



RAILWAY ACCIDENT INVESTIGATION UNIT IRELAND

SUMMARY OF INVESTIGATION REPORT

Investigation into SPADs on IÉ Network,
from January 2012 to June 2015

RAIU Report No: RS2016 – R001

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Reader Guide

This summary report is an abridged version of a full RAIU investigation into SPADs on IÉ Network, from January 2012 to June 2015 (R2016-R001). This full investigation report is available on the RAIU website, www.raiu.ie.

Report publication

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RAIU
2nd Floor, 2 Leeson Lane
Dublin 2
Ireland

email: info@raiu.ie
website: www.raiu.ie
telephone: + 353 1 604 1241
fax: + 353 1 604 1351

Report preface

The RAIU is an independent investigation unit within the Department of Transport, Tourism and Sport (DTTAS) which conducts investigations into accidents and incidents on the national railway network, the Dublin Area Rapid Transit (DART) network, the LUAS, heritage and industrial railways in Ireland. Investigations are carried out in accordance with the Railway Safety Directive 2004/49/EC, the Railway Safety Act 2005 and Statutory Instrument No. 258 of 2014 European Union (Railway Safety) (Reporting and investigation of serious accidents, accidents and incidents) Regulations 2014.

The RAIU investigate all serious accidents. A serious accident means any train collision or derailment of trains, resulting in the death of at least one person or serious injuries to five or more persons or extensive damage to rolling stock, the infrastructure or the environment, and any other similar accident with an obvious impact on railway safety regulation or the management of safety.

The RAIU may investigate and report on accidents and incidents which under slightly different conditions might have led to a serious accident. RAIU investigations are conducted for the purpose of accident and incident prevention which includes the gathering and analysis of information, the drawing of conclusions, including the determination of causes and, when appropriate, the making of safety recommendations in order to prevent accidents and incidents in the future and improve railway safety.

It is not the purpose of an RAIU investigation to attribute blame or liability.

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Section 1

Part 1 – Introduction to the RAIU Investigation

Part 2 – Parties involved (directly & indirectly)



RAIU

Railway Accident Investigation Unit

Part 1 – Introduction to the RAIU Investigation

- 1 In accordance with the Railway Safety Act 2005 and Statutory Instrument No. 258 of 2014 European Union (Railway Safety) (Reporting and investigation of Serious Accidents, Accidents and Incidents) Regulations 2014, the RAIU investigate all serious accidents, the RAIU may also investigate and report on accidents and incidents which under slightly different conditions might have led to a serious accident.
- 2 On the 8th December 2013, two trains were travelling towards each other in the same section of track, only stopping when the signalman made a call for the trains to stop, the trains stopped 175 m apart at Millstreet Station Platform. As part of the initial RAIU investigation, the RAIU reviewed other Category A SPADs in IÉ in 2013. Although none of these SPADs resulted in fatalities, the consequences of SPADs can lead to multiple fatalities, such as the SPAD at Cherryville Junction, Co Kildare, in 1983; where the 18:50 hrs Galway to Dublin passenger service passed Signal CY161 at danger and collided, rear-on, with the 17:15 hrs passenger service from Tralee to Dublin which was stationary, killing seven passengers. This SPAD incident is the most recent SPAD incident which has resulted in fatalities on the IÉ network.
- 3 As a result of these factors, the RAIU made the decision to carry out an investigation, under article 19 (2) of the Railway Safety Directive (EC, 2004), into the SPAD at Millstreet on the 8th December 2013; as, given that under slightly different conditions, this SPAD incident may have led to a head on collision (serious accident), which had the potential for fatalities and serious injuries.
- 4 The decision was also made to expand the investigation to include all Category A SPADs from January 2012 to June 2015, inclusive, in order to see if there were any trends into the types and causations of SPADs on the IÉ network. A total of forty-five SPADs were reviewed by the RAIU. These Category A SPADs were divided into different event types, namely:
 - SPADs during *normal train operations*;
 - SPADs during *degraded train operations*;
 - SAS and SOY SPADs.
- 5 The investigation will focus on three main SPADs, the SPADs at Millstreet on the 8th December 2013, the SPAD at Gortavogher on the 19th December 2013 and the SPAD at Muine Bheag on the 9th April 2013 as these best reflect the SPAD event type on the IÉ network, i.e. SPADs during normal train operations, SPADs under degraded train operations and Start Against Signal (SAS) /Start on Yellow (SOY) SPADs, respectively.

Part 2 – Parties directly & indirectly involved in the investigation

Iarnród Éireann

- 6 IÉ is the railway *infrastructure manager* (IM), managing the design, installation, testing, inspection, maintenance, renewal and operation of the railway's physical assets.
- 7 IÉ is also the *railway undertaking* (RU) that owns and operates mainline railway services in Ireland.

Balfour Beatty Rail Ireland

- 8 BBRI is part of the Balfour Beatty Group, and have being operating as a RU since March 2014. BBRI operate and maintain On Track Machines (OTMs) on behalf of IÉ. BBRI staff comprises of a number of On Track Machine Driver Operators (OTMDOs) and fitter groups which are located throughout Ireland.
- 9 The OTMDOs are trained at the IÉ training school, however, the competency management of the OTMDOs is managed by BBRI.

Railway Safety Commission (RSC)

- 10 The RSC is the national safety authority, (The name of the Railway Safety Commission changed to Commission for Railway Regulation, CRR from Monday 29th February 2016) which is responsible for the regulatory oversight of the SMS and enforcement of railway safety in the Republic of Ireland in accordance with the Railway Safety Act 2005 and the European Railway Safety Directive.
- 11 The RSC's mission is to advance the safety of railways in Ireland through diligent supervision and enforcement. The RSC is required to ensure that each railway organisation operating in the State understands and effectively manages the risk to safety associated with its activities. The RSC is required to ensure that each railway organisation operating in Ireland understands and effectively manages the risk to safety associated with its activities. This is achieved in through: Conformity Assessment, Supervision & Enforcement, Economic Regulation; European & Legislative Harmonisation.

Section 2

Part 3 - SPAD at Signal TL223, Millstreet, on the 8th December 2013

Part 4 – SPAD at Signal XX098, Gortavogher, on the 19th December 2013

Part 5 - SPAD at Signal WL167, Muine Bheag, on the 9th April 2013

Part 6 - Collective review of all Category A SPADs



PART 3 – SPAD at Signal TL223, Millstreet, on the 8th December 2013

12 On the 8th December 2013, the IÉ 11:50 hours (hrs) passenger service from Tralee to Heuston (Train A303) was running late. In an effort to minimise delays, the Centralised Traffic Control (CTC) Signaller and the Traffic Regulator made the decision to change the crossing point of Train A303 and the 12:10 hrs Cork to Tralee passenger service (Train A304) to Millstreet Station (Cork), instead of Banteer Station (the routes are on a bi-directional single line track with crossing loops). It was expected that Train A304 would arrive first at Millstreet Station (a one-platform station), disembark passengers and shunt into the crossing loop. However, both trains approached Millstreet Station at the same time. As Train A303 approached Millstreet Station, it passed signal TL223 at danger without authority. The SPAD resulted in the two trains occupying the same section of line, travelling towards each other, until the CTC Signaller put out a general call for the trains to stop. Both train drivers applied the brakes and the trains came to a stop 175 metres (m) apart on the platform at Millstreet Station. IÉ awarded a SPAD Risk Ranking (SRR) of 21 to this Category A SPAD therefore categorising it as a *high risk* SPAD.

