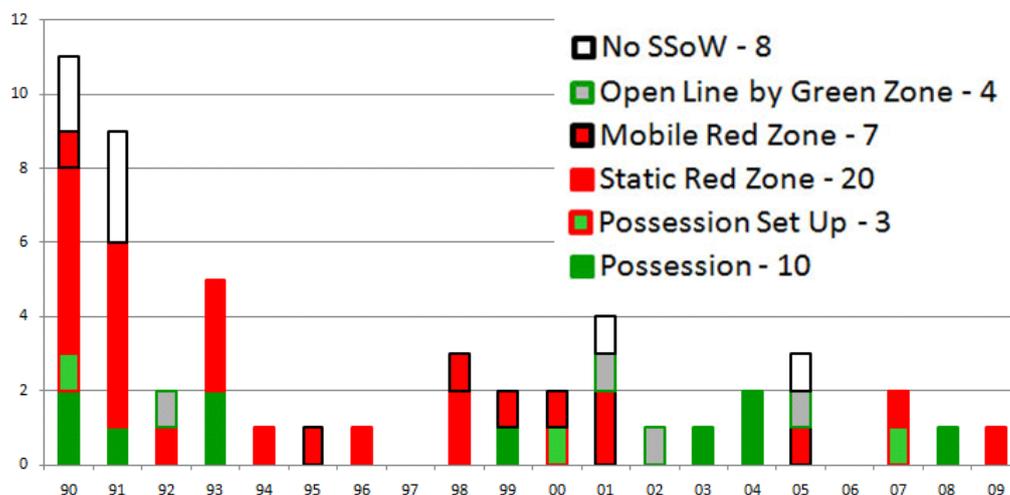


Figure 1 – Analysis of fatalities from SSoW failures 1990 to 2009

Attachment 1 lists the 52 fatalities from being struck by a train due to SSoW failure between 1990 and 2009. These are analysed by SSoW in Figure 1 which shows a significant reduction in track safety fatalities after the early nineties. This was perhaps due to campaigns emphasising the need for rules compliance. Despite similar campaigns since then, the level of fatalities has remained about the same indicating that this approach alone is not sufficient.

Safe System of Work \ Role	Total	COSS / IWA	Lookout	Protection Assistant	Machine Controller	Other Workforce
Established Possession	5				1	4
Possession Set Up	2			2		
Open line by Green Zone	3					3
Red Zone - Static	6		2			4
Red Zone – Mobile	7	4	3			
None	2	1				1
Total	25	5	5	2	1	12

Table 1 – Analysis by SSoW and person killed – 1994 to 2009

Table 1 is an analysis of fatalities from 1994 to 2009 by both SSoW and the role of the person killed. This shows that those providing the SSoW are exposed to significantly greater risk than the average track worker, for example

- 32% (8 of the 25) fatalities were those providing the SSoW
- When used, lookouts are more than half the fatalities. i.e. 5 fatalities out of 9 occasions (6 static red zone plus 3 of the mobile zones requiring lookouts)
- 16% of fatalities (4 of the 25) were working alone in a mobile site, this would be a quite small percentage of the total work done on the track

There is thus a requirement to normalise this data to establish the level of risk for each role providing protection.

How and Why Fatalities Occur

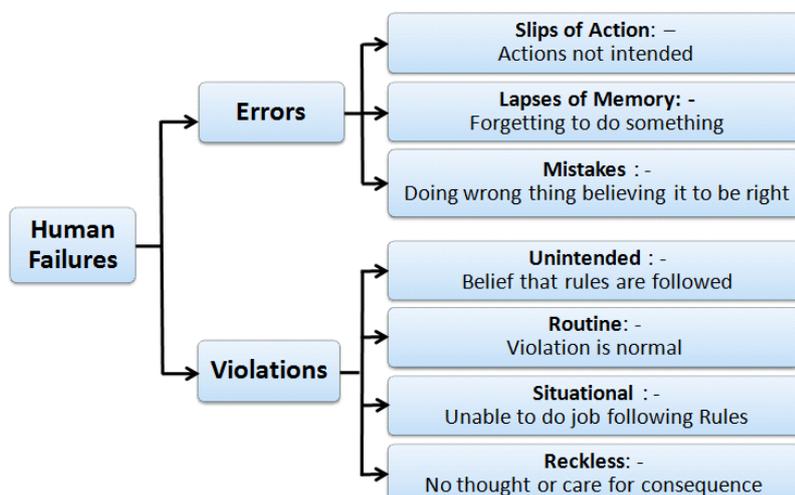


Figure 2 – Human Errors and Violations

Effective action to reduce track safety fatalities requires an understanding of how and why such accidents occur. Ultimately all such accidents occur from some form of human failure which may be classified as either errors or violations as shown in Figure 2. When errors occur, the rules are known. Violations occur when rules are, or should be, known. Generally violations occur as a result of the individual's working environment with reckless violations being a small proportion. Situational violations can be assessed by the substitution test which asks the question "Would other people in a similar situation do it the same way".

