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**Information and Intelligence Needs Analysis to
guide the development of Human factors and
SMS strategy for HMRI**

HSL/2006/27

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EXECUTIVE SUMMARY

Objectives

The primary aim of the work was to support Her Majesty's Railway Inspectorate (HMRI) topic strategists for Human Factors and Safety Management Systems in the development of strategies. The work was to involve a review of the various information and intelligence sources published by and about the rail industry to identify whether these provide sufficient material to identify areas for setting future priorities. In the event that this was not the case to then develop a recommendation on the process for prioritised targeting of risk control.

The objectives were:

- Information and Intelligence Needs Analysis:
 - Identify the various information sources and collate;
 - Develop a framework for their analysis;
 - Carry out a first level analysis of sources;
 - Summarise the various information sources in terms of human factors and safety management systems content.
- Stakeholder evaluation;
- Make recommendations on rail industry performance indicators;
- Prepare report.

Main Findings

The UK rail industry collects a wide variety of safety performance measures. This project involved a review of the multitude of information sources to identify whether they could be used as a guide for the development of the HF and SMS strategies. This step involved the identification of the various information sources and carrying out a first analysis of these to identify whether HF and SMS factors are contained within these. In the main, causal factors were not identified within the various information sources, in fact the only reports containing meaningful data for this project were the investigation reports (either those authored by HMRI, RSSB, and LUL).

As such the various data sources do not identify industry priority needs in terms of Human Factors and Safety Management Systems. Therefore an alternative approach was proposed to help inform HMRI on priorities and decision-making, and a stakeholder evaluation of the acceptability of this method was carried out.

Recommendations

- HMRI, LUL, RAIB and RSSB investigation reports could ‘tentatively’ be used as a key information source.
- These reports could then be used to identify key topic areas, with expert judgement used to identify a manageable number (~ 10) of issues in terms of Human Factors and Safety Management. Experts groups formed from HMRI/ORR, technical, policy and operational.
- These issues could then be prioritised following consultation with operational stakeholders to ensure that pertinent areas are being addressed to avoid duplication of effort and identify where most benefit can be secured.
- It would be wise to further explore whether improvement in the quality of incident investigations would be valuable and achievable.

1 INTRODUCTION

The primary aim of the work was to support HORNET topic strategists in the development of strategies in the areas of human factors and safety management within the rail industry. The work was to involve a review of the various information and intelligence sources published by and about the rail industry to identify whether these provide sufficient material to identify areas for improvement, as well as provide a benchmark such that strategic changes can be monitored.

The UK rail industry collects a wide variety of safety performance measures. This project involved a review of the multitude of information sources to identify whether they could be used as a guide for the development of the Human Factors and Safety Management System strategies. This step involved the identification of the various information sources and carrying out a first level analysis of these to identify whether HF and SMS factors are contained within them.

The objectives were:

- Information and Intelligence Needs Analysis:
 - Identify the various information sources and collate;
 - Develop a framework for their analysis;
 - Carry out a first level analysis of sources;
 - Summarise the various information sources in terms of human factors and safety management systems content.
- Stakeholder evaluation;
- Make recommendations on rail industry performance indicators with the intent being to track improvements in the management of human factors and safety management;
- Prepare report.

The work was devised to be a 'fit for purpose' review to be completed under short timescales. Hence the intention was not to perform a rigorous and detailed analysis of the various data sources available but to carry out a high level analysis of the data sources and identify whether they could be used to guide the development of strategies for human factors and safety management systems.

2 DATA SOURCES

A wide variety of information sources were identified in consultation with HMRI. Efforts were made to ensure that the material collected represented the whole industry, including infrastructure controllers, mainland rail, metros and light rail from a range of sources including individual companies, Rail Safety and Standards Board (RSSB) and Health and Safety Executive (HSE). Most of these sources are either submitted to HSE or are publicly available on the Internet so could readily be obtained. The documents reviewed included:

- Incident reports;
- Incident investigations;
- Formal inquiry reports;
- Signals Passed at Danger (SPAD) reports;
- HSE inspector investigations;
- Various logs of operational incidents and events (Network Rail (NR), London Underground Limited (LUL) and Channel Tunnel Rail Link (CTRL));
- Various risk-based publications from RSSB on Safety Risk Model (SRM), Predictive Indicator Model (PIM) and Safety Management Information System (SMIS);
- Various annual reports on safety.

Appendix 1 outlines the various documents identified and their respective sources. RIDDOR reports could not be reviewed due to the HSE programme of rationalising databases across the organisation. A decision was made that RIDDOR data would not significantly inform the analysis but that the data is the basis for a number of HSE reports, which were reviewed.

Efforts were made to ensure that material was gathered from the full range of sectors regulated by HMRI from mainline rail companies, such as Network Rail and the Train Operating Companies, to Metros (e.g. London Underground and SERCO Metrolink) and Heritage companies. Depending on the source and the availability of material the documents spanned the time period from 2000 to 2005; wherever possible the most recent sources were sampled.

The documents obtained were reviewed and summarised and a précis of these are shown in Appendix 2. For each document the title, author, periodicity of the document and the source of the document is presented, along with a summary and a comment about whether the document contains useful content on human factors or safety management systems. From this initial review it can be seen that few of the documents contain material on either human factors or safety management.

The most useful documents are:

- Safety and Environmental Assurance Report authored by Network Rail (currently being reviewed and updated by NR). The existing format provides an overview of safety headlines, and also covers Key Performance Indicators (KPIs) which cover HF/SMS issues such as Safety Critical Communications and Time Exceedances.

- Incident Investigation reports are authored by RSSB, HSE and LUL (those reviewed in this study) and provide useful depth information on root causes. The information is not systematic and fails to provide trend information but provides a useful indicator on two levels – the first being in terms of the quality of the investigation and whether root causes are robustly identified; and the second highlighting particular topics for examination.
- The Annual Safety Performance Report, published annually by RSSB provides an annual summary of the performance of the Network Rail controlled infrastructure in terms of fatality and injury rates, accident rates and occurrences of accident precursors. It provides headline performance figures for the rail industry and includes: changes to the Predictive Indicator Model (PIM), trend data, major injury data and strategy for improvements and the actions required of railway group members. There is some HF/SMS content in terms of professionalism and competence, as well as safety culture and training issues.
- RSSB also publish an annual summary of Formal Inquiry Recommendations. This provides a useful précis of the areas that formal inquiries believe would prevent the recurrence of specific incidents. In particular, issues such as rules, standards and instructions, infrastructure asset assurance, and competence management are highlighted. Whilst this does not provide trend data it provides a useful indicator in terms of the suitability of recommendations, as well as the industry's timely resolution of key issues.

Due to the high level of safety reporting across the rail sector it is worth commenting that the majority of the HSE-published material is a reworking of industry data so it was decided that it would be better to use the original data. One exception is the HSE reports on heritage railways whose incidents are not reported by the Rail Safety and Standards Board. RSSB reports have the advantage of an internal understanding of the rail sector and provide a level of explanation and analysis for certain trends.

3 DATA ANALYSIS

The next phase of the work was to analyse the data to identify any patterns in the data relating to Human Factors and Safety Management Systems. As discussed in the previous chapter the majority of the information sources did not provide data on human factors or safety management as root causes of the incidents, hence the sample selected is not large and furthermore many of the root causes could not be robustly identified.