13 The RAIU investigation found that the *immediate cause* of the SPAD was that Driver A303 did not see that Signal TL223 was displaying a stop aspect and continued driving towards Millstreet Station. Possible *contributory factors* to Train A303 arriving at Millstreet Station Platform were:

- The current basic overrun protection in the Millstreet area does not provide sufficient protection to trains on single lines with crossings loops;
- Driver A303 lost situational awareness, as he thought Signal TL223 was displaying a green aspect;
- Driver A303 had an incorrect expectation that Signal TL223 would be displaying a green aspect as he had never approached the signal displaying a red light; this incorrect expectation was reinforced by the fact that the barriers for Level Crossing XE061 were lowered on his approach and there were passengers waiting on the platform. Furthermore, he had not been made aware by radio or by any other means and he was unaware that the crossing point for the trains had changed;
- Driver A303 did not apply any form of *Error Prevention Technique (EPT)* on the approach to the yellow aspect of Signal TLR223 to remind him that Signal TL223 would be displaying a red aspect;
- Driver A303 did not apply any EPT to refocus on his driving duties after he had become stressed, distracted and preoccupied by the events at Killarney Station during the same journey, where two young children were left unattended, which resulted in Driver A303 having to return to the station. Driver A303 had also become distracted by the fact that he was unable to provide relief duties for another service, due to the late running of the train. Driver A303 may have also become distracted by the speed board, located directly after Signal TL223; and the flashing lights of Level Crossing XE061;

- The CTC Signaller and the Traffic Regulator were unaware that they had inadvertently reduced the overrun protection for the trains, as they allowed Train A304 onto the platform instead of holding it outside the station.

14 *Underlying causes* associated with the incident, include:

- The Traffic Regulator's Manual does not include specific instructions or any form of dynamic risk assessment in relation to the alteration of the scheduled movements of trains;
- IÉ's Lineside Signal Sighting & Spacing Signalling Standard (I-SIG-2043) does not adequately address the risks associated with distraction features in the vicinity of signals, in particular, the positioning of speed boards in the vicinity of signals.

15 The *root cause* associated with the incident was:

- Non-technical skills, such as EPT, are not adequately promoted, trained for, assessed or monitored during driving training and driver competency management as outlined in IÉ-RU's suite of Operations SMS documents (namely OPS-SMS-3.0, OPS-SMS-3.1, OPS-SMS-3.2 & OPS-SMS-3.5).

PART 4 – SPAD at Signal XX098, Gortavogher, on the 19th December 2013

16 On the 19th December, in Gortavogher (County Clare), lightning strikes resulted in signal and level crossing equipment failures. The touch screen in the Mallow level crossing control centre (LCCC) was not showing the status of a number of signals at the level crossings in the area and as a result the Galway Line Signaller (GLS) and the level crossing control operative (LCCO) despatched emergency operatives (EOs) to the level crossings to assess and manage the level crossings. The LCCO did not inform the GLS not to allow any trains to enter the section until the EOs were onsite and in control of the level crossings. As a result, the GLS informed the driver (Driver A780) of the 05:55 hrs passenger service from Limerick to Galway (Train A780), while he was in Ennis that there were faults with the level crossings which would be managed by EOs and gave the Driver A780 the proceed aspect to enter the section. As Driver A780 approached the first level crossing with reported faults (XE071) he stopped in rear of the stop signal until the EO cleared the signals and Driver A780 travelled through the level crossing without incident. However, the signals at the next level crossing with reported faults (XE098) were not illuminated and Driver A780 only became aware of the situation when it was too late to stop in advance of the signal and level crossing and travelled through the level crossing with the barriers raised to road traffic (the EO was onsite but had not taken local control of the level crossing). Due to issues with the train radio operating in the cab (also as a result of the lightning strikes), Driver A780 travelled for a further eleven kilometres (km) before coming to a stop. IÉ assigned an SRR of 18 to this Category A SPAD; therefore categorising it as a *medium risk* SPAD.

17 The RAIU investigation into this SPAD event found the immediate cause of the Driver A780 travelling past signal XE098DS at danger was that the GLS allowed Train A780 into the section of track where it was known there was two faulty level crossings, as the LCCO have not told the GLS not to allow trains into the section until the EOs had arrived at the level crossings and had verified that they were in order to allow a train approach. Contributory factors to Train A780 passing Signal XE098DS were:

- Driver A780 had not travelled toward Level Crossing XE098 cautiously, as set out in the Rule Book, as he had an incorrect expectation that he would approach Level Crossing XE098 with the signals operational;
- The visibility of the signals was affected by the adverse weather conditions, which resulted in Driver A780 losing situational awareness as to his location in terms of the level crossing and resulting in him, not seeing Signal XE098DS until it was too late to stop;
- The LCCO did not have clear understanding of the LCCC instructions, which resulted in him not telling the GLS not to allow trains into the section until the EOs had local control. In addition, the LCCO was not aware that he had to get the EO to verify the status of the level crossing;
- The GLS did not fully appreciate the role of the EO and was not aware that EOs were required to verify the status (to the LCCO) of the level crossing before allowing trains to approach them.

18 Underlying causes to the SPAD are:

- The LCCC Instructions are not user friendly, which has resulted in the LCCOs reverting to the Rule Book which is not fully comprehensive in terms of the operation of CCTV level crossings;
- The roles and responsibilities of the LCCOs and the Signaller are not fully established, in that the LCCOs appear to have gained more responsibility over recent years, which is not supported by any documentation.

19 The root causes to the SPAD was:

- Role of the LCCO and GLS do not appear to be fully outlined in any formal documentation.

PART 5 – SPAD at Signal WL167, Muine Bheag, on the 9th April 2013

20 On the 9th April 2013, at approximately 11:19 hrs, the 10:15 hrs passenger service from Heuston to Waterford (Train A504) approached Muine Bheag Station with signals WLR161 and WL161 displaying double yellow and single yellow aspects, respectively. This signalling sequence was

due to, Signal WL167 (on the exit of the station) displaying a red aspect, as a Track Recording Vehicle (TRV) was due to cross Train A504 at Muine Bheag Station.

- 21 Train A504 was travelling with a driver (Driver A505, who was not the rostered driver for this service) and trainee driver. After performing a number of platform duties, such as ensuring all passengers disembarked and boarded the train safely, the Person in Charge (PIC) gave the 'Station Works Complete' and the 'Ready to Start' signals despite seeing that Signal WL167 was at danger. The trainee driver saw the PIC give these signals as he was looking out of the cab window and Driver A505 watched the PIC give the signals on the in-cab Man Machine Interface (MMI) screen. Driver A505 did not observe Signal WL167, which is positioned approximately 215 m off Muine Bheag Station Platform.
- 22 Driver A505 then departed Muine Bheag Station and on approaching Signal WL167 saw that Signal WL167 was displaying a red aspect and immediately applied the emergency brake, coming to a stop a short distance past the signal. The signalman contacted Driver A505 on the train radio to inform him he had passed Signal WL167 at danger and not to move the train.
- 23 The RAIU investigation found that the immediate cause of the Driver A505 starting against and travelling past Signal WL167 at danger was that he did not check the signal prior to departing Muine Bheag Station. Contributory factors to Driver A505 not checking Signal WL167 prior to departing the station:
- There was no DRA in the driving cab which may have reminded Driver A505 to check the signal prior to starting against Signal WL167;
 - Driver A505 had an incorrect expectation that Signal WL167 was displaying a proceed aspect due to an over-familiarisation with the normal signal sequencing at Muine Bheag Station; not knowing that a TRV was due to cross his train at Muine Bheag Station; and receiving the 'Ready to Start' signal from the PIC Muine Bheag;
 - Driver A505 was distracted by the presence of the Trainee Driver in the driving cab;
 - Driver A505 was unable to apply any EPTs to remind him to check the signal and manage the distraction in the cab, as he did not have appropriate EPT training;
 - PIC Muine Bheag giving the 'Ready to Start' signal despite knowing the signal was at danger.
- 24 Underlying cause to the SPAD is:
- Training in EPTs and competency management systems are not sufficiently robust, especially for SAS SPADs which account for the largest amount of SPADs on the IÉ network, and where there was, historically, no DRA present in the driving cabs.

