MEETING: RSSB Board Meeting  
DATE: 07 November 2013  
SUBJECT: Passenger Risk  
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1. Purpose of paper

1.1 This paper is part of the Strategic Board Agenda considering modelled safety risk for the industry. It considers passenger risk, safety trends and some of the ways that the sources of passenger risk are being tackled.

1.2 The paper provides a brief overview of the key points. Annex A then provides some analysis of recent trends in passenger harm, the Precursor Indicator Model (PIM) and progress against the HLOS target. Annex B contains analysis on accidents involving train dispatch. Finally, Annex C provides a ‘snapshot view’ of some of the ways in which sources of passenger risk are being tackled.

2. Key trends and issues in passenger risk

2.1 Detailed analysis of the key trends in passenger risk can be found in the Annual Safety Performance Report (ASPR) 2012/13. A notable change since publication is a decrease in harm from passenger major injuries, largely accounted for by a reduction in the number of slips, trips and falls and platform/train interface (PTI) accidents. For further analysis, see Annex A.

2.2 The HLOS target for passenger safety is a 3% reduction in risk during Control Period 4 (CP4). The trend in passenger risk to the end of September 2013 is consistent with the requirement of the HLOS target, having achieved a 7.3% reduction to date. More information can be found in Annex A.

2.3 The UK has amongst the lowest passenger risk of all of 25 member states of the EU on the basis of recently published National Reference Values (NRVs).

2.4 The ASPR 2012/13 reported a large increase in the PIM during that year, due to an increase in infrastructure failures. Much of this increase was linked to a rise in landslips following high levels of rainfall. The passenger PIM has since fallen from 39.5 to 36.6. Further analysis can be found in Annex A.

3. Station safety

3.1 Under the Modernisation of Safety Cooperation (MoSC) project, the System Safety Risk Group (SSRG) has been created to facilitate and manage 100% of industry system safety risk. Station safety falls within SSRG’s remit and will be reviewed and considered by a sub group moving forward; sub groups are expected to have completed their first meetings by March 2014, and work is currently underway to set up the groups and manage the short term risks.

4. Development of a GB strategy for managing the platform-train interface

4.1 The board agreed that proposals for a coherent GB strategy on PTI should be developed by RSSB with the aim of coordinating PTI-related activities towards common industry goals that will improve operational performance, as well as reducing safety risk.
4.2 More information on recent progress of the strategy can be found in the CEO report, Agenda Item 3.

5. **Train dispatch**

5.1 Train dispatch procedures are designed to manage specific risks. During typical operation, passengers and members of the public should be sufficiently clear of the train’s ‘dispatch corridor’ before it begins to move off. When errors occur, passengers may be trapped in train doors, fall from the platform edge or come into contact with the moving train.

5.2 Between 1 April 2008 and 31 March 2013, accidents involving dispatched trains accounted for only 1% of all accidents at the PTI. However, they accounted for 10% of the harm and four out of the 16 fatalities during this time. Intoxication was implicated in three of those four fatalities. Further analysis can be found in Annex B.

**Falls between train and platform**

5.3 On 24 July 2013, a train door closed on a pushchair as a passenger tried to alight with her child at Cogan. When the guard released the doors, the pushchair tipped forward, causing the child to fall between the train and the platform. He was taken to hospital with minor injuries, but the consequences could have been worse.

5.4 Although falls between the train and platform are regularly recorded in the Logs, RAIB has published a report on a serious accident that occurred at London Charing Cross on 24 November 2012. It occurred when a passenger approached a train after the dispatcher had given the ‘right away’. She fell between the train and the platform just before it started moving, coming into contact with the wheels and suffering life-changing injuries. The train was stopped after 43 metres when a passenger pulled the emergency communication handle. The dispatcher had no means of alerting the driver.

**‘Trap and drag’**

5.5 Recent RAIB activity has highlighted the ‘trap and drag’ phenomenon, which – like fall between train and platform incidents – can also reveal flaws in the dispatch process (or execution) and the post-incident problem of stopping moving trains.

5.6 On 5 June 2013, a passenger tried to board a train at Newcastle Central as the doors were closing. She put her hand between the leaves expecting them to re-open, but they closed around her wrist. The train then started to move, forcing her to jog alongside.

5.7 The conductor could not see the trapped passenger due to the curvature of the platform. Those on board saw what had happened and pulled the emergency door release. The conductor then applied the emergency brake.

5.8 There is a parallel here with metro train operation – doors on much of the older London Underground stock will re-open if a passenger puts an arm between the leaves. This is also true of the units used on the Tyne & Wear Metro. On 12 April 2012, a passenger put her arm in the closing doors of a train at Jarrow just before departure. Instead of re-opening as expected, a malfunction meant they trapped her, forcing her to run alongside as the train pulled out. A passenger on board activated the emergency door release, allowing the woman to free herself.
5.9 RAIB investigated a similar event at King’s Cross on 10 October 2011. A passenger’s hand became trapped when she tried to board a train as the doors were closing. The train started to move before her fingers were released and she was dragged along the platform for around 20 metres. A member of platform staff had not fully checked the train doors before giving the ‘right away’. However, when the passenger alarm was operated, the train did not stop immediately because the driver decided to continue to the next station. This decision had no effect on the incident, but was contrary to the Rule Book and, in slightly different circumstances, could have made it worse.