3.1 DEVELOPMENT OF HUMAN FACTORS AND SAFETY MANAGEMENT SYSTEMS FRAMEWORK

Some of the data did provide HF and SMS material and hence a framework to categorise this was required. The first step prior to this analysis was to develop a framework for analysing the incident data. A wide range of frameworks and models were considered in the development of the framework, including TRACER (Shorrock & Kirwan, 2002; RSSB, 2005), SMIS (RSSB, private communication), Signal Passed at Danger Data Collection Form (RT3252/B), Reason's latent and active causes (Reason, 1990, 1996). A bibliography of other documents consulted is included in the references section. However when the data was referred to it was found that these models were all too complex and that they would not inform the analysis, hence a simpler framework was adopted based on HSE's publications – HSG48 (1999) and HSG65 (1997). The mindmap presented overleaf is pragmatic and is initially based around:

- Incident Detail – nature of outcome and its severity, potential consequences
- Type of incident e.g. maintenance error, equipment problem
- Who was involved e.g. driver, trespasser etc
- HF/SMS issues:
 - Organisation e.g. poor work planning, work patterns, supervision etc.
 - Technical factors e.g. power failure, maintenance system failure;
 - Individual e.g. competence, personality, risk perception;
 - Job e.g. task, workload, and procedures.

When using the mindmap model an incident was initially categorised according to whether it was a near miss or an actual event. The nature of outcome was coded as injury, damage or disruption; the severity of the incident was coded as high, medium or low; and finally the potential consequences were coded as high, medium or low. The incident was then coded according to what happened, such as whether the incident was a maintenance error or a possession problem etc.; and then by who was involved, this may have been the driver, signaller etc. Following these basic factual classifications if further information was available from the incident record expert judgements were made to categorise the human factors issues. These were grouped into four main areas, which were: job, individual, organisational, and technical factors.

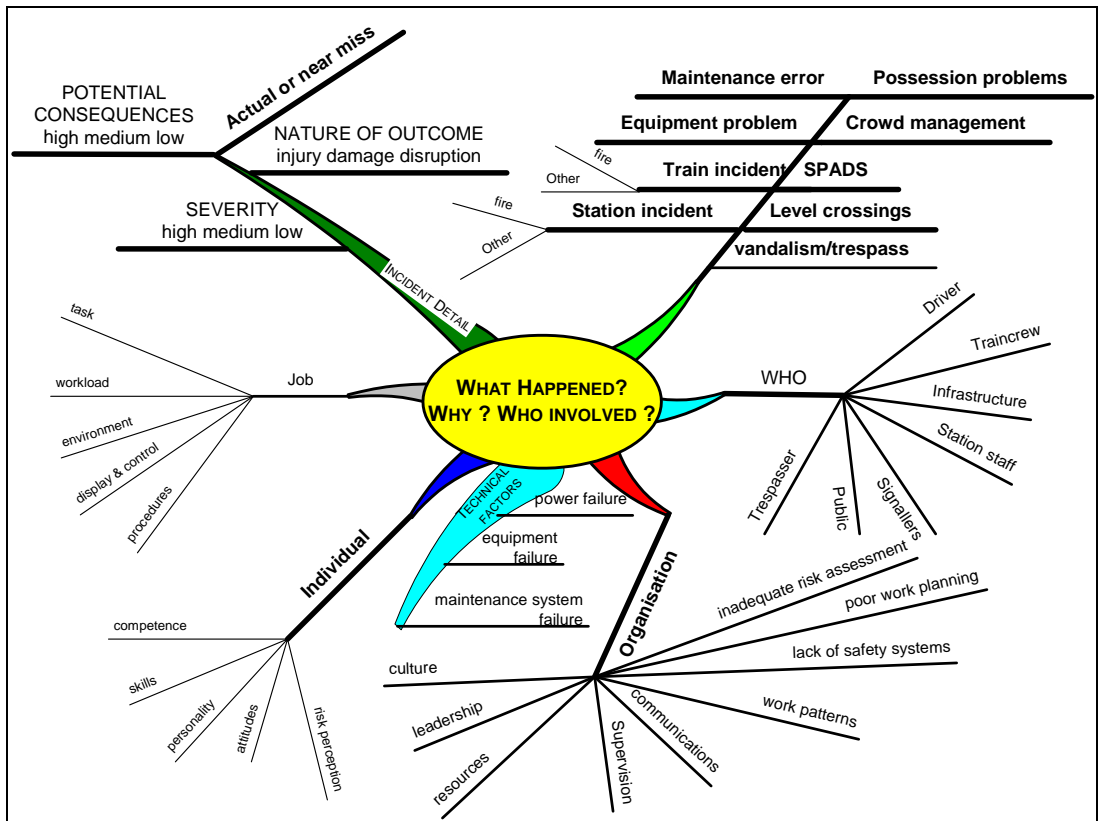


Figure 1: Framework for analysis of the Data sources

3.2 OUTCOME OF DATA ANALYSIS

The data were analysed using an Excel spreadsheet based around the framework shown in Figure 1. The following charts are based on the data entered. The majority of the data comes from Network Rail and HSE published material.

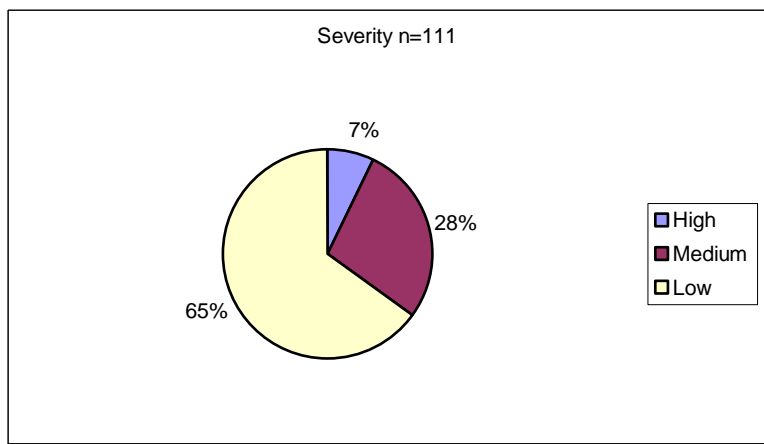


Figure 2 – Severity of incidents

The majority of incidents (65%) were judged to be of low severity. It is worth noting that signals passed at danger in the main are reported as being of low severity, in particular due to the risk mitigation afforded by Train Protection and Warning System (TPWS).

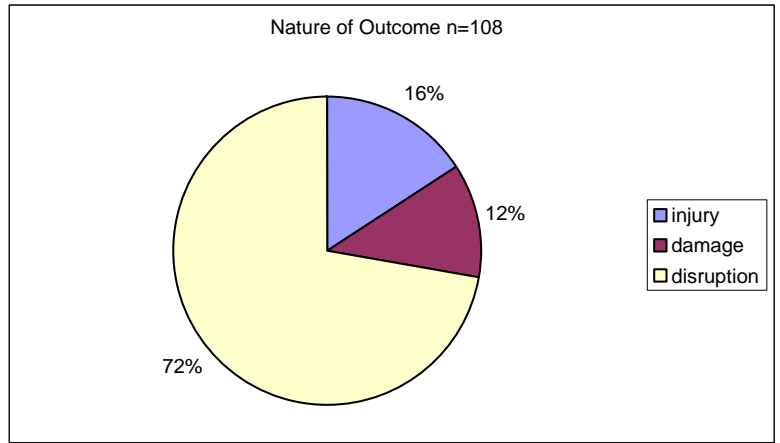


Figure 3 – Nature of Outcome

The majority of incidents (72%) resulted in disruption, again many of these were SPADs where the main consequence of the incident was disruption to the service.

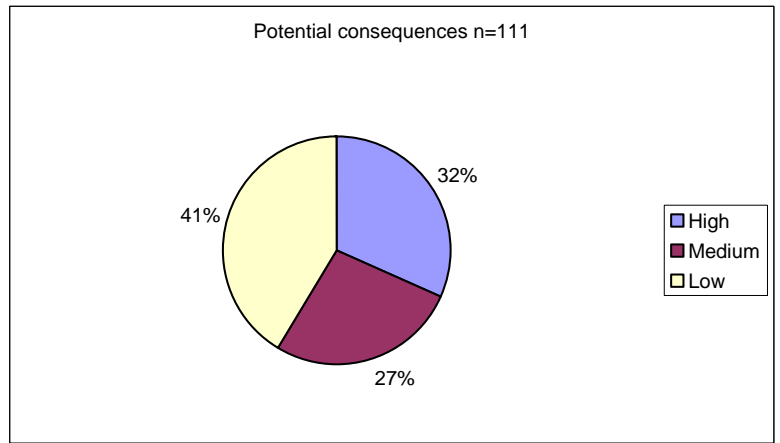


Figure 4 – Potential consequences of Incident

41% of incidents were judged to result in potentially low consequences.