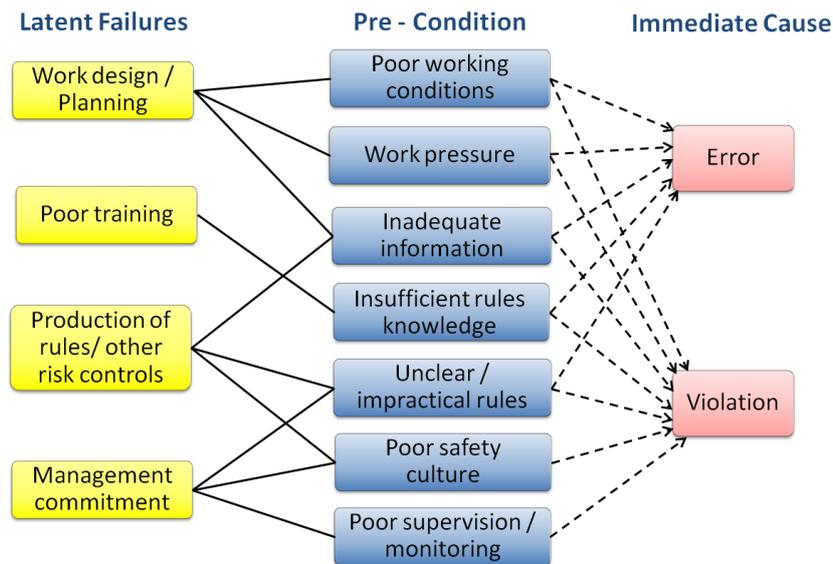


Figure 3 Suggested pre-conditions and latent failures of track safety incidents

Figure 3 is derived from TRIPOD Beta incident analysis technique which considers that errors and violations may occur as a result of the pre-conditions that arise from latent failures. Figure 3 suggests typical pre-conditions for track safety incidents and their associated latent failures. For example, the way rules are produced can influence safety culture if the workforce considers that rules are impractical and are produced to protect the management.

If track safety incidents are blamed on individuals, the opportunity to learn from them is lost. This point is made by the HSE publication "Reducing error and influencing behaviour" (HSG 48) which states:-

"Many accidents are blamed on the actions or omissions of an individual who was directly involved in operational or maintenance work. This typical but short-sighted response ignores the fundamental failures that led to the accident. These are usually rooted deeper in the organisation's design, management and decision making functions"

The extent to which individuals are blamed for such incidents is an indication of poor safety culture and indicates an unwillingness to accept management system deficiencies making it unlikely that the underlying causes of accidents will be addressed.

The Rule Book

Rule Book Scope

Track safety rules in the Rule Book are a Railway Group Standard. It is not clear why this should be the case as work on the track is directly controlled by Network Rail who as employer of its own employees or contractors has direct control of track work. Group Standards are only required for matters “which involve co-operation between two or more duty holders”.

The Rule Book that would seem to be the only Group Standard whose purpose and scope is not specified. Although prescriptive rules are required for real time operations, they are not always appropriate for planned activities. This is illustrated by the 1984 Morpeth train crash, the underlying cause of which rigid application of rules. The immediate cause of this crash was excessive speed through a 40mph curve. After a similar accident in 1969 “Morpeth magnets” were fitted at locations with severe speed restrictions to sound a warning which, if not acknowledged by the Driver, applies the brakes. Under rules for provision of Morpeth magnets, Morpeth north curve did not qualify for one due to progressive speed restrictions north of the curve. Had a magnet been fitted it is most likely that the 1984 crash would not have occurred.

In view of the above it is suggested that scope of the Rule Book should be “real time interaction between different members of the Railway Group”.

Rules and Risk Assessment

Rules are just one type of risk control and cannot be considered in isolation from other types of control measures. The Management of Health & Safety at Work (MHASAW) Regulations, introduced in 1992, requires employers to undertake a “suitable and sufficient risk assessment” to identify and record risk control measures and to review their risk assessments when significant changes occur. Track safety rules have evolved as part of the Rule Book and are produced by RSSB. Other track risk controls are Network Rail’s responsibility. This split responsibility does not provide the cohesive approach to risk controls implicit in the MHASAW Regulations. There would seem to be no risk assessment validating current track safety other risk controls or one to review adequacy of rules following the large increase in use of OTP in the 1990s.