PART 6 – Collective review of all Category A SPADs

Factual findings

- 25 A collective review of all Category A SPADs was then carried out by the RAIU which made a number of findings in relation to the prevalence of SPADs, SPADs are most likely to occur:
- To drivers with between three and five years of driving experience;
 - In the afternoon or evening time;
 - Within the first thirty minutes driving.
- 26 It was also noted that a quarter of drivers involved in the SPADs reviewed by the RAIU, had previous SPADs; while nearly 40% had been involved in a safety related occurrence that required that the driver be reclassified. Detailed descriptions of each of the forty-five events are given in the main report, a summary of the circumstances are shown below, categorised as either SAS SPAD, SOY SPAD, SPADs in normal operations, SPADs during degraded operations.
- 27 In relation to the infrastructure, the RAIU investigation found that enhanced overrun protection, which mitigates against disregard of signal aspects warning of a signal at danger and against disregard of a signal at danger by a train starting from rest, is provided on IÉ in the form of either advisory (Continuous Automatic Warning System (CAWS)) or mandatory train control systems (Automatic Train Protection (ATP)). CAWS accounts for is available on 41.6%, while ATP is available on 4.6 % of the IÉ network, which means that over half of the IÉ network is protected through basic overrun protection, meaning that there is a strong reliance of the performance of drivers in the prevention of SPAD events.

Human factor contributory factors related to Category A SPADs

- 28 The RAIU found that loss of situational awareness, distraction and/or preoccupation and incorrect expectation were the main contributory factors associated with the causation of SPADs. The occurrence of these human factors varied related to event type, for example:
- Loss of situational awareness, distraction and/or preoccupation, and incorrect expectation of signal aspect were all major contributory factors in SPADs occurring during normal train operations;
 - Incorrect expectation was the major contributory factor in SPADs occurring during degraded train operations, which was generally as a result of inputs from other operational staff, such as signalmen;

- Incorrect expectation, distraction and/or preoccupation, and loss of situational awareness where all major contributory factors in SPADs occurring during normal train operations;
- Distraction, loss of situational awareness and incorrect expectation were all major contributory factors in the occurrence of SOY SPADs, with distraction being a contributory factor in nearly all SOY SPADs.

29 A summary of the human factors findings for the forty-five investigations are included as an appendix to this document.

Use of EPTs to manage human factors

30 Irrespective of the different human factor contributory factors or event types, the RAIU found that the vast majority of the drivers involved in Category A SPADs, did not apply any form of EPTs, or incorrectly applied EPTs, to manage these human factors. As a result, the drivers were unable to refocus after distraction, avoid incorrect expectation or maintain situational awareness as they had not developed appropriate EPTs. This was as a result of drivers receiving inadequate training in EPTs and the lack of any form of assessment in terms of EPTs. The RAIU found that, post incident, the majority of drivers had developed some form of EPTs, which they found to be very effective in the management of distractions, incorrect expectations and situational awareness, and consider that if they had applied these EPTs on the day of the SPAD incident, the SPAD would not have occurred.

SPAD Management

31 IÉ have adopted a system for the calculation of SPAD severity which appears to 'underscore' the severity of SPADs, with a large number of SPADs being awarded an SRR of 0; as a result a true reflection of the SPAD severity on the IÉ network cannot be determined. IÉ have engaged a consultant to review this process (awaiting report). In terms of IÉ's collation of SPAD event information, the databases provided to the RAIU are inconsistent, sometimes inaccurate and not complete (as they generally do not include any findings from IÉ reports). In terms of the internal investigation of SPADs on the IÉ network, a large number of the reports take an excessive amount of time to complete (exceeding their own requirements of six months); while some reports remain in draft format. The reports indicate that there is a lack of consistency in the investigative terms used resulting in the frequent misuse of common investigation terms.

32 It was also found that drivers on the IÉ network generally do not report near miss events (only one near miss SPAD has ever been reported in IÉ between 2012 and 2015). If an adequate near miss reporting system was adopted it could be used as a tool by IÉ in relation to the proactive management of the prevention of SPADs; however, as this is not occurring, there is no early

detection for the early identified of SPADs by certain drivers or at certain signals on the IÉ network.

Driver management

33 Drivers, in some cases, are permitted to make a number of movements post SPAD event in order to recover the situation. However, it is evident that SPAD events are traumatic for drivers and although they may feel they can carry out the movements, errors sometimes occur. In addition, even after 'very serious' incidents, drivers have been permitted to carry out train movements, despite other drivers being available. In terms of other operational staff, in a lot of SPAD events, these operational staff were not removed from duties, despite it being later found that their actions were contributory to the SPAD event. This variance in the treatment of operational staff, has led to the perception of some drivers involved in these incidents that the drivers are. The general treatment of the drivers, post SPAD event, has also increased the perception as it has been found by the RAIU that in some cases drivers are treated poorly, with the suggestion of further sanctions and accusations of having SPADs on purpose. Actions taken against some drivers appeared quite punitive. The above factors have resulted in drivers not reporting near miss SPADs or other incidents, for fear of further sanctions; or fear of being removed from the driving grade and IÉ.

Additional Observations

Suspected self-harm incidents

A number of the drivers interviewed as part of this investigation had been involved in fatal incidents on the railway line as a result of individuals purposefully placing themselves in front of the moving train. The drivers who experience these incidents found the event itself to be very traumatic.

In certain cases, drivers were left alone on the train for long periods of time without any instruction from management (this is likely the result of trying to arrange emergency services and arrangement for the transfer of train passengers to a bus service). In addition, in some instances drivers were required to attend the Coroner's Court and were questioned by the families of the deceased, the drivers who experienced these scenarios found them to be very stressful and found that they had no support from the company when required to attend these courts. However, it should be noted that in some depots, drivers are well supported through this time.

Drivers involved in these incidents are initially offered six counselling sessions. Some drivers have stated that they have requested additional support from the CMO, while some drivers do not consider that they need the counselling service.

Near miss reporting

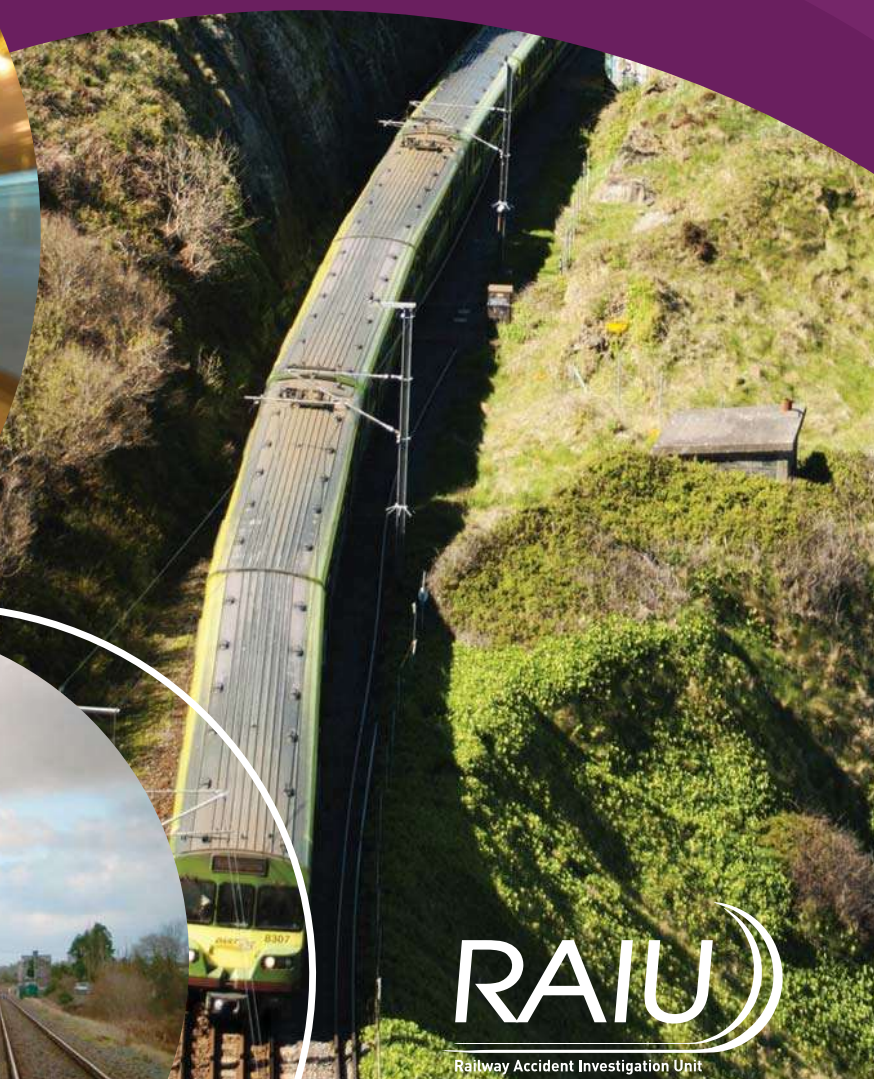
It is clear that a number of unsafe acts must occur prior to the occurrence of a SPAD, however, drivers are not reporting these incidents, and to date, there has only been one near miss SPAD reported to IÉ which resulted in the driver being placed on a DD&SS. Drivers are not reporting these incidents because of concerns of being placed on a DD&SS or other sanctions.