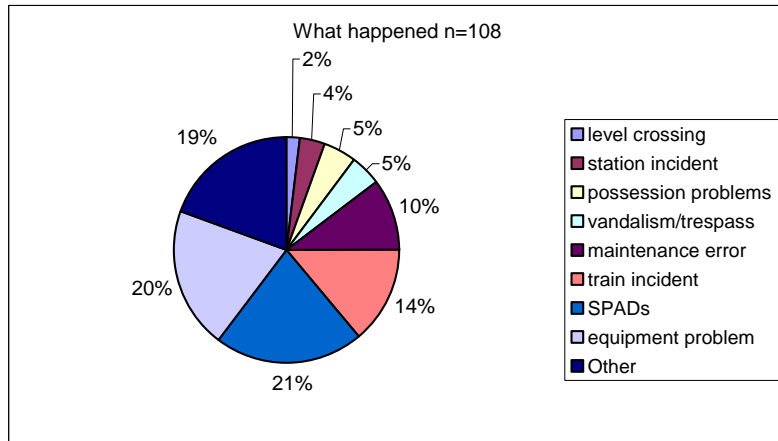


Figure 5 – Type of Incident

Over half of the incidents (total 60%) were caused by either SPADs, equipment problems or Other. However, it is possible that this is a data anomaly as these types of incident are more likely to be subject to rigorous investigation and are therefore more likely to be present in this data.

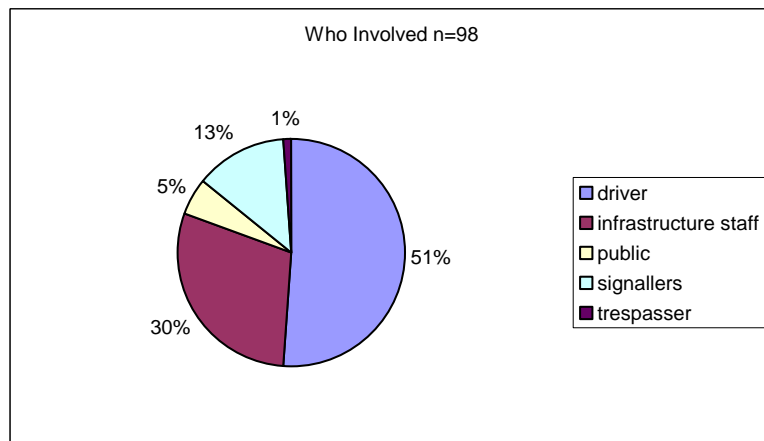


Figure 6 – Individuals involved

Just over half (51%) of incidents involved the driver, with a further 30% of incidents involving infrastructure staff. Since SPADs are the primary incident represented it is to be expected that drivers would represent such a large proportion.

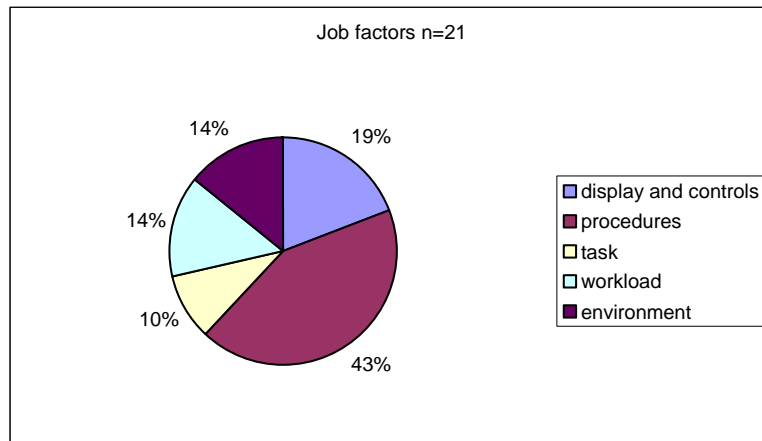


Figure 7 – Job factors

The most commonly implicated job factor was procedures, implicated in 43% of incidents, followed by displays and controls in 19%. However only about a fifth of incidents provided information on job factors, therefore this is not a significant finding.

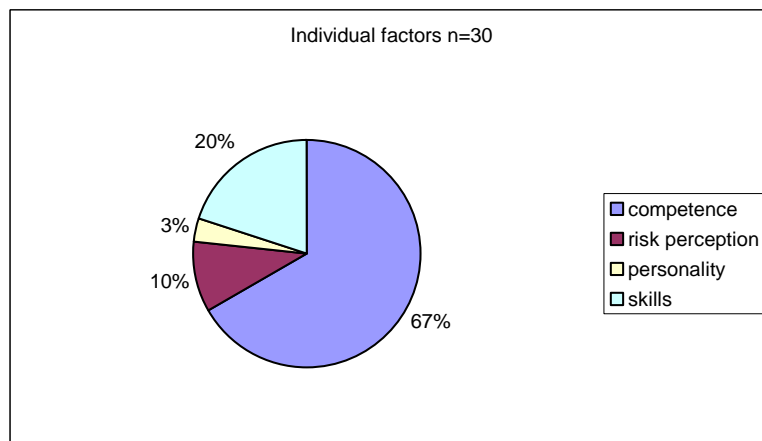


Figure 7 – Individual factors

The majority of incidents where a root cause was attributed to individual factors were judged as being a question of individual competence (67%). Again a note of caution should be expressed as less than a third of the incidents analysed cited individual factors as the incident root cause.

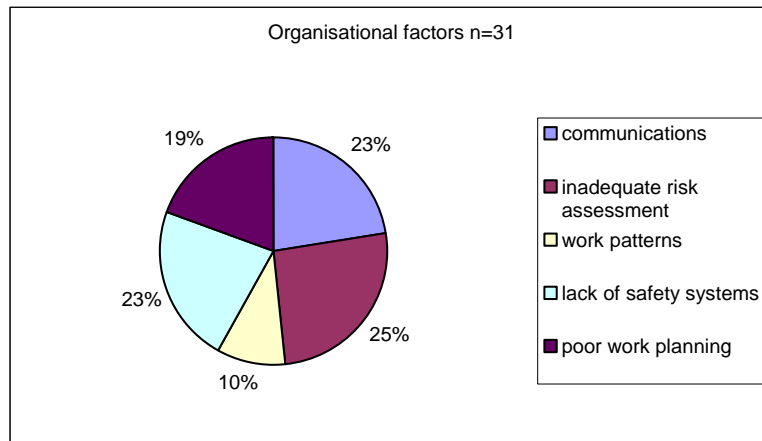


Figure 8 – Organisational Factors

The majority of incidents implicating organisational factors were judged as resulting from an inadequate risk assessment (25%), followed by a communications issue (23%). Again a note of caution should be expressed as less than a third of the incidents analysed cited organisational factors as the incident root cause.