Rules for Track Work

Track safety rules must control the interfaces between the operational railway and between different principal contractors with principal contractors are responsible for managing risk from their work. Table 2 shows Rule Book Modules or Handbooks applicable to work on the track, the scope of some of which is unclear, for example OTP movements are covered by both modules T11 and OTP. The term “Possession” is primarily concerned with train movements (the engineer has possession of to control of engineering train movements) and track safety rules for work on the open line are bolted on to provide a set of possession track safety rules. This can be confusing and results in some issues not being addressed.

Module / Hbook	Title	Commentary on rules applicable for AC lines possessions
AC	AC Electrified Lines	14 sections, only issue of OLE permit concerns the COSS
DC	Electrified Lines	
OTP	On Track Plant	OTP movements, on & off tracking, safe operation of OTP
T3	Possession of the line for engineering work	Issuing and withdrawal of permit to work for work requiring train movements
T11	Movement of engineering trains and on-track plant under T3 arrangements	Train & OTP movements once possession is set up. Does not include OTP movements into the possession from access points
HB1	General duties and track safety for track worker	
HB3	Duties of Lookout and site warden	
HB6	General duties of an Individual Working Alone (IWA)	
HB7	General duties of a Controller of Site Safety (COSS)	Very little relevant to T3 possessions which are not mentioned. Mandates the COSS form, most of which is not relevant to possessions
HB8	IWA, COSS or PC blocking a line	
HB9	IWA or COSS setting up safe systems of work within possessions	Explains how SSoW derived for open line are applied to possessions

Table 2 – Track Safety Rules

Control of possession risk

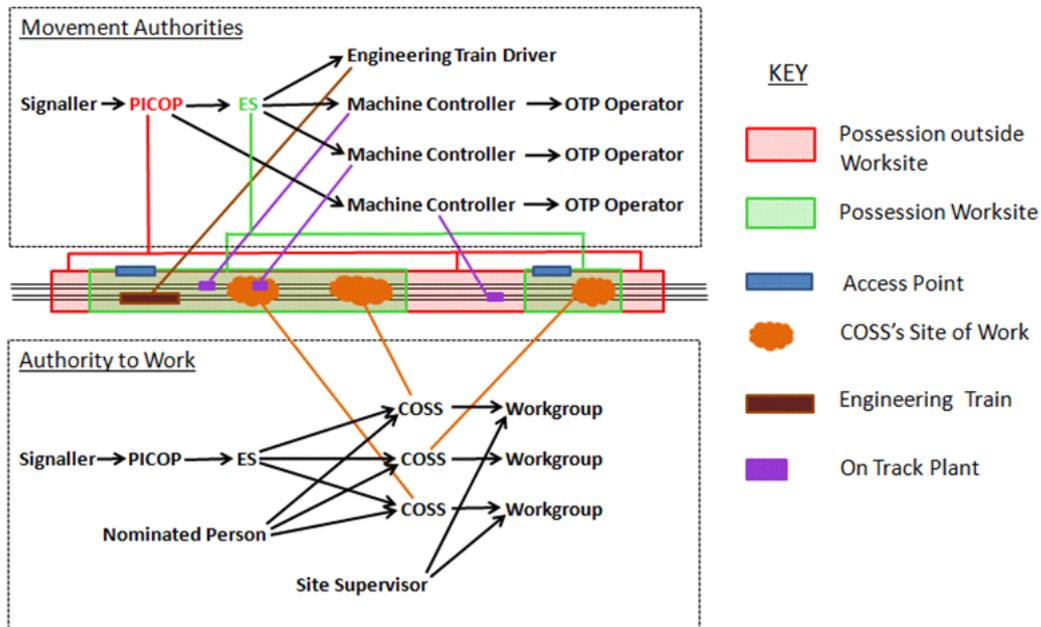


Figure 4 – Possession demarcation and communications

Figure 4 shows how a possession is demarcated and authority is given to start work and control train movements. With only one item of work the possession, possession worksite and COSS's site of work can be the same with one person undertaking the role of PICOP, ES and COSS. In a complex possession there may be many sites of work with large numbers of OTP operating. In such cases, it is essential that communications are no more complicated than they need be, the requirement for all

safety communications is clearly defined and everyone's role is clearly understood. It will be seen that this is not the case.