Section 3

Part 7 – Relevant actions taken or in progress by IÉ

Part 8 – Relevant actions taken or in progress by the RSC

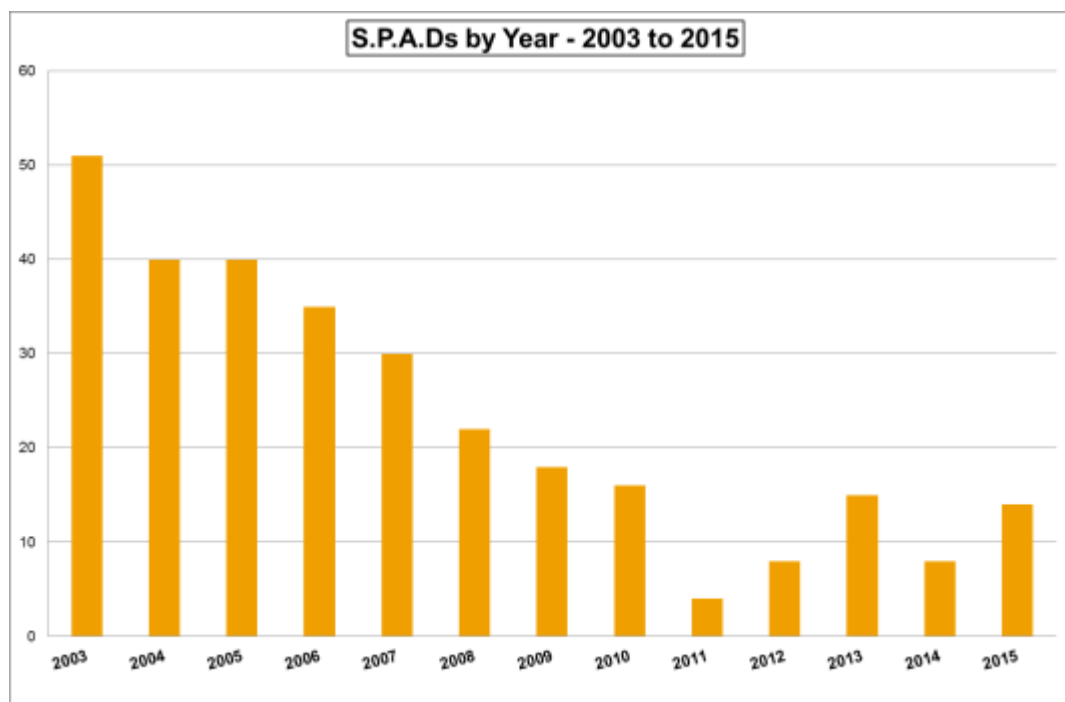
Part 9 – Relevant actions taken or in progress by BBRI



Part 7 – Relevant actions taken or in progress by IE

Introduction

34 IÉ state that they are “seeking to continuously improve its management of SPAD risk”. The following figure shows the significant reduction in the number of SPADs which has been achieved from 2003 to 2015 (however it is noted that there are two peaks in the numbers of SPADs in 2013 and 2015).



35 As of the publication of this report, IÉ have stated that the following actions have been taken:

- Development of professional driving standards – A suite of standards dealing with driver selection, training, competence assessment, development and support, route knowledge, briefing and communication of safety critical information has been introduced into IE based on best practice. A professional driver’s handbook as well as a competence standard booklet has also been produced defining best driving practices and this is supplied and briefed to drivers;
- Driver recruitment and training – Improvements have been made to the selection of drivers utilising up to date psychological profiling. In regard to training the training course has been revamped and train simulators have been introduced at training centres in Inchicore and Mallow. Drivers receive a range of briefings such as human factors, non-technical skills, and safety critical communications also;

- Enhanced driver support & monitoring – Where a need has been identified post incident or through the competence management process drivers are placed on DD&SSs to ensure that any weaknesses/risks are correctly dealt with;
- Increased driver engagement – Drivers participate in central and local Operations Risk/SPAD focus groups, workshops and review groups to ensure that their views are taken on board in all the initiatives that are being developed;
- Benchmarking from UK and European rail operators – IÉ keeps in touch with best UK and world practice through the employment of a UK based industry expert who assists in the development of standards, briefings and workshops. Additionally through our workshops several UK based experts have shared their knowledge and experience of SPAD and operational risk management with management and drivers;
- Safety monitoring – Drivers are subject to monitoring of their driving performance through regular downloads and analysis of OTDRs, these check the speeds of trains, braking and defensive driving performance, etc.;
- LRA management - IÉ has introduced a range of measures for the management and communication of Low Rail Adhesion (LRA) conditions. These range from vegetation management, sanding devices on trains, spreading of Sandite and Traction Gel application. In addition all drivers receive an annual LRA briefing and communication of LRA hotspots;
- SPAD investigations – All SPADs are fully investigated. A revised data collection form has been introduced as well as an OOR form. This review takes place no later than 5 days after the incident and a key feature is that the driver involved in the incident is invited to participate in the review. The outcome of the review is recommendations to prevent reoccurrences. Both of these forms have now been revised and an enhanced process for SPAD investigation is now in place. An important aspect of this is driver involvement in the investigation process by their attendance at the review meetings;
- Human Factors/Non-technical skills - IÉ recognises the importance of ensuring that drivers are fully aware of the impact of human factors in their driving performance. Issues such as concentration, distraction, fatigue, stress, attitudes and perception etc are dealt with in training and briefing. The concept of the assessment of non-technical skills is built into the competence assessment process and Traction Executives have been trained in this assessment. IÉ employs the services of the Occupational Psychology Centre in the UK to assist with Human Factor related issues. The CMO is also involved where drivers may have psychological or other medical issues impacting on their performance;
- National Operational Risk and SPAD Focus Group - IÉ have a review process in place for SPADs and other operational occurrences. A network wide SPAD Focus Group was formed in the early 2000s that changed focus to Operational Risk & SPAD's in about 2008 to reflect the wider operational accidents and precursors. This group meets five times per annum and hold a conference/workshop annually. These meetings are attended by management and staff, including Drivers/DTEs/Signalmen from IÉ-RU, IÉ-IM and other Operating companies.

From IÉ-RU train drivers and DTEs attend and recent events are discussed and actions determined. The outputs from the annual workshop assist in formulating the action plans for the following year.

Investment Led Technical Initiatives

Driver Reminder Appliance

36 The DRA is a device in a driving cab to enable the driver to set a reminder when stopped at a signal that the signal is at danger. When set the DRA prevents the driver being able to take power. In its most simple form it is manually activated and automatic setting systems are considerably more complex and costly. As it is not automatic the correct use of the device must be policed for maximum effectiveness. The use of the DRA can be monitored as it is linked in to the OTDR. The manual DRA will be fitted to all driving cabs of IÉ rolling stock that do not have ATP fitted i.e. the IÉ fleet of diesel trains. The device is linked into the OTDR data recorder which will record activation of the device in accordance with accepted standards. This involved software modifications of the TELOC data recorders to incorporate the additional channel. The design and development work commenced in Q1 2015 and the project to fit Iarnród Éireann fleet of diesel trains with the DRA was completed on 8th December 2015. The DRA will be fitted to Infrastructure maintenance vehicles in 2016. The use of DRA is mandatory as described by the IÉ Rule Book. The Nexala system which is currently installed and operational on the 22000 fleet only provides the facility to gather data from the OTDR and generate a DRA usage report. It is not possible to provide usage reports to any other fleets at this time. The Nexala system is currently being installed on the 29000 fleet but will not be fully operational until late 2016.