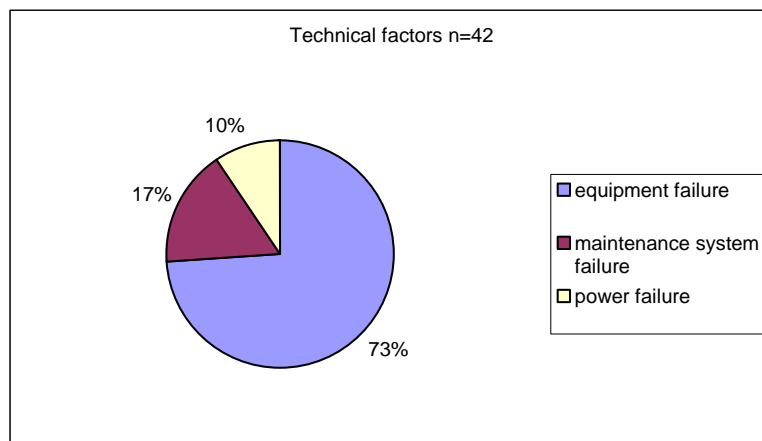


Figure 9 – Technical factors

The major contributory technical factor was equipment failure, contributing to 73% of technically based incidents.

3.3 SUMMARY OF THE DATA ANALYSIS

Only a small sub-set of the information sources could be analysed using the simple HF/SMS framework. The data came from NR and HSE sources – many of these were HSE investigation reports, SPAD reports or other incidents that the industry considers sufficiently severe to warrant some analysis. As such the data is biased towards the more severe incidents, as these are likely to be the ones that have been analysed in sufficient depth to provide any root cause data. A further note of caution needs to be applied in that equipment failure and environmental factors are commonly used as root causes, however the factors underlying these are not robustly interrogated. Hence for example equipment failure could be as a consequence of poor design,

inadequate manufacture, not fit for purpose, lack of maintenance, maintenance error etc. and the investigations typically fail to identify their role.

A number of 'railway culture' type factors emerge from the review of this data. Namely that drivers are held responsible for many of the incidents in which they are involved. This is particularly prevalent as SPADs make up such a large number of the incidents within the sample analysed. It is unclear whether the trend to hold drivers responsible is increasing or decreasing in light of the better understanding of the role of human factors in the causation of incidents. For example SPAD investigations now also consider track layout and signal sighting, signaller mistakes and expectation of drivers. Cultural factors also emerge in that competence is also used as a underlying factor, without seeking further explanation of why competence could be deemed inadequate, or what systemic failures could be involved.

Higher-level organisational factors (e.g. culture, leadership, resources and supervision) are not attributed as root causes to the incidents reviewed. This is perhaps indicative of a tendency to attribute individual and technical failures as the root causes and failing to interrogate further and identify root causes of the individual and technical failures where appropriate. This finding holds even for some detailed incident investigations.

3.4 NETWORK RAIL AND LONDON UNDERGROUND LOG OF INCIDENTS

Network Rail (NR) and London Underground (LUL) issue logs of incidents entitled 'Daily Incident Log' (NR) and Noteworthy Incidents (LUL). These are compendiums of operational incidents and are reported daily by NR and weekly by LUL. The incident logs provide data in terms of what is happening within the rail industry. They provide limited material on human factors and safety management systems unless it was immediately apparent (e.g. the driver admitted a lapse of concentration following a SPAD). The information provided provides useful material on operational events, and Paul Wilkinson (HMRI) provides a useful summary drawing attention to particularly relevant issues based on these daily logs from NR. See figures 10 and 11 for a breakdown of these information sources.

Figure 10 shows that the top four categories reported by NR incident logs were Station overruns, Cat B SPADs, Bridge Strikes and Operating Irregularities. In contrast, the top four categories reported by LUL incident logs were SPADs, Fires, Track circuit/signal failure and track safety.