Issues with possession rules

- Maximum speeds in possession work-sites - A common misconception is that walking pace (recently defined as 5 mph) applies throughout the possession worksite. However section 3.2 of Handbook 9 makes it clear that this requirement only applies to the COSS's site of work. As OTP access points are an integral part of the engineering work, the possession worksite generally includes both the site of work and the access point. With OTP access points being typically 5 miles apart there is an average 5 mile round trip between worksite and access. As a result of this misconception, OTP will take an hour to make this round trip even though there may be no-one working in much of the worksite.
- Control of OTP movements - Rule Book module T11 requires the ES to authorise each move in a possession worksite. Whilst this is practicable for engineering trains which make relatively few moves, with hundreds of individual OTP moves in a possession work-site it is impossible for the ES to authorise each individual OTP move. Thus common practice is for the ES to delegate movement authority to the Machine Controller. This is not addressed by the Rule Book. A further issue is that OTP enters the possession sideways at access points. Arrangements for the ES to control of such moves are not defined in the Rule Book and the ES is expected to rely on memory to know the location of each item of OTP.
- Route setting in possessions – It is not uncommon for OTP and trains to run through incorrectly set points in possessions due to the route being incorrectly set. Sometimes this is due to the signalling interlocking being unnecessarily disconnected (e.g. it is not possible to run through crossover points with signalling interlocking operational). Points run-throughs in possessions would be significantly reduced if there was a defined process to set routes, as there is for a signal failure on open line. This would require those on site to have diagrams with the same information as the signaller's panel.
- Red zone working in possessions –Red Zone working using lookouts is a system of work to protect personnel from trains appearing unexpectedly at high speed. In a possession trains and OTP are controlled by possession personnel and are able to stop before reaching the workgroup. Thus this is an inappropriate use of a rule suitable for work on the open line in a possession. Instead rules should take account of the practicalities of possession working (e.g. communication between a Machine Controller and COSS in the site of work).
- Issue of isolation permits to COSSs – The requirement to issue isolation permits to COSSs does not take account of the role of the ES to authorise COSSs to start work in a possession worksite. As a result more isolation permits are issued that is necessary.

Issues with other risk controls

- Situational awareness – The workforce must have a situational awareness of all aspects of the possession. This is particularly important for project workers whose work requires them to be mobile, unlike maintenance staff. Other than at complex locations, diagrams are an effective way of providing such awareness especially as possession limits are specified in different ways as

shown in table 3. There is however no specification for possession diagrams or any process to provide employees or contractors with the information needed for them (e.g. location of signals). In this respect Network Rail does not meet its Client obligations under the CDM Regulations to provide safety information that in its possession. Thus various parties produce their own diagrams from surveys, local knowledge etc. Figure 5 is an example of such a diagram produced by a possession management contractor. Network Rail has a Geographical Information and Asset Information systems which, if integrated, could produce such diagrams at the click of a mouse.

Limit	Specification of Possession Limits
Possession	Signals and / or points numbers
Possession work-site	Mileage
COSS's Site of Work	As agreed with ES, not documented
Isolation limits (AC)	OLE mast numbers
Access points	Mileage