Train Protection Strategy

37 The IÉ Board has approved the company strategy for the introduction of a TPS and work is underway on this project. The main objective of TPS is to provide a technical solution for SPAD mitigation where none exists currently and to eliminate high risk SPADs on the running line that have the potential for catastrophic consequences. This involves the development and safety approval of equipment that provides existing CAWS and ATP functionality and additional safety benefits:

- Provision of ATP on DART DMU fleet;
- Provision for train stop using fixed balises on DART and CAWS areas;
- Provision for train stop in non-CAWS areas using switchable balises;
- Provision for train regulation to line speed and speed restrictions;
- Provision of a compatible equipment platform for future migration to ETCS/ERTMS;

- The TPS will replace the life expired CAWS / ATP equipment;
- The project is currently developing a prototype on-board solution for three fleets, EMU 8520, DMU 29000 and DMU 22000 (ICR);
- IEIM have carried out a review, which has shown that the currently planned action of installing this system on the trains and fitting the infrastructure with Eurobalises will provide a train-stop function, mitigating the SPAD risk;
- This system is similar to systems already in service in Europe, and will have ATP and speed supervision functionality. The technical development of the system, and its safety approval by the RSC, are well advanced and, subject to availability of funding, IE plans to introduce the system on its network as soon as practicable;
- The overall roll-out strategy will be risk-based, in order to provide the maximum safety benefit for a given installation cost during the roll-out phase, and a study is being undertaken to assess the safety benefits of various approaches;
- The design development phase of the project was funded through the Multi Annual Contract but this budget cannot extend to cover the rollout phase. The rollout phase is therefore dependent on Government commitment to provide the required funding. The roll-out of the TPS should not commence until funding is guaranteed since an incomplete project would lead to multiple types of TPS within the IÉ rail network and an intolerable risk scenario.

Management Initiatives

Current Train Operations initiatives – Operational Risk Workshops

38 A number of Operational Risk workshops have been held to enable participants identify improvements to standards, procedures and practices that may contribute to a reduction in risks from SPADs and other operational incidents. These workshops include attendees from management, supervisory and driver grades. The output from the workshop is a number of actions to be progressed. The workshop is an opportunity to communicate improvements and to hear what further actions are needed.

DD&SS

39 One of the key outcomes of the Risk Workshop was a clear message that the DD&SS was perceived as being punitive and not being applied consistently across the organisation. In order to achieve further buy in from drivers and improve the perception of the standard a process has been undertaken involving Drivers from all Districts as well as DTEs to revise this standard. Considerable work has been undertaken and at this stage and the revised standard was in October 2015. The improvements to the standard is in the following areas:

- Reduction in the time on Category A plans for 4 years to 3 years;

- Transfer of first time/minor incidents from Category D plans to Corrective coaching under the existing Continuous Competence standard, OPS.SMS 3.1;
- Revision of Safety Performance Review Process to ensure that it is clearer and more equitable;
- Introduction of Review Meetings involving drivers from all districts and representative of management in order to address any concerns over a lack of the consistent application of the standard.

Driver Training and Competence

40 IÉ recognises the importance of ensuring that drivers are fully aware of the impact of human factors in their driving performance. Issues such as concentration, distraction, fatigue, stress, attitudes and perception are dealt with in training and briefing.

41 The concept of the assessment of non-technical skills is built into the competence assessment process and Traction Executives have been trained in this assessment. IE employs the services of the Occupational Psychology Centre in the UK to assist with Human Factor related issues. The Chief Medical Officer is also involved where Drivers may have psychological or other medical issues impacting on their performance.

42 Safety standard OPS SMS 3.1, Competence Management Drivers, was reviewed during 2014 and revised version in place since September 2014 Issue 1, V 1.03. It has an enhanced process for assessing drivers in non-technical skills and provides a matrix to record the various elements of train driver competencies

43 During 2014, prior to the introduction of the revised standard, the DTEs and Driver Trainers attended workshops, facilitated by a railway industry consultant, on the application of non-technical skills. The identification of non-technical skills relative to SPAD occurrences is included in the investigation process, the driver development & support process and the continuous competency process.

44 The Professional Drivers Handbook was revised in 2014 and Issue 4 published in November 2014 and has enhanced guidance on non-technical skills.

External Depot Review of Train Drivers Competence processes

45 An external consultant has been engaged to review the management of driver's competence process at all the main depots and to report on findings. This review is now complete and a number of actions have been identified. Overall the report is very positive in its findings. The output from the review formed part of the agenda for the risk workshops and provided opportunity for engagement with staff in developing action plans.

External review of Human Factors

46 IÉ-RU have engaged with Trinity College Dublin where a research fellow is undertaking a review of human factor issues that affect train driver performance and the scope of the research encompasses the occurrences of SPADs. The research programme commenced in January 2016 and is expected to take approximately one year to complete. The results of the research will inform the management of all staff into the future.

Safety Culture and Leadership

47 A key strategic safety initiative, is a campaign with the aim of improving safety culture in the organisation, was launched in February 2015 with over 70 senior managers in attendance. The key elements of this campaign have been:

- A widespread communications campaign to engage all staff in improving our safety performance under the banner of “Accident free Depends on Me”;
- Improved processes for reporting of ‘close call’ events in an uncensored and non-judgemental way;
- Safety leadership training for all senior management levels;
- Engagement of safety representatives from across all company functions;
- A safety award scheme to acknowledge and promote best practice
- Widespread communication of period safety performance and action plans

48 As part of this initiative we have also reviewed and strengthened our standard for Driver Development and Support (OPS-SMS-3.2) to provide enhanced advice, support and development of drivers. The standard provides for non-punitive actions that support drivers in developing their overall competence. The process to review this standard included engagement with drivers to capture their input and ensure that it would fully reflect best practice for the development and application of such a standard.

External Review of Management of SPAD events

49 The RSC reviewed a snapshot of 5 recent SPAD events and suggested Iarnród Éireann’s hazard ranking was potentially flawed. They requested a review of the 90 SPADS that have occurred since the hazard ranking system was implemented. An external expert carried out a review of signal passed at danger investigations from 2009 to 2015. The review has found that the management of SPAD events is substantially robust and the re ranking of the SPAD events matches closely with the results previously reported by Iarnród Éireann. The report identifies a number of opportunities for improvement to further strengthen Iarnród Éireann’s use of SPAD risk ranking.

50 The user manual for the risk ranking tool has been updated and training in the use of the tool is scheduled to take place on 22/03/2016 and is being facilitated by an external provider. A number of people from both the IM and RU Safety Departments are being trained in the risk ranking process.

Expected reduction in the number of SPADs due to Technical& Management Initiatives

51 IÉ are pursuing continuous improvement in SPAD performance and has sought other initiatives to achieve a further step change in performance including the fitment of driver reminder appliances to all fleets by the end of 2015, further management initiatives focussing on human factor elements for drivers and signallers and the introduction of Train Protection Strategy. The management initiatives will focus on the enhancement of safety culture, development of human factor elements for drivers and signallers, further improvement in the management of SPAD events and continued benchmarking against best practice in SPAD prevention strategies. These initiatives are expected to reduce the incidents of SPADs significantly and the figure below estimates the reduction over the next five years.

Year	Reduction from Technical Initiatives - DRA	Reduction from Management Initiatives	Expected SPAD Reduction	Expected number of SPADs
Current *				11
2016	35%**	5%	40%	7
2017		5%	5%	7
2018		5%	5%	7
2019		5%	5%	7
2020		5%	5%	6
* Based on average number of SPADS over last 5 years				
** Based on IÉ SAS SPAD rate of 50% and reduction rate of 70% of SAS SPADS achieved in the UK following introduction of DRA				

Part 8 – Relevant actions taken or in progress by the RSC

Actions taken by the RSC

Actions taken in 2014

52 In February 2014, the RSC undertook an audit of IÉ's SMS. The audit focused on the "Maintenance and Operation of the Traffic Control and Signalling System". In September 2014, the RSC received a copy of Irish Rail's investigation report , an OOR following a SPAD occurrence at Signal MW826 at Mallow Station, which occurred on the 16th May 2014. Having reviewing the OOR, the RSC commenced a PPI Inspection into the occurrence, this involved the review and examination of all IÉ's standards/procedures relating to SPAD risk ranking and interviewing key personnel involved in SPAD risk ranking. In December 2014, the RSC met with the Safety Compliance Manager and the Chief Traction Executive to discuss the SPAD risk ranking process and concerns with had with IÉ-RU's application of the process.