Network Rail Daily Incident Log n=145

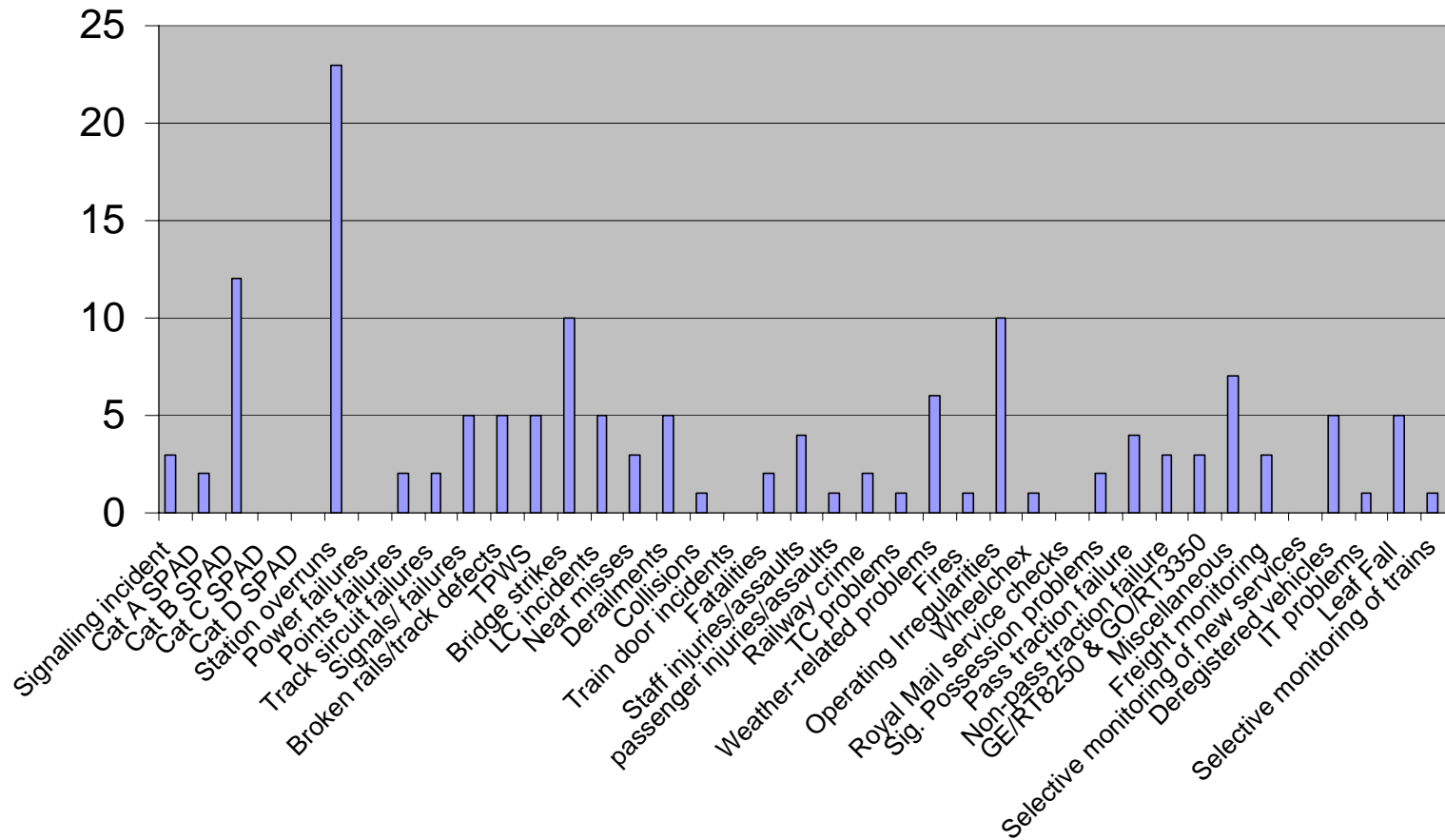


Figure 10 – Network Rail Daily Incident Log

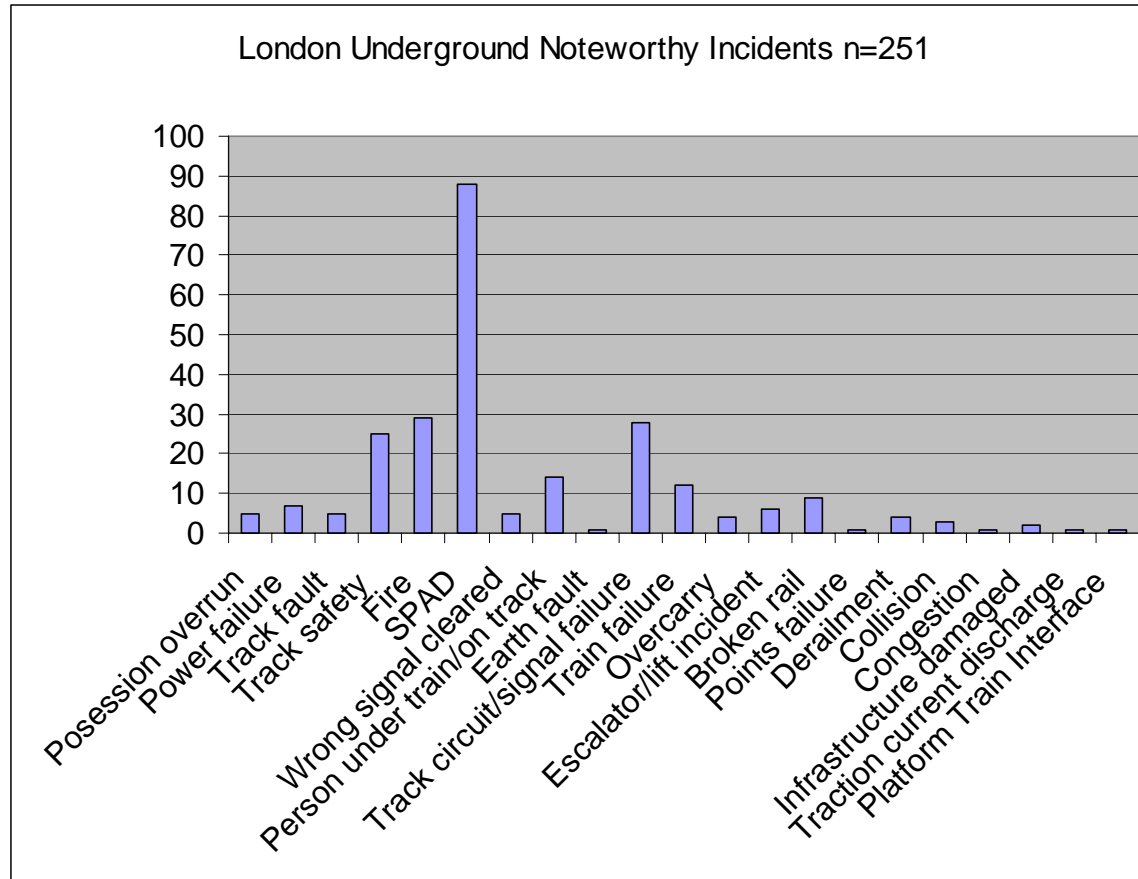


Figure 11 – London Underground Noteworthy Incidents

4 STAKEHOLDER EVALUATION

The original intent of this research was to carry out a stakeholder evaluation to identify industry performance indicators, as well as an understanding of industry needs with respect to performance indicators. Hence the intent was to develop a suite of performance indicators for the rail sector that would be sufficiently sensitive to show whether strategies and interventions are effective at achieving change within the industry. However, implicit within this requirement was the notion that strategies to address human factors and safety management systems could be identified from the analysis. It quickly became apparent that the current data sources, including formal inquiry reports did not provide adequate baseline data and that an alternative approach to identifying human factors and safety management systems priorities is required. As a result an alternative method for the identification of human factors and safety management strategic issues was proposed.

It was proposed to carry out a stakeholder review with the 6 HMRI teams to outline the approach for identifying strategic topic areas and explore the viability and acceptability of the approach. A briefing note and outline questions are included at Appendix 3. The proposed approach for strategy development is as follows:

- Use investigation reports as a key information source to inform the identification of Human Factors and SMS needs. A mix of both high and low consequence investigations would be considered.
- These reports would then be used to identify key topic areas, with expert judgement used to identify the top 10 issues in terms of Human Factors and Safety Management.¹
- These issues would then be prioritised following consultation with operational, technical and policy stakeholders to ensure that pertinent issues are being addressed in future strategies.

Furthermore due to the paucity of data it is proposed that HMRI consider ways of driving improvements in securing that root causes are adequately identified and that human factors and safety management systems are covered. As such HMRI stakeholders were also questioned as to the best way to address this.

A summary of the outcome of the stakeholder evaluation is as follows:

Regarding the proposed use of HMRI reports as the starting point for picking out the key issues in HF/SMS all six respondents suggested that a wider selection of documents should be consulted, such as RSSB reports as they were thought to contain useful HF input. One participant thought it important to include European reports. In general, full reports were thought to be quite valid although a bias towards engineering was acknowledged. One participant suggested witness statements as a useful source of raw data.

The interviewees all agreed that an expert review panel could then be used to identify the top 10 issues in terms of HF and SMS. One participant suggested that this take the form of a workshop so the context of the investigations could be discussed. Another interviewee suggested that experts could be from both industry and academia. They all agreed that these issues could then be prioritised following consultation with operational stakeholders. However three participants believed that stakeholders might give priority to their own agendas and this should be avoided. One interviewee felt that the consultation should be held with only a few people. Another interviewee commented that HMRI should set the agenda and not industry.

¹ To be later decided whether expert judgements are made using the Delphi model or the focus group approach.

Five of the interviewees believed that the quality of incident investigations could be improved whilst the sixth remained unconvinced. The issue of resources, both time and money, were mentioned as barriers. Three of the participants acknowledged that there was always scope to improve HMRI investigations but that 'inspectors do their best and are highly trained'. Further training for less experienced inspectors would be useful, as would reminders and briefings. The interviewees all thought that industry could improve the quality of their own investigations. One participant felt that any 'quality procedures' for doing investigations would get in the way. Conversely, another participant thought that prompt headings in an investigation report format would assist in the incorporation of HF issues.

5 CONCLUSIONS

The primary aim of this work was to support the HF/SMS topic strategists in determining whether or not the information on incidents published about the UK rail industry could be used to guide the development of strategies on human factors and safety management systems. Additionally, would the information provide a means of benchmarking and evaluating the industry status quo concerning HF and SMS, such that the impact of any strategic intervention could be determined.

The first step of the work was to identify and gather a range of information sources, representing all major players within the industry and hence including HSE, RSSB, NR, LU as well as light rail. These were collected from a wide range of sources and a basic review of these documents was carried out to characterise each type in terms of its title, author, periodicity, the source of the document, a summary and a review of its HF/SMS content. From this initial review it is apparent that few of the documents contain material on either human factors or safety management. The most useful documents identified are:

- Safety and Environmental Assurance Report (SEAR) authored by Network Rail. Provides a summary of Key Performance Indicators a number of which refer to HF/SMS issues such as safety critical communications and time exceedances;
- Incident Investigation Reports as authored by HSE, RSSB and LUL which provide useful in-depth information on incident root causes;
- RSSB's Annual Safety Performance Report provides an annual summary of the Network Rail controlled infrastructure. There is some information on HF/SMS, such as professionalism and competence and it provides a useful report on the performance of the industry;
- RSSB's Formal Inquiry Recommendations that is a précis of the recommendations made within formal inquiries to prevent the recurrence of specific incidents.

A framework was developed to systematically analyse the data sources in terms of their human factors and safety management system root causes. A range of complex and comprehensive frameworks were abandoned due to the paucity of the data. A pragmatic framework was developed using HSG48 and HSG65 to model HF and SMS. The data was analysed using this framework and the conclusions are outlined below:

- The data is biased towards the severe as these are more likely to have been sufficiently analysed to provide root cause data;
- Equipment failures and environmental factors have a large role in these incidents, however the factors underlying these are not robustly interrogated in the incident descriptions;
- Drivers are held responsible for many of these incidents, however it is unclear whether this trend is increasing or decreasing in the light of a better understanding of the role of human factors in incidents;
- Skills and competence are identified as separate issues within the framework developed, however it is unclear how these factors are actually discriminated between;
- Higher-level organisational factors (e.g. culture, leadership, resources and supervision) are not attributed as root causes to the incidents reviewed. This is perhaps indicative of a tendency to attribute individual and technical failures as the root causes of incidents without attempting to identify causes of these failures;
- The majority of the data comes from Network Rail and HSE published material.