Table 3 – Specification of possession limits

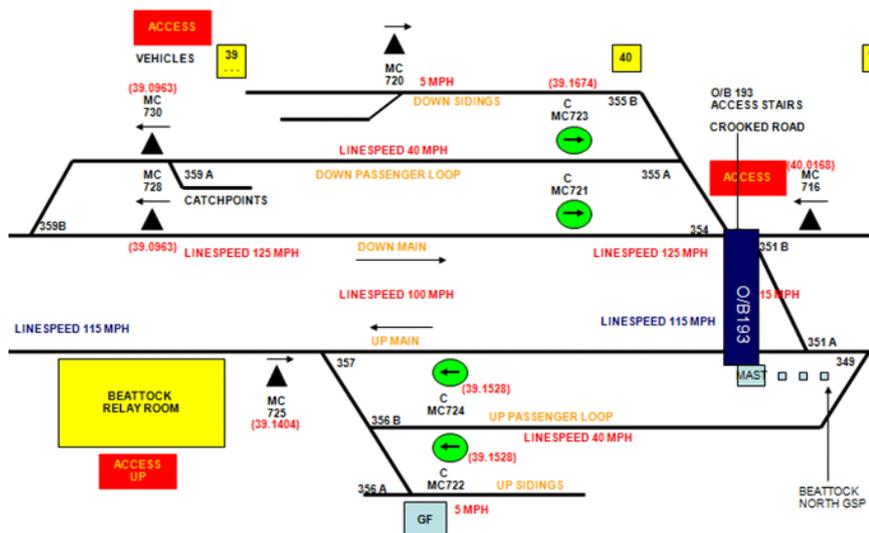


Figure 5 – Example possession management diagram

- Controller of Site Safety - A COSS must have the competency to establish one of many different SSoWs. On the open line this is a demanding role. However in an all lines blocked possession, it is relatively straightforward as the SSoW has, in effect, already been established. Many COSSs only work in all lines blocked possessions but to do so they must have the full range of COSS competencies. This wastes significant training investment and presents a risk as the COSS's competence to set up open line SSoWs will only be retained if practised regularly. With the lack of an all lines blocked possession COSS competency, it is not feasible for many who supervise work in possessions to be a COSS. As a result possession workgroups often have both a COSS and site supervisor responsible for their site safety.
- Facilities for PICOPs / ESs – Although simple possessions can be managed from a van by PICOPs and ESs who know their area, complex possessions present a challenging task. To optimise engineering and train access, a large amount of work may need to be done in possessions. The challenge is to provide systems and facilities to ensure such possessions are

managed safely. Such facilities could include an office, magnetic marker board with diagram and forms to track movements and on / off tracking. In a trial that provided such facilities, one ES stated “I’d rather control a complex work-site with facilities like this than a simple work-site from the back of a van.”

- Access points - As typically there can be miles between an access points and the site of work, movement of personnel and plant over this distance is a safety and productivity issue. Opportunities to provide access points as part of a project are often lost as there is no standard requiring project designers to consider access points. This is unfortunate as access points can often be provided a minimal cost if specified at start of design stage, rather than being given to the contractor as a variation. Failure to consider safe access is a breach of the CDM Regulations designer’s obligations. In this respect a designer is anyone whose specification affects project design (e.g. project sponsors). Network Rail’s standard for technical approval of civil works does not refer to CDM designers responsibilities. A minor addition to the Form A specified in this standard could ensure safe access is considered.
- Authority to work communications – To minimise risk and reduce possession set up times communications need to be as straightforward as possible. Figure 6 below demonstrates the unnecessary complexity of current arrangements compared with those if the issue of isolation permits and COSS competency suggestions in this paper were to be adopted.

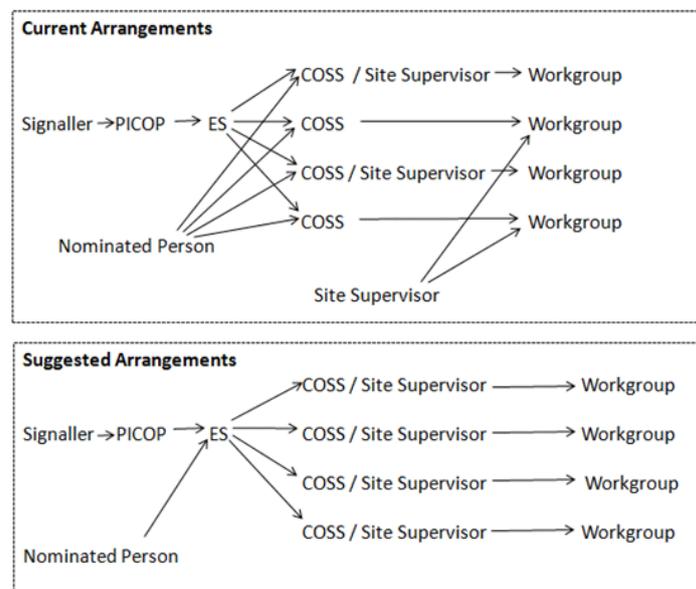


Figure 6 – Current and proposed possession communications

Requirement for a Possession Handbook

Possession rules have evolved from the need to control train movements with other rules “bolted on” in an ad hoc manner. They need to be better presented and enhanced to cover issues not addressed. A possession safety handbook could deliver this requirement and be provided relatively quickly as there is little requirement to change existing possession rules. The starting point for such a guide must be the requirements of the work rather than train movements. This is an evolutionary approach which minimises the training impact of rules changes on the many who work in possessions. It is likely that a possession handbook would be well received as were previous PTS & COSS handbooks.