Actions taken in 2015

53 In March 2015, the RSC met with SPAD experts from the RSSB to discuss the SPAD risk ranking process and concerns the RSC had with IÉ's calculation of same. The RSC met with the Head of Safety Infrastructure and the Procedures Manager – Infrastructure to advise them of the RSC's concerns with the IÉ-RU's application of the SPAD risk ranking process. In June 2015, the RSC completed their audit, focused on the "Maintenance and Operation of the Traffic Control and Signalling System". The RSC then wrote to the IÉ Chief Executive requesting that they undertake a critical review of the management of SPADs.

Actions taken in 2016

54 In March 2016, an RSC Inspector attended SPAD Risk Ranking Training provided by UK Consultant AD Little Limited.

Ongoing Activities

55 The RSC meet quarterly with the respective manager's responsible for internal audit and accident/incident investigation from IÉ-RU and IÉ-IM to discuss ongoing audits and accident/incident investigations. These activities include reviewing SPAD occurrences, associated investigations and relevant audits

56 The RSC meet quarterly with the senior executives from IÉ-RU and IÉ-IM to discuss safety performance that includes reviewing SPAD occurrences

57 The RSC produce an annual Railway Safety Performance Review that presents and discusses accident and incident trends. This includes the presentation and discussion of SPAD occurrences

58 The Commission produce an annual report on its activities for the Minister for Transport, Tourism & Sport and make comment on accident/incident statistics and areas of concern.

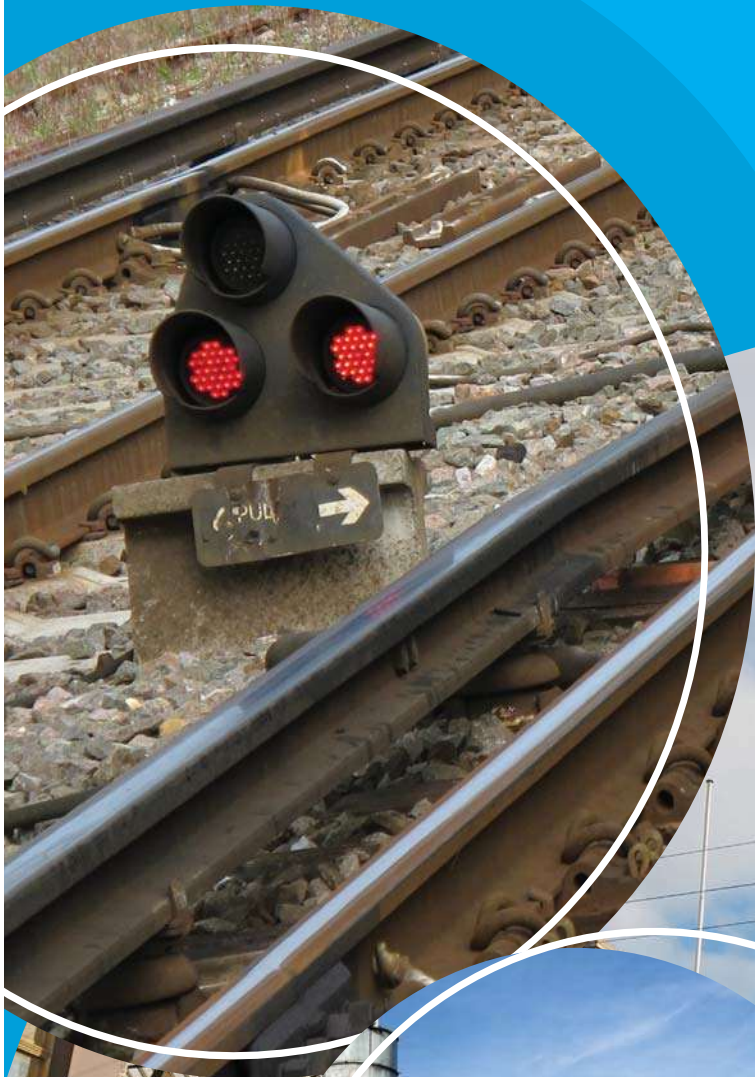
Part 9 – Relevant actions taken or in progress by BBRI

59 It is BBRI's intention to support the current in-house CMS and are currently developing a new element to the drivers assessing standard which will cover the seven areas pertaining to non-technical skills as follows:

- Situational awareness – Which will focus on attention to detail, overall awareness, maintaining concentration, retain information (during shift) and anticipation of risk;
- Conscientiousness – Which will include training on a systematic and thorough approach and checking positive attitude towards rules and procedures;
- Communications – Listening (people not stimuli), clarity, assertiveness, sharing information;
- Decision making – Effective decisions, timely decisions, diagnosing and solving problems;
- Cooperation and working with others – Considering others' needs, supporting others, Treating others with respect, dealing with conflict / aggressive behaviour;
- Workload Management – Multi-tasking and selective attention, prioritising, calm under pressure;
- Self-management – Motivation, confidence and initiative, maintain and develop skills and knowledge, prepared and organised.

Section 4

Part 10 – Safety Recommendations



RAIU

Railway Accident Investigation Unit

Part 10 – Safety Recommendations

General description

60 In accordance with the Railway Safety Act 2005 (Government of Ireland, 2005) and the European Railway Safety Directive (European Union, 2004) and Statutory Instrument No. 258 of 2014 European Union (Railway Safety) (Reporting and investigation of serious accidents, accidents and incidents) Regulations 2014, recommendations are addressed to the national safety authority, the RSC. The recommendation is directed to the party identified in each recommendation.

61 Actions reported that address factors which otherwise would have resulted in a RAIU recommendation:

- The project to fit the IÉ fleet of diesel trains with the DRA was completed on 8th December 2015. The DRA will be fitted to Infrastructure maintenance vehicles in 2016;
- IÉ-RU have reviewed and enhanced their training and competency management systems in relation to non-technical skills, in particular related to the adoption of EPTs by drivers. They have developed a system whereby these non-technical skills can be assessed and this is now incorporated into the suite of training and competency management operations documents. IÉ-RU have also reviewed their current system of driver profiling to ensure that a driver's classification clearly illustrates the drivers' driving history;
- IÉ-RU reviewed and enhanced their management of drivers, post SPAD event;
- IÉ-RU have reviewed their current system for the monitoring of over-speeding so that if a driver is found to be overspeeding, that this is formally recorded as an area for development for the driver;
- IÉ have reviewed their operating procedure which deals with the Supporting of Staff following Fatalities on the Line. This has been developed in conjunction with driver's representatives. It also makes provision for support in relation to attendance at Coroners courts and provides training for District Traction Executives and District Managers in providing support;
- IÉ have reviewed train despatch procedures with a view to eliminating SAS and SOY SPADs, and issued a "Professional Dispatchers Handbook" outlining good practice in dispatching techniques.

New safety recommendations

Safety recommendations associated with engineering & infrastructure

62 The majority of train protection on the IÉ network is through basic overrun protection. To date, approximately only half of the IÉ network is fitted with a form of enhanced overrun protection. The provision of enhanced overrun protection mitigates against drivers disregarding signal aspects warning of a signal at danger and against disregarding of signals at danger by a train starting from rest. This form of protection, would have provided additional train protection in all SPAD incidents identified in this report. The absence of enhanced overrun protection results in the safety of the trains being dependent on the actions of the drivers, and places an unrealistic reliance on drivers not to commit any errors.