It can be concluded from the data sources that they do not provide adequate baseline data or provide a suitable lead into the development of strategies on human factors and safety management systems. As such an alternative approach is proposed which involves the use of investigation reports, and expert panel review. The opinion of HMRI stakeholders was sought on the acceptability and appropriateness of this approach and their conclusions were as follows:

- HMRI, LUL, RAIB and RSSB investigation reports could 'tentatively' be used as a key information source.
- These reports could then be used to identify key topic areas, with expert judgement used to identify a manageable number (~ 10) of issues in terms of Human Factors and Safety Management. Experts groups formed from HMRI/ORR, technical, policy and operational.
- These issues could then be prioritised following consultation with operational stakeholders to ensure that pertinent areas are being addressed to avoid duplication of effort and identify where most benefit can be secured.
- It would be wise to further explore whether improvement in the quality of incident investigations would be valuable and achievable.

6 REFERENCES

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HSE (1999) Reducing Error and Influencing Behaviour. HSG48

HSE (1997) Successful Health and Safety Management. HSG65

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Watts, P (1999) Questioning safety – using TRIPOD to prevent accidents. Shell International Limited (SI)

HSE (2000) Improving maintenance – a guide to reducing error. HSE

7 APPENDICES

Appendix 1 – DATA SOURCES

Appendix 2 – DATA SUMMARY

Appendix 3 – BRIEFING NOTE

APPENDIX 1 – DATA SOURCES

- Incident reports – Paul Wilkinson, Accident Investigation Section, HMRI
- NCC log – Paul Wilkinson, Accident Investigation Section, HMRI
- RIDDOR – Graham Stephens, Statistics Branch, COSAS, HSE
- LU Noteworthy incident logs
- HSE Inspector Investigation reports – information from FOCUS
- SPAD reports – see HSE’s internet
- RSSB Formal Inquiry reports
- Public inquiry reports e.g. Ladbroke Grove, Southall, Hatfield, Clapham, Kings Cross
- Colin Dennis/ Paul Sizer – Safety Risk Model, PIM
- Network Rail, Balfour Beatty etc
- Risk profile bulletin – RSSB
- SEAR – safety, environment assessment report – Roger Livermore, NR Team, HMRI
- RSSB strategic safety plan

APPENDIX 2 – DATA SUMMARY

NETWORK RAIL

No.	Title	Author	Periodicity	Source
NR1	NIR - Safety Related Defect Report	Rail companies send it to Network Rail NCC for immediate dissemination by fax	as and when 1 example from 2/9/05	Paul Wilkinson, HSE
Summary	E.g. Some nuts were detached on an axle. Detected but could have caused problems. Wanted NR to circulate to all companies who may use the same drive unit.			
HF content	Not routinely – could be some HF within the description of the defect and its causes. However this will be random rather than systematic.			
SMS content	Not routinely – could be some SMS within the description of the defect and its causes. However this will be random rather than systematic.			

No.	Title	Author	Periodicity	Source
NR2	NIR - Urgent Operating Advice	Rail companies send it to Network Rail NCC for immediate dissemination by fax	as and when 1 example from 15/12/04	Paul Wilkinson
Summary	E.g. New comb plates on escalators do not comply with necessary standards and had led to an incident. Wanted the info to be shared across the industry.			
HF content	Not routinely – could be some HF within the description of the defect and its causes. However this will be random rather than systematic.			
SMS content	Not routinely – could be some SMS within the description of the defect and its causes. However this will be random rather than systematic.			

No.	Title	Author	Periodicity	Source
NR3	Channel Tunnel Rail Link (CTRL) Incident Log	Channel Tunnel Rail Link	Daily 1 example from 15/9/05	Paul Wilkinson
Summary	CTRL equivalent of Network Control Centre daily log. Details miscellaneous events from delays, possessions, power loss, alarm information to suspect cars over a 24 hour period. Appears to be simply a log, justifying the various delays incurred as a result of these incidents. On average 30 words describing each incident. Could categorise but with little value.			
HF content	No.			

SMS content	No.
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No.	Title	Author	Periodicity	Source
NR4	Network Rail Daily Incident Log (NCC)	Network Rail	Daily 6 examples from Oct/Nov 2005	Paul Wilkinson
Summary	<p>Outlines the incidents that have occurred within a 24-hour period. They are not all safety related – again it provides a link with the delays incurred and a particular incident. It does provide data under the broad incident headlines e.g. signalling incidents, SPADs, broken rails etc. So at a rudimentary level provides a summary of incident frequencies – but provides no causal analysis and is primarily descriptive. Many incidents from this are logged, in particular broken rails/track defects, bridge strikes, spads, level crossing incidents and near misses. Fewer possession problems are reported by NR cf LUL and refer to different events. Eg LU talk of problems with staff going missing, recharge issues etc as opposed to NR who’s focus appears to be on overruns and allocating responsibility for this – as opposed to the safety side.</p>			
HF content	No.			
SMS content	No.			

No.	Title	Author	Periodicity	Source
NR5	Safety and Environmental Assurance Report	Network Rail	Period (4 weekly) 1 example from 26/6/05-23/7/05	Paul Wilkinson/Roger Livermore
Summary	<p>Provides an overview of safety output performance, environment & significant individual incidents and developments. Has the main safety headlines such as: fatalities, Category A SPADs, derailments, broken rails etc. Causes are listed for significant errors but there is not much in terms of useful detail.</p>			
HF content	<p>Yes – Key Performance Indicator (KPI) detail such as Safety Critical Communication Quality, Time Exceedances by NR Maintenance Staff, and Time Exceedances by NR Non-Maintenance staff. Provides status and progress against targets. Does not state how material is collected.</p>			
SMS content	Yes- see above			

No.	Title	Author	Periodicity	Source
NR6	Safety and Environment Plan	Network Rail	Annual 1 example 2004 update	Website

Summary	Sets out how NR will systematically improve performance in terms of control of key risks, reduction of business loss, compliance with new legislation & work with partners to improve safety, health and environment.
HF content	Not much HF included explicitly in the plan.
SMS content	Includes many SMS issues such as: leadership and visibility, level crossings, management of the safety interface, safety and environmental competence, and fire safety, and describes goals and objectives of this.

RSSB

No.	Title	Author	Periodicity	Source
R1	The railway strategic safety plan-supporting document	RSSB	Annual Most recent example - 2005	RSSB website
Summary	This document supports R1. Aim is to help railway industry companies to draw up business cases to support safety expenditure, it provides supporting information to the strategic safety plan. Targets and suggested actions are made on issues such as: level crossings, SPAD reduction, broken rails, safety critical communications, risk to workforce, risk to passengers, risks with public behaviour and enabling safety improvement. Provides a link to the Safety Risk Model. Also, provides case studies demonstrating the safety cost/benefit of changes.			
HF content	Yes - Describes the actions being taken to change the safety critical communications culture			
SMS content	Yes - Enabling safety improvement actions covers actions to improve competence of senior managers through leadership. Core values were described as : commitment, leadership, openness, reporting, responsibility and measurement. Describes a derailment at Kings Cross with SMS concerns (Sept 2003).			