Work on open line

- RIMINI (risk minimisation on track) – The RIMINI process introduced in 2001 created a culture of planning for work on the track and so was perhaps single greatest track safety improvement in track safety over the past 10 years. It did however create a large amount of repetitive paperwork for the COSS due to requirements of both the Rule Book and Network Rail standards. This is an example of the lack of a cohesive approach to risk controls. There is no RIMINI hierarchy for T2 protection, this could reduce risk as T2A / T2D applied on site is less prone to human error and requires less staff on site than placing detonator protection a mile away. Perhaps most significantly, 9 years after RIMINI introduced, there is no process to provide the required information about location of signals etc required for planning.
- Lookout operated warning systems (LOWS) – Where they are required, lookouts account for more than half the fatalities. The risk faced by Lookouts is greater than other track workers and may be intolerable. This is partly because Lookouts must have line of sight the workgroup and approaching trains and so must be close to the track. When walking along the track it can be impossible to always comply with the requirement to be in a place of safety. As LOWS does not require the lookout to be in sight of workgroup it reduces the need for lookout to be close to the track and eliminates the need for a lookout chain (site, intermediate and distant lookouts). Widespread use of LOWS would reduce risk to lookouts and provide cost savings. Although there have been some trials, use of LOWS is minimal with the systems used being cumbersome and not practicable for mobile worksites. There is a need for Network Rail to take the lead in developing such systems.
- Track circuit operating devices (TCOD) – A TCOD is a clip which applied to both rails at the worksite to activate the track circuit and put signals to danger. Most T2 protection is by detonator protection that is typically applied over a mile from the worksite. Using a TCOD to apply protection on site eliminates the need for someone to place detonator protection and the resultant risk of miscommunication. It also reduces T2 setup time and so increases opportunities for Green Zone working. However despite their benefits TCODs are not widely used although they are popular with those who use them. This is due to type approval issues and it being unclear where they can be used (the provision of such information is a CDM client duty). The use of TCODs should be promoted and an equivalent developed for use with axle counters.
- Trackside facilities – The most effective way to minimise risk is to eliminate the requirement for an individual to be on track. If this is not possible, technology should be used to minimise the risk of human error. This could be done by:
 - Additional access points to minimise time walking along the track
 - Track warning systems at locations requiring frequent work (e.g. junctions) eliminating the need for lookouts
 - Fixed TCODs – A fixed switch that operates a track circuit on site
 - Lockouts that enable those on site to keep signals at danger – new bi-directional signalling requires lockouts, or an alternative system, to ensure track worker risk is not increased.
 - Remotely operated designated earthing points required for isolations

The above also provides productivity improvements. Although there are potentially significant costs associated with the provision of such facilities, if provided as part of a project their cost may be

minimal if specified at outline design stage. At some locations there may be a justification for a stand-alone project to provide such facilities. There is therefore requirement for a strategy for the provision of trackside facilities which needs to be incorporated into relevant standards. This would deliver CDM designers obligations to consider safety of those on track.

Conclusions

Business benefits

Although this paper is primarily concerned with reducing risk to track workers, many of its suggestions offer business benefits. The importance of this is shown by the ORR's 2009/10 efficiency assessment which concluded that Network Rail's infrastructure work is 34% to 40% less efficient than European railways and that one reason for this is the way possessions are carried out. Efficiency improvements in this paper include:

- OTP travelling at an appropriate speed in possession worksites
- Reduction in travel time between access and worksite in possessions
- Improved possession set up times from simplified communications
- Reduction of costs of points run-throughs in possessions
- A possession COSS competency eliminating the duplication of site supervisor and COSSs
- TCODs eliminate requirement for an individual to place detonator protection
- Trackside facilities that eliminate or reduce requirement for personnel to go on track
- LOWS eliminating the need for lookout chains

Lack of progress

Despite report recommendations and initiatives over many years there have been few improvements to track safety risk control measures. For example, the RSSB report into fatal On Track Plant accident at Hednesford in 2004 "a review of module T3 and T7 of the rule book should be undertaken to establish safe systems of work which accommodate multiple activities and train movements within worksites." This has yet to be undertaken. Also the Rail Accident Investigation Branch bulletin on the Kentish Town 26.10.09 possession incident notes that its recommendations from the similar Acton 24.6.08 incident have yet to be implemented

Barriers to progress

The lack of progress on issues in this paper is a function of organisational culture and the way risk controls are produced. The following barriers to progress need to be addressed if necessary improvements are to be obtained. .

- Rules culture – The rail industry has a strong culture of rules compliance. This is a great strength but can result in a blame culture that considers an individual to be solely responsible for rule breaking. This does not allow for genuine mistakes and the nature of the poor working environment and so masks the need to improve risk controls.
- Organisational culture – The first step in any process improvement is acknowledgement of a problem. This requires a culture that is willing to openly identify problems. Following concerns expressed by the ORR and Network Rail's own members it is now accepted that, for at least 5 years, hundreds of Network Rail's minor accidents (around 70% of total RIDDOR reportable

accidents) have not been reported. This is indicative of an organisational culture that does not encourage identification of problems.