Lessons learnt

5.10 The RAIB reports and investigations discussed in this paper raised the following issues:

- The importance of fully checking train doors before trains depart;
- The need for drivers to stop trains immediately if the passenger alarm is operated when any part of the train is within a station;
- The need for the passenger alarm to be fully functioning;
- The possibility of providing a warning to people on the platform that a train is about to move; and
- The possibility of providing means for platform staff to remove the RA indication after it has been given.

Actions taken

5.11 In light of the Brentwood ‘fall between train and platform’ incident (28 January 2011), RSSB amended RIS-3703-TOM ('Monitoring the train during train departure') in March 2013 to emphasise that the train dispatch task should include monitoring of the door close process, and ‘should be designed to mitigate the risk of staff involved in train dispatch failing to observe a person falling between the platform and the train or of observing potentially dangerous occurrences taking place.’

5.12 In June 2013, the Rule Book was changed to require guards to stay at the door controls until the train has completely left the station. This will allow the guard to respond to visual or audible alarm signals from the platform (from dispatch staff or members of the public). Dispatch staff must also position themselves on the platform so that they can see the whole length of the train.

Dispatch against red

5.13 Cases of trains being dispatched against red signals regularly appear in the daily control logs, although the SMIS database shows only one such dispatch incident in 2012 resulted in a start against signal (SAS) SPAD: at St Erth on 26 November 2012, when a St Ives service passed SE63 (bay platform) signal at red by three feet, its driver having received the bell code from the guard. Note that this incident features in the RED 36 safety DVD.

5.14 In this case, the level of risk was low because the track layout at St Erth is such that, had the train continued beyond the overlap, it would have run down the branch, and not out onto the main line.

5.15 Most 'dispatch against red' incidents result in the driver holding the train in the station or stopping short of the signal. However, the more these ‘near misses’ occur, the more likely we are to have another passenger service SASSPAD, the perils of which were demonstrated by the fatal collision at Paisley Gilmour

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1 There was a total of 18 platform SASSPADs last year from all causes.
Street on 16 April 1979 and at Granges-près-Marnand, Switzerland, on 29 July 2013.

5.16 It should also be noted that – even for low risk ranking SPADs like St Erth – ‘dispatch against reds’ can cause delays and impact passenger satisfaction.

**Lessons learnt**

5.17 These incidents highlight the need to adhere to the Rule Book (Module SS1, section 3.4), which clearly states that the dispatcher must check that any starter signal is showing a proceed aspect before giving the ‘right away’.

**Action taken**

5.18 RSSB featured ‘dispatch against red’ in the SPADtalk column of Right Track 4, published in February 2013. The St Erth incident also features in RED 36.

6. **Uncontrolled detraining**

6.1 As was highlighted in last year’s paper, there have been a number of cases of uncontrolled detraining in recent years, involving passengers on stranded and delayed trains, who either forced the doors open or used the emergency release handles to open the doors and alight onto the track. In such cases once the passenger has alighted from the train, they are categorised as trespassers\(^2\) in the statistics.

6.2 Since April 2012, there has been one case of uncontrolled detraining, which occurred at Southcote Junction on 5 September 2013. The train had failed and after half-an-hour, a passenger had climbed out of a window. Over the next half-hour, further passengers attempted to alight the train until an assisting train arrived and all passengers were able to re-board. No injuries were reported during the incident.

7. **Passenger risk from train accidents**

7.1 According to the Safety Risk Model (SRM) v7.5, train accidents account for 8.2 FWI per year. Of this, 3.1 FWI is to passengers, which is 6% of the total risk to passengers (54.7 FWI per year).

7.2 The PIM measures the underlying risk from train accidents by tracking changes in the occurrence of accident precursors. At the end of June 2013, the overall PIM stood at 88.6, while the passenger PIM stood at 36.6 (the public and workforce indicators were 43.0 and 9.1 respectively). Further analysis can be found in Annex A.

8. **Recommendations**

8.1 The board is invited to:

- **CONSIDER** and **DISCUSS** the key points identified in this paper.
- **CONFIRM** that they are content that they have reviewed and considered the significant items of passenger safety risk that impact on the industry and are satisfied with the overall arrangements to control the risk.

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\(^2\) Incidents involving access to prohibited areas of the railway are categorised as trespass if that access was the result of deliberate or risk-taking behaviour. All such events are analysed under risk to members of the public. Such behaviour includes deliberately alighting a train in running (other than as part of a controlled evacuation procedure), and getting down from the platform to the tracks, for example to retrieve an item that has been dropped.
Annex A  Recent trends in passenger harm and the passenger PIM

The average level of harm to passengers over the past five years has been 41.7 FWI per year, of which 24.6 FWI have been major injuries.

- The level of passenger harm due to major injuries has been increasing over the past six years reaching 30.8 FWI in 2012/13.