No.	Title	Author	Periodicity	Source
R2	The railway strategic safety plan	RSSB	Annual Most recent example - 2005	RSSB website
Summary	Analyses the current risk profile on the railway, identifies priorities for action and explains how the industry intends to address the priorities during 2005. It is broken down according to risks associated with train accidents, risks to the workforce, risks to passengers on trains and at stations, and risks associated with public behaviour. Outlines areas for industry action in terms of a high level plan (the detail is provided in R1 above).			
HF content	No			
SMS content	No			

No.	Title	Author	Periodicity	Source
R3	Annual safety performance report 2004	RSSB	Annual Most recent example - 2004	RSSB website
Summary	Presents trends in safety performance indicators including fatality and injury rates, accident rates and occurrences of accident precursors. Refers to risk on or affecting Network Rail controlled infrastructure. Gives headline performance for the industry, and includes: changes to the PIM, trend data, strategy for improvements and some major incident data and outlines the actions required of Railway Group members.			
HF content	Yes – Professionalism and competence.			
SMS content	Yes – information on safety culture and progress in terms of indicators. Professionalism and competence (identified as a significant issue from incidents) and covers self assessment of senior management competences. Outlines progress on the Precursor Indicator Model (PIM) & monitors train accident risk.			

No.	Title	Author	Periodicity	Source
R4	Formal Inquiry Recommendations Annual Summary Report 2004	RSSB	Annual Most recent example - 2004	RSSB website
Summary	Summarises the 2004 formal inquiry recommendations annual report, showing the progress that the industry is making in using recommendations to improve safety on the railways. In particular it highlights issues concerning: rules, standards and instructions; infrastructure asset assurance; and competence management.			
HF content	No – although competence management raised as a key area for improvement.			
SMS content	Yes – planning a key issue – for infrastructure maintenance, possession planning. Also raised issue of method statements.			

No.	Title	Author	Periodicity	Source
R5	Railway Group Quarter 1 2005 Safety Performance Report	RSSB	Quarterly 1 example from Q1, 2005	RSSB website
Summary	Measures safety performance against the objectives set out in the strategic safety plan. Summarises current progress in key areas of safety by identifying any high level areas of change. Provides trend data against the SSP targets, namely risks associated with train accidents, risk to passengers, risk to the workforce, risks associated with public behaviour. Simply a progress report – contains no HF/SMS.			
HF content	No			

SMS content	No
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No.	Title	Author	Periodicity	Source
R6	PIM factors	RSSB	As and when Most recent list (Sept 05)	RSSB
Summary	Outlines the factors within the Precursor Indicator Model linked to data collected from SMIS & actual counts of incidents – e.g. animals on line, broken rails etc			
HF content	No			
SMS content	No			

No.	Title	Author	Periodicity	Source
R7	Overview of the half-year 2005 safety performance report	RSSB	Half yearly Most recent example – Oct 2005	RSSB website
Summary	The report considers both the safety performance of the railway system as a whole and the safety performance across four areas from the SSP: train accident risk, risk to passengers on trains and at stations, risk to the workforce, risk from public behaviour. The overall level of risk on the mainline railway has risen by 6.6% compared with the end of 2004.			
HF content	No			
SMS content	No			

No.	Title	Author	Periodicity	Source
R8	Safety performance reporting	RSSB	Information only September 2005	RSSB website
Summary	Download from RSSB website on safety reporting and the various types of reports available.			
HF content	No			
SMS content	No			

No.	Title	Author	Periodicity	Source
R9	Summary of safety performance	RSSB	Monthly 1 example from July 2005	RSSB website

Summary	Outlines the key events by month on the following topics: fatalities, reportable train accidents, and precursors. Purely descriptive – no causal coding.
HF content	No
SMS content	No

No.	Title	Author	Periodicity	Source
R10	Railway Group Half Year 2005 Safety performance report	RSSB	Half yearly 1 example from August 2005	RSSB website
Summary	To analyse trends and issues in safety on the mainline railway. Document R7 provides a summary of this document.			
HF content	No			
SMS content	No			

No.	Title	Author	Periodicity	Source
R11	Formal Inquiries Edgeley Junction	RSSB	As and when Incident date: 13/4/05	RSSB website
Summary	Summary of the report and recommendations into this incident where the driver of an engineering train was struck and fatally injured by a passenger train. Describes a formal inquiry and therefore causal analysis is carried out and covers some HF/SMS issues.			
HF content	Yes – distraction of driver, safety critical communications,			
SMS content	Yes – planning and change management; no safe method of working.			

No.	Title	Author	Periodicity	Source
R12	Formal Inquiry Final Report Ufton Level Crossing: Passenger train collision with a road vehicle and subsequent derailment	RSSB	As and when Report date: 21/6/05	RSSB website
Summary	Investigation report into the passenger train collision with a road vehicle and subsequent derailment at a level crossing. There were 6 fatalities on the train (inc the train driver) and the driver of the car. Most of the issues in the report concerned handled of the incident as opposed to preventing its recurrence. Provide rich useful data but is not systematic.			

HF content	Yes – evacuation issues, lighting, signage etc. and other issues concerning passenger evacuation. A number of recommendations surround dealing with level crossings.
SMS content	Yes – risk assessment of level crossings, training, procedures following accidents.

No.	Title	Author	Periodicity	Source
R13	Formal Inquiry Recommendations Report 2004	RSSB	Annual 1 example for 2004	RSSB website
Summary	Progress report on implementing formal inquiry recommendations. Reviews what recommendations have been made following incidents on for example: rules, standards and instructions, infrastructure asset assurance (namely possessions planning, method statements) and competence management.			
HF content	Yes- primarily in terms of competence management including flexible workforce, contractors and experience.			
SMS content	Yes – planning identified (from the number of recommendations) as a key area requiring improvement.			

No.	Title	Author	Periodicity	Source
R14	Formal Inquiry - Seven Kings summary and recommendations	RSSB	As and when Incident date: 28/1/04	RSSB website
Summary	Summary of the report and recommendations into this incident – where a driver used an unauthorised route and was hit by a train.			
HF content	Yes – issues surrounding late running trains, working from irregular depots, time pressures and rule violations.			
SMS content	No.			

No.	Title	Author	Periodicity	Source
R15	Formal Inquiry - Fareham Tunnel report and recommendations	RSSB	As and when Incident date: 14/3/2004	RSSB website
Summary	Summary of the report and recommendations into this incident – where a contractor died examining a vertical shaft.			
HF content	Yes – visual inspection of tunnel only – so did not identify problems with the shaft cover.			
SMS content	Yes – contractor management, management and coordination on site were inadequate, no risk assessment or method statement, poor liaison.			

No.	Title	Author	Periodicity	Source
R16	Formal Inquiry - Liverpool Lime Street report and	RSSB	As and when Incident date: 2/11/2004	RSSB website

	recommendations			
Summary	Summary of the report and recommendations into 2 instances of Pendolino trains colliding with buffer stops.			
HF content	No			
SMS content	Yes – change to braking software not tested, designed to prevent wheel damage without considering the full impact of the change.			

No.	Title	Author	Periodicity	Source
R17	Formal Inquiry - Prideaux Viaduct report and recommendations	RSSB	As and when Incident date: 9/3/2005	RSSB website
Summary	Summary of the report and recommendations into the derailment of a freight train.			
HF content	Yes – visual inspection issues and staff competence.			
SMS content	Yes – faulty decision-making concerning replacement of emergency tie-bars, inadequate planning and risk assessment. Lack of competence of staff. Unaware of standards.			

No.	Title	Author	Periodicity	Source
R18	Formal Inquiry - Newbridge Junction: report and recommendations	RSSB	As and When Incident date: 5/4/2005	RSSB website
Summary	Summary of the report and recommendations into this incident where a railway inspector was struck and killed by a passenger train.			
HF content	Yes – violation/error ? distraction ? Not aware of hazards? Fatigue ? Lack of attention – a number of explanations proposed for the look-outs actions.			
SMS content	Yes – poorly specified work, short notice, inadequate safety briefings, roles and responsibilities, complacency, no checks/audit of working practices.			