- Risk not understood - Track safety incidents are currently classified as irregular working which does not show the nature of the risk (e.g. the high level of risk to which Lookouts are exposed). Thus suitable performance track safety indicators are required. With large numbers of accidents and incidents not being reported as described above there is a requirement for Network Rail to ensure it has robust arrangements to record all incidents and identify lessons learnt from them.
- Acceptance of risk of change – Although no individual has responsibility for the deficiencies identified in this paper, any improvements to rules or other risk controls requires an individual to be responsible for the change. This can create a reluctance to accept any risks, even if these are outweighed by benefits of the change, thus perpetuating the status quo.
- Production and change of track safety rules – Track Safety Rules are produced by the RSSB's Traffic Operations and Management Subject Committee that has only 3 of its 18 members working for Network Rail. This committee is primarily concerned with real time train operations rather than planned engineering work. The RSSB standards code requires that any rules change requires extensive stakeholder communication which can take up to 2 years. The process to produce track safety rules is therefore not appropriate. In particular there is no justification for RSSB producing track safety rules for which Network Rail has legal responsibility.

Way forward

The pre-requisite for real track safety improvement is removal of the barriers to progress. For this reason this paper makes only two recommendations:

- Network Rail, as the responsible employer, should take ownership of track safety at Director Level to ensure a cohesive approach to rules and other risk controls, a culture that encourages safety improvements and a strategy for provision of track safety assets and systems.
- Network Rail's track safety improvement programme must be based on risk assessment, legislative requirements, issues in this paper and incorporate lessons from previous initiatives

And finally - Do rules keep track workers safe?

Yes - rules do control the risk to track workers. They are generally fit for purpose, enshrine much good practice and in most situations provide a robust safe system of work.

But – they are presented in a manner that is not easily understood and do not address some issues. Other risk control measures also need to be improved. Unless this changes, the risk to track workers will remain at the upper limit of tolerability and productivity will continue to be unnecessarily reduced

Any comments on this paper or requests for further clarification would be welcomed. I can be contacted at dshirres@blueyonder.co.uk.

Attachment 1 – Fatalities struck by train due to failure of SSoW 1990 to 2009

Date	No Killed	Location	Person killed	SSoW	DETAILS
09/01/1990	2	Langbank	Worker	Red Zone - Lookout	Struck by train whilst working on OLE
23/01/1990	1	Nutborne LX	Worker	Red Zone - Lookout	Struck by train
10/02/1990	1	Wamphrey & Beattock	Blockman	T3 Set Up	Struck by train whilst preparing for a possession
20/03/1990	1	Runcorn Viaduct	Worker	Red Zone - Lookout	Struck by train whilst working on OLE
03/07/1990	1	Marsh Bolton	Worker	None	Struck by a train whilst walking in the 4-foot as he returned from his mealbreak
03/10/1990	1	Rugby	Worker	None	Struck by train whilst using unaccustomed walking route
12/10/1990	1	Aldwarke	Worker	T3	Struck by train in a possession
01/11/1990	1	St Clears	Lookout	Red Zone – IWA / Mobile	Struck by train whilst acting as lookout for patrolling gang
06/11/1990	1	Dullingham	Worker	Red Zone - Lookout	Struck by train
18/11/1990	1	Pelaw Junction	Worker	T3	Struck by flailing machine in a possession
18/01/1991	3	Edge Hill	Worker	None	Struck by train leaving depot whilst responding to a fault
27/01/1991	1	Wimbledon	Worker	T3	Struck by train carrying out shunt move in a possession
14/02/1991	1	Forth Bridge	Worker	Red Zone - Lookout	Struck by train
13/05/1991	1	Southall	Worker	Red Zone - Lookout	Struck by train
11/06/1991	1	West Byfleet	Worker	Red Zone - Lookout	Struck by train
18/07/1991	1	Arnside Viaduct	Worker	Red Zone - Lookout	Swept away whilst walking across apron of viaduct
20/10/1991	1	Leyland	Worker	Red Zone - Lookout	Struck by train
21/01/1992	1	Northchurch Tunnel	Worker	Red Zone - Lookout	Struck by train
31/08/1992	1	Midcalder	Worker	T2/3 adjacent to Open Line	Hit by train on adjacent line
07/03/1993	1	Forth Bridge	Worker	Red Zone - Lookout	Struck by train
07/03/1993	1	Napsey	Worker	T3	Struck by train in possession
17/03/1993	1	Pevensy	Worker	T3	Struck by train in possession
14/07/1993	2	Faversham	Worker	Red Zone - Lookout	Struck by train
12/12/1994	1	Trent South	Worker	Red Zone - Lookout	Lookout sounded warning but did not move to a place of safety and was struck by the train
31/03/1995	1	Colwich	IWA	Red Zone – IWA / Mobile	Engineering Supervisor struck by train. There was a T2/T3 adjacent to Open Line
19/09/1996	1	Sproughton (Ipswich)	Worker	Red Zone - Lookout	An OLE Lineman struck by 1P90 running under Single Line Working over Up line. Person acknowledge whistle from train but failed to move out of way. Lineman had no reason to be in this location at the time
10/03/1998	2	Ebbw Jcn	Worker	Red Zone - Lookout	Gang working on two sets of points. Although lookout sounded two men working on one set of points did not move to a place of safety and were struck by the train.
03/11/1998	1	Darlington North Rd	IWA	Red Zone – IWA / Mobile	Worker struck by train: P/Wayman stepped in front of train at Haughton Road bridge and was struck by it.
09/05/1999	1	Edge Hill East Jcn	Worker	T3	Tamping supervisor engaged in tamping operations on down fast line was struck by 7L42 making a propelling move on up fast line. Work was within possession