63 The absence of the provision of enhanced overrun protection on single lines with crossing loops is the highest risk in relation to SPAD events. The RAIU have identified seven incidents of SPADs on single lines with crossing loops between January 2012 and June 2015. One of these SPADs was the SPAD at Millstreet on the 8th December 2013, which allowed for two trains to approach the same station platform, and only coming to a stop 175 m apart on the instruction of the signalman; resulting in the high risk of a potential head-on collision of two trains. As a result, the RAIU make the following safety recommendation (All Category A SPADs; Millstreet, CF-01):

IÉ-IM must introduce an adequate train protection systems on all of the IÉ network for the protection of trains; this system should be robust and to an acceptable standard within Europe; and have the appropriate ATP and speed supervision functionality

64 The RAIU have identified two SPAD incidents on the DART network, namely the SPADs at Signals CY33, Connolly, on the 11th September 2014 and SPAD at Signal DN201, Howth, 21st April 2015, whereby the drivers of the trains maintained the engagement of the running release on the approach to signals displaying red aspects, thus effectively 'overriding' the train protection function of the ATP. As a result the RAIU make the following safety recommendation:

IÉ-IM should review the functionality of the ATP's running release to ensure that the train protection function in relation to passing a signal at danger is appropriately maintained where drivers are approaching signals displaying red aspects. If this is not feasible with the current equipment it should be included any new train protection system introduced on the network.

65 The driver of the SPAD at Signal CY33 (Connolly) on the 11th September 2014, reported instances of abnormal downgrades at CY26 and CY33 as a result of SET issues, as a result, the RAIU make the following safety recommendation:

IÉ-IM should review the functionality of signals in the Connolly area so that the instances of abnormal downgrades are minimised.

Safety recommendations associated with human factors

66 The RAIU have made a number of observations in relation to the occurrence of Category A SPADs, namely in relation to the prevalence of SPADs:

- In the afternoon/evening;
- At the start of driver's shifts;
- For drivers with 3-5 years driving experience.

67 As the RAIU could not determine any definite causes for these findings, the RAIU make the following safety recommendation:

IÉ-RU should commission an independent review, in terms of human factors, to determine why there is a prevalence for the occurrence of SPADs: at certain times of the day; at certain times of drivers shifts; and for drivers with three-five years driving experience.

Safety recommendation associated with driver management and the DD&SS

68 The RAIU review of the incidents found that the drivers had been subject to varying treatment by IÉ as a result of the SPAD incidents. whereby, on the occurrence of a SPAD incident, some of the drivers have:

- Been removed from the driving grade for long periods, with no communications with management;
- Been subject to sanctions (in terms of hours and pay or removal from the driving grade);
- Been subjected to inquiry processes, which have been lengthy and involved the interviewing of drivers by up to eleven members of staff;
- Been accused of having the SPADs on purpose.

69 The placement of drivers on a DD&SS was viewed to be a punitive measure; rather than its intended function as a method of redeveloping driving skills and supporting the drivers in returning to driving duties, after a SPAD event.

70 It has also been noted, that other operational staff had not been relieved from duty similar to drivers, despite their actions being later found to be contributory to the incident (particularly in the case of SPADs during degraded train operations).

71 The review of the IÉ investigation reports also indicates that the drivers actions are considered to be the immediate, contributory and underlying causes to the SPAD incident, despite, this not always being the case

72 As a result of the above, the RAIU make the following safety recommendation:

IÉ RU should review the culture within the company so that actions taken after SPAD's supports learning within the driver grades should errors occur, and that the DD&SS is used for redeveloping competence in driving skills and supporting the drivers in returning to driving duties, after a SPAD event.

Safety recommendations associated with near miss SPAD events

73 To date, only one near miss SPAD event has been reported within IÉ, despite a number of drivers indicating to the RAIU that they have been involved in near miss SPAD events.

74 Drivers should be able to report near misses without the fear of sanctions, as a result, the RAIU make the following safety recommendation:

IÉ-RU should introduce a near miss reporting system, whereby, drivers may report near misses without the fear of sanctions being imposed.

75 As the previous near miss reporting system, introduced into IÉ was unsuccessful, and given that near miss SPADs are occurring, and consequences of SPADs can be serious, the RAIU make the following safety recommendation:

IÉ-IM should identify high risk signals and, where the technology exists, introduce a mechanism to monitor the approach speed to these signals; to ensure that near misses are identified and managed.

Safety recommendations in relation to Traffic Regulation

76 In relation to the dearth of information provided in the Traffic Regulator's Manual specific to the management of trains during delays, the RAIU make the following safety recommendation (Millstreet, CF-06, UC-01):

IÉ-IM should review the Traffic Regulator's Manual with a view to introducing guidance for Traffic Regulator's in terms of the management of train delays and the switching of crossing points.

77 The Traffic Regulator was unaware that he had reduced the overrun protection for the train approaching Millstreet Station through his planned sequence of movements. There appears to be no clear training programme for Traffic Regulators, in particular, there is no training related to the dynamic risk assessments of regulating trains; only mentoring by other Traffic Regulators is provided; as a result the RAIU make the following safety recommendation (Millstreet CF-06):

IÉ-IM should review their training and competency management for Traffic Regulators so that they have the appropriate skill set in terms of identifying potential risks associated with the regulating of trains

Safety recommendations related to SPADs during degraded train operations and safety critical communications

78 The RAIU review of SPADs occurring during degraded train operations, found that the actions of some third parties were contributory to the incidents occurring in most SPAD events. The RAIU also found that there were several instances of poor communications between operational staff during degraded train operations, and as a result the RAIU make the following safety recommendations:

IÉ-RU and IÉ-IM should carry out a review of the interfaces between different operational staff (i.e. drivers, LCCOs, signalmen and EOs) so that all operational staff can adequately manage train operations during degraded situations. Part of this review should focus on the safety critical communications between operational staff.

79 In some cases, there is no recording of communications between safety critical staff (e.g. between drivers and signalmen, such as the SPAD at SAOIB, Limerick (Limerick), 24th September 2014). As a result, the RAIU make the following safety recommendation:

IÉ-IM should identify all locations where safety critical communications are not recorded and develop a programme of works for the introduction of recording safety critical communications at these locations.

Safety recommendations related to the LCCOs

80 In relation to the SPAD at Signal XX098, Gortavogher, on the 19th December 2013, the Signalmen and LCCO allowed the train to enter a section where it was known that there were faults at the level crossings and with no EOs in attendance. As a result, the RAIU make the following safety recommendation (Gortavogher CF-07, CF-09, CF-10, UC-03, UC-04, RC-02):

IÉ-IM should review the procedures applicable to signalmen, Level Crossing Keeper, LCCO and level crossing emergency operators with particular emphasis on the actions to be taken by each when a fault is detected at a level crossing. This review should consider circumstances where a train may already have entered the affected section of line, and circumstances where the signal may be missing or extinguished.

Safety recommendations related to the placement of speed boards

81 The RAIU have found that the placement of speed boards near signals has been a contributory factor in three SPADs reviewed during this investigation, namely the SPADs at:

- Signal CE482, Glounthaune, on the 29th June 2014 – where the driver became distracted by the speed board after departing a station on a yellow aspect, and had a SOY SPAD;
- Signal XE061, Curravorrin Level Crossing, on the 2nd October 2012 – where the driver lost situational awareness as a result of the speed board, which was placed after a signal that was only capable of displaying a yellow aspect;
- Signal GL353, Athenry, on the 10th July 2013 – where the driver became distracted by a number of events, including the speed board, and had a SOY SPAD.

82 The RAIU also found that the placement of speed boards may have been a contributory factor to the SPAD at Signal TL223, Millstreet, on the 8th December 2013; as a result, the RAIU make the following safety recommendation (Millstreet, UC-02)

IÉ-IM, should review their procedures for the placement of speed boards and brief relevant staff to be vigilant in the placement of lineside signage with respect to the potential for obscuring of signals or otherwise unintentionally providing distractions to drivers, especially in the case where there are fixed colour light signals or they have potential to cause SOY SPADs.