No.	Title	Author	Periodicity	Source
R20	Overview of the issue 4 – Risk Profile Bulletin	RSSB	Annually	RSSB website
Summary	Summary of risk information available to assist the industry manage safety effectively. Provides information from the Safety Risk Model. Provides headline figures on fatalities risks/ALARP etc			
HF content	No			
SMS content	No.			

LU

No.	Title	Author	Periodicity	Source
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L1	Safety, health and environmental performance report	LUL	Quarterly 1 example Q4 2004/2005	LU direct
Summary	A summary of progress in all areas of SQE including trends on headline performance e.g. incidents, SPADs, workplace violence etc.			
HF content	Yes – details ongoing Formal Investigations that may want to be reviewed, issues around monitoring safety critical work, problems with emergency exercises and debriefs, summary of CIRAS.			
SMS content	Yes – audit scores, progress against safety actions (inc. areas such as inadequacies in Planned General Inspections, risk assessment issues), outlines precursor analysis, and raises other areas of concern.			

No.	Title	Author	Periodicity	Source
L2, L3, L4	Noteworthy Incident Report	LUL	Weekly 4 examples from Sept-Nov 2005	HSE
Summary	A weekly description of all noteworthy incidents - namely all fatalities, major injuries, signal overruns, confirmed fires, train service delays exceeding 30 mins, any Form 'A' reports, significant near misses			
HF content	No/patchy – some of the descriptors of the events may identify root causes which may cover HF issues.			
SMS content	No/patchy – some of the descriptors of the events may identify root causes which may cover HF issues.			

HSE

No.	Title	Author	Periodicity	Source
H1	SPADs - HM Railway Inspectorate reports	HSE	Monthly 1 example for July 2005	HSE
Summary	Provides information on SPADs within Network Rails infrastructure. Uses RSSB risk ranking to categorise severity. Does not include LU or light rail. Does not include any HF or SMS.			
HF content	No			
SMS content	No			

No.	Title	Author	Periodicity	Source
H2	SPAD Investigation summaries	HSE	as and when 7 examples from Dec '04 to March '05	HSE website
Summary	Provides an investigation summary into a selection of signal overruns			
HF content	Yes – where appropriate e.g. lapse of concentration, equipment performance expectations, signal aspect expectations, inexperience, route knowledge & workload.			

SMS content	Yes – where appropriate
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No.	Title	Author	Periodicity	Source
H3	Hatfield Derailment Investigation - Interim recommendations of the Investigation board	HSE	as and when	HSE website
Summary	Provides interim recommendations on the derailment at Hatfield.			
HF content	No.			
SMS content	No.			

No.	Title	Author	Periodicity	Source
H4	Derailment of FGW HST at Southall East on 24/11/2004	HSE	as and when	HSE website
Summary	Interim report on the status and initial findings of the investigations into the derailment. This report simply reports of the key interim findings concerning derailment on points and the state of the track. No underlying causes are reported at this stage.			
HF content	No			
SMS content	No.			

No.	Title	Author	Periodicity	Source
H5	HSE's annual report on railway safety 2004	HSE	Annual 1 example 2004	HSE website
Summary	Reports on industry progress in key areas. Provides a useful summary of the year in terms of key events.			
HF content	No.			
SMS content	No.			

No.	Title	Author	Periodicity	Source
H6	Railway Accident Statistics 1/4/04 - 31/12/04 Data Analysis	HSE	Annual 1 example July 2005	HSE

Summary	Outlines the status of safety on the rail network including safety performance, enforcement action, incident investigations. Includes mainline, undergrounds and light rapid transport. The only significant information this report adds is material surrounding heritage railways. One key area lacking is that company annual reports provide some underlying explanation for trends and the organisational context.			
HF content	Yes – small amount of causes of train accidents but very much at the level of staff error, management and supervisory failures etc.			
SMS content	Yes – small amount of causes of train accidents but very much at the level of staff error, management and supervisory failures etc.			
No.	Title	Author	Periodicity	Source
H7	Investigations Summary	HSE	As and when ~ 70 examples reviewed from 2000 onwards	FOCUS
Summary	Descriptions of all HSE investigated incidents - all RIDDOR reports (i.e. fatalities and major injuries), signal overruns and significant near misses e.g. SPADs etc. Injuries and complaints can be from either passengers on trains / at stations or the workforce.			
HF content	Yes – some of the descriptors of the events may identify root causes e.g. lapse of concentration, inexperience, shift patterns & workload. However this is dependant on the summary of the individual inspector i.e. random rather than systematic.			
SMS content	Yes – small amount of causes of train accidents but very much at the level of staff error, management and supervisory failures etc. However this is dependant on the summary of the individual inspector i.e. random rather than systematic.			

MISCELLANEOUS

No.	Title	Author	Periodicity	Source
M1	SHEQ Corporate Responsibility	Balfour Beatty	Annual 1 example downloaded Sept '05	Website
Summary	Outlines their priorities for the year (e.g. SMS documentation, accident investigations, safety tours, audit etc.) and reports on Key Performance Indicators.			
HF content	Yes – KPI onsite safety briefings and competence assessment.			
SMS content	Yes – KPIs are mainly SMS based e.g. planned inspections, senior management safety tours, corrective action requests, site safety briefings, and competence assessment.			

No.	Title	Author	Periodicity	Source
M2, M3	CIRAS National Report	CIRAS	Annual 2 examples	Website

			from 2002 and 2003	
Summary	Provides an overview of the data reported to the near miss agency, and the use made of company channels.			
HF content	No – but interesting in terms of the types of issues reported and by whom.			
SMS content	No – but interesting in terms of the types of issues reported and by whom.			

No.	Title	Author	Periodicity	Source
M4	Serco Metrolink	Serco	Period 1 example for Dec '04.	Emailed from company
Summary	Provides an overview of the accident statistics e.g. RTAs involving trams, injuries to passengers and staff, SPADs etc.			
HF content	No			
SMS content	No			

Appendix 3 – Briefing Note

Information and Intelligence Needs Analysis to support the development of Strategic Plans in the areas of Human Factors and Safety Management Systems

Over the next few weeks, HSL's Risk Management Section hope to make contact with you over the phone for some 5-10 minutes. It is to discuss a proposal for establishing future HF and SMS direction and priorities for work. We have been carrying out some work for Claire Dickinson and Julie Chadwick on the above project.

Aim of this document

To provide you with background details concerning the rationale underlying this project and to outline how you can support this phase of work.

Background

The UK rail industry collects a wide variety of safety performance measures. HSL have carried out a review of this multitude of information sources to identify whether they could be used as a guide for the development of the HF and SMS strategies. This step involved the identification of the various information sources and carrying out an analysis of these to identify whether HF and SMS factors are contained within these. In the main causal factors were not identified within the various information sources, in fact the only reports containing meaningful data for this project were the investigation reports (either those authored by HSE, RSSB, and LUL).

As such the various data sources do not identify industry priority needs in terms of Human Factors and Safety Management Systems. Therefore an alternative approach is being proposed to help inform HMRI on priorities and decision-making. We seek your help in terms of evaluating an approach for developing these strategies in lieu of objective data to support it.

Stakeholder consultation

We are seeking your opinions on this alternative approach for the development of the Human Factors and Safety Management System's strategies in terms of its viability and acceptability.

Questions to think about

- HSE investigation reports could be used as a key information source. Would this be possible? Could we see a mix of both high and low consequence investigations?
- These reports would then be used to identify key topic areas, with expert judgement used to identify the top 10 issues in terms of Human Factors and Safety Management.
- These issues would then be prioritised following consultation with operational stakeholders to ensure that pertinent issues are being addressed.
- Generally would you like to improve the quality of incident investigations? What is the best way of doing this? Is it through training, checklists, awareness raising or briefings?

We look forward to speaking to you soon