20/05/1999	1	Stafford	IWA	Red Zone – IWA / Mobile	Patrolman struck by train whilst he was lubricating points.
09/10/2000	1	Vauxhall	Blockman	T3 Set Up	Worker struck by train - Sent to place possession protection
10/10/2000	1	Bradford Mill Lane Jcn	Lookout	Red Zone – IWA / Mobile	Lookout struck by train. The team of three were replacing a broken fishplate under a red zone.
18/07/2001	1	Purley Oaks	Lookout	Red Zone – IWA / Mobile	Lookout for a group who were undertaking Ultrasonic testing struck by a train. A converging space between adjacent tracks was used as a place of safety without a safe limit being marked
10/08/2001	1	Desborough	Worker	T2/3 adjacent to Open Line	Worker struck by train. Considered that adjacent open line was blocked (CC). No safe system to cross adjacent open line
28/10/2001	1	Waterloo (Main)	COSS	Red Zone – IWA / Mobile	PWay COSS struck by train. He crossed over three other lines to No. 1582 points which were outside of the protection of which he was the C.O.S.S. and in the process of giving up for no obvious reason.
19/12/2001	1	Hitchin	Worker	None	One of a group of 3 Jarvis S&T staff walking on the track was struck by train when he strayed into its path. No Safe System of Work, getting access to signalling locations not properly considered
20/06/2002	1	Cheddington	Worker	T2/3 adjacent to Open Line	Crossing open lines to get to a possession. Acknowledged train on Down Slow and was struck by train on Up Slow
23/02/2003	1	Chelford	Worker	T3	Train moved with an RRV not clear. Contractor crushed between back of wagon and RRV jib
28/09/2004	2	Hednesford	Worker	T3	Two personnel working with a Long welded rail train were hit by a RRV
05/04/2005	1	Newbridge Jcn (Bathgate Line)	Lookout	Red Zone – IWA / Mobile	Lookout struck by train Lookout standing in 4 foot of Bathgate branch, seems to have assumed approaching train was routed on Glasgow main line
11/06/2005	1	Acton Main Line	Worker	T2/3 adjacent to Open Line	Got off train to clear equipment away from adjacent open line
26/10/2005	1	Trafford Park West Jcn	COSS	None	COSS for ATWS installation and two others were stood in the Down cess. There was a requirement to look at Trafford Park East junction so the COSS and one other crossed to the Up side to six foot between the Arrival and Departure roads, close to the Up line. 1L13, 0852 Liverpool Lime Street to Ely Central Trains service passes the site on the Up, striking the COSS.
29/04/2007	1	Ruscombe Jnc	Worker	Red Zone - Lookout	Struck by empty coaching stock as it changed route - victim was carrying out welding and did not move clear
29/11/2007	1	Reading	Blockman	T3 Set Up	PICOP's Assistant struck by train during giving-up of possession.
12/07/2008	1	Rugby	Machine controller	T3	MC crushed between machine and wall when driver lost sight of him
02/12/2009	1	Whitehall Jnc, Leeds	Lookout (distant)	Red Zone - Lookout	Distant lookout - died of his injuries after being struck by empty coaching stock.