- Comparison between the first quarter of 2013/14 and the same period in the previous year does not show a notable change in the overall level of passenger harm. However, it can be seen that the level of passenger harm due to major injuries has decreased.

- There was a large increase in the number of major injuries in the fourth quarter of 2012/13 followed by a large decrease in the number of major injuries in the first quarter of 2013/14, which is at the lowest level over the period shown.

- Comparison between different accident types that occurred in the first quarter of 2013/14 and the average of the previous eight quarters shows that the overall decrease can largely be accounted for by a reduction in the number of slips, trips and falls and platform/train interface accidents which lead to major injuries.
Chart 3 shows trends in the overall PIM indicator (the topmost line) since the baseline date of September 2006, and trends in the contribution of the six PIM groups to passenger risk.

Since March 2012, there has been an increase in train accident risk as measured by the PIM and in March 2013, it reached its highest level since March 2009. By July 2013, the overall indicator stood at 88.6 (compared with 74.9 in March 2012 and 90.9 in March 2013 and the indicator of passenger risk stood at 36.6 (compared with 27.5 in March 2012 and 39.4 in March 2013).

Although there were increases in all bar one of the main PIM groupings, the rise in the PIM over 2012/13 has been driven mainly by an increase in the risk from infrastructure failures due to landslips, following high levels of rainfall during the year. The PIM contribution from infrastructure failures (the largest contributor to train accident risk) has fallen slightly since March 2013 and at the end of June 2013 stood at 14.2.

The table below shows how individual PIM subgroups have changed since March 2012.

<table>
<thead>
<tr>
<th>Passenger indicator from:</th>
<th>March 2012</th>
<th>March 2013</th>
<th>July 2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infrastructure failures</td>
<td>9.0</td>
<td>16.6</td>
<td>14.2</td>
</tr>
<tr>
<td>Irregular working</td>
<td>6.2</td>
<td>7.8</td>
<td>7.5</td>
</tr>
<tr>
<td>Public behaviour at level crossings</td>
<td>2.6</td>
<td>2.7</td>
<td>2.7</td>
</tr>
<tr>
<td>Objects on the line</td>
<td>3.7</td>
<td>3.7</td>
<td>3.6</td>
</tr>
<tr>
<td>SPADs</td>
<td>2.8</td>
<td>5.4</td>
<td>5.5</td>
</tr>
<tr>
<td>Trains and rolling stock</td>
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<td>3.2</td>
<td>3.1</td>
</tr>
<tr>
<td>Public indicator</td>
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<td>42.1</td>
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<tr>
<td>Workforce indicator</td>
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<td>9.3</td>
<td>9.1</td>
</tr>
</tbody>
</table>
In the High Level Output Specification (HLOS), the DfT established safety metrics for both passenger risk and workforce risk and specified a requirement for a 3% reduction in both categories over CP4, which runs from 1 April 2009 to 31 March 2014.

The HLOS target for passenger risk is shown as an index starting at 100% at the beginning of CP4, with a target of 97% for March 2014. The measure will comprise two elements: train accident risk and movement/non-movement risk, as defined by the SRM.

The trend in passenger risk to the end of September 2013 is consistent with the requirement of the HLOS target, having achieved a 7.3% reduction to date.
Annex B  Accidents involving dispatched trains

In the last five years, there have been four fatalities involving trains in the process of being dispatched. The most recent occurred on 22 October 2011 at James Street, Liverpool, when a 16-year-old female passenger fell between the train and the platform and was struck by the train as it departed.

The following analysis is based on all passenger injuries occurring at the PTI during the past five years, and highlights those events occurring just after dispatch, when the train has begun moving.

Chart 5.  PTI injuries involving dispatched trains, 2008/09 to 2012/13

- Out of the 6,666 PTI injuries occurring in the last five years, 54 involved dispatched trains. While these account for only 1% of accidents, they account for 10% of the harm (5.0 FWI).
- Nearly half of these injuries, but nearly all of the harm, involve a passenger being struck by the train, typically when they are too close to the platform edge or have fallen between the train and the platform.
- When only considering fatalities at the PTI, accidents involving dispatched trains account for an even higher proportion. A quarter of all fatalities at the PTI involved dispatched trains and all of these were passengers being struck by the train.
- Intoxication was implicated in three of the fatalities, three of the major injuries, and five of the minor injuries; in total, it has been associated with 67% of the harm.
Under the Modernisation of Safety Cooperation (MoSC) project, the System Safety Risk Group (SSRG) has been created to facilitate and manage 100% of industry safety risk at system level and will be reviewed and considered by a sub group moving forward; sub groups are expected to have their first meetings by March 2014, and work is currently underway to set up the group to manage the short term risks. A coherent GB strategy on PTI is being developed by RSSB with the aim of operating risk management strategies, as well as reducing safety risk.

Programme of stairway marking, increased use of the slip, trip, and fall toolkit, Passenger safety awareness campaigns. Improved emergency preparedness training of staff, improved winter preparedness, increased CCTV coverage, improved passenger communications..