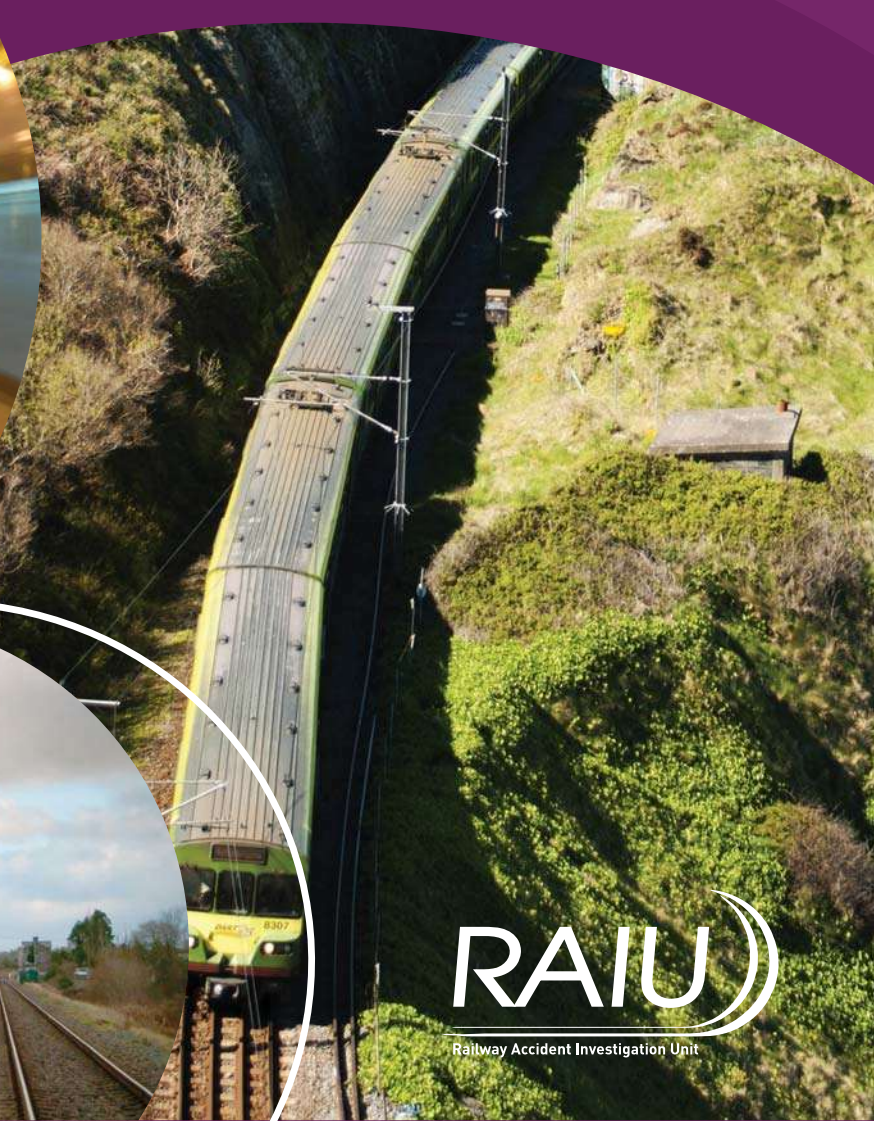
Safety recommendation related to the investigation of SPAD events

83 A review of the internal IÉ investigation methods by the RAIU found that the current system of reporting (OOR) has not yet been formalised; there is a lack of consistency in relation to the terms used in the reports and that the reports appear to take a very long time to complete, as a result the RAIU make the following safety recommendation:

IÉ-IM & IÉ-RU should review the current system of reporting SPAD events so that reports are consistent and published within a set period of time.

Section 5

Appendix – Summary of all Category A SPADs events, January 2012 – July 2015



Appendix – Summary of all Category A SPAD events (2012 – mid-2015)

SAS SPADs (17 incidents)

Location	Signal	Date	Commentary	Factors
Pearse	PE31S	16.01.12	Driver read through to another signal	Spatial Awareness
Limerick Junction	LJ368	07.03.12	Fire at station, unusual event, unfamiliar movement	Spatial Awareness
Ballybrophy	BY488	08.05.12	PIC gave 'Ready to Start' but signal obscured	Spatial Awareness
Bray	BR445	05.02.13	Driver thought he was 'holding road', pulled forward	Spatial Awareness
Killlucan	SL719	21.06.13	Ill passenger, worried about phone reset	Spatial Awareness
Killarney	TL214	09.08.13	Started without checking	Spatial Awareness: Multi-SPAD Signal
Pearse	PE35s	10.08.13	Trying to reset radio	Spatial Awareness: Multi-SPAD Signal
Rathmore	TL226	26.02.14	Read through to signal ahead	Spatial Awareness
Dundalk	DD269	13.05.14	Misread shunt signal, offered to help other driver	Spatial Awareness
Mallow	MW826	16.05.14	PIC gave 'Ready to Start', overran by 966m	Spatial Awareness
Heuston	HN291	11.10.14	Misread shunt, derailed at trap	Spatial Awareness; Communications
Boyle	SL817	18.10.15	Problem with brake, late, distracted	Spatial Awareness
Howth	DN201	21.04.15	ATP not engaged, power lever depressed	Spatial Awareness; Training Report Awaited
Enniscorthy	RL543	09.06.15	OTM didn't tell Signaller plan	Spatial Awareness; Communications
Maynooth	MN143	23.06.15	Driver assumed he had signal as he saw point move.	Attention, awareness
Fairview	CY69	25.06.15	Did not check shunt	Spatial Awareness
Muine Bheag	WL 167	09.04.13	PIC gave 'Ready to Start', did not check plus trainee	Spatial Awareness

SOY SPADS (10 incidents)

Location	Signal	Date	Commentary	Factors
Thurles	TS469	01.11.12	Distracted by Signalman's radio call	Spatial Awareness
Limerick	LK5	08.07.13	Thought signal was Y, sunlight?	Spatial Awareness; Multi-SPAD Signal
Athenry	GL353	10.07.13	WSLP switch set wrongly by Signalman, signal at 'R'	Spatial Awareness
Dundalk	DD262	10.08.13	Distracted by dropping mobile phone	Spatial Awareness
Curragh	HK196	14.03.14	Accelerating to signal in advance despite of 'Y' in rear	Spatial Awareness
Glounthaune	CE842	29.06.14	Distracted by speed board, overran 'R' by 82m	Spatial Awareness
Bray	BR36	20.08.14	Read through to mainline signal	Spatial Awareness
Connolly	PE18	11.03.15	Fail to control train and stop at 'R'	Spatial Awareness; Multi-SPAD Signal
Bray	BR31	28.04.15	Fault on BR31, Signalman couldn't clear '29', passed '31'	Spatial Awareness
Pearse	PE34	18.01.15	Packing bag	Spatial Awareness

SPADs during Normal Operations (11 incidents)

Location	Signal	Date	Commentary	Factors
Longpavement Level Crossing	XE010DS	09.04.12	Didn't react to 'Y' and moved back after SPAD	Spatial Awareness
Curavorrin Level Crossing	XE061	02.12.12	Fixed 'Y', the increased speed	Spatial Awareness
Caherryon	GL336	26.10.12	Saw 'Y', braked for 'R' but too close, sunlight?	Spatial Awareness
Hazelhatch	HK152	15.02.13	Saw 'YY' and 'Y' but overran 'R' by 40m	Spatial Awareness
Athy/Cherryville	WL131	12.03.13	Distracted by reaching for WTT and glasses	Spatial Awareness
Dundalk	DD276	09.05.13	Thought he was traversing points, unclear communications	Spatial Awareness; Communications
Connolly	CY26	03.04.14	Tandem with CY33, confusion both 'R'	Spatial Awareness: Multi-SPAD Signal
Connolly	CY33	11.09.14	Run/release engaged, HiViz, water bottle	Spatial Awareness; Training
Galway	GL391	30.01.15	Confused movement; poor communications with Signalman	Spatial Awareness; Communications
Clonsilla	CL102	15.05.15	Increased speed at 'Y', expected upgrade, personal issues	Spatial Awareness
Millstreet	TL223	08.12.13	Driver not warned of passing place, speed board	Spatial Awareness

SPADS during degraded Operations (7 incidents)

Location	Signal	Date	Commentary	Factors
Black Bog Level Crossing	XW038Us	16.05.15	Poor communications – pilotman/signalman/driver	Communications
Charleville	RC874	18.08.13	Tamper driver read wrong signal, layout?	Spatial Awareness SOY
Limerick Junction	LJ348	25.08.13	Travelled under guards instruction	Operations
Athenry	GL354	16.11.13	Train slid past signal, lack of control	Spatial Awareness
Limerick	SAOIB	24.09.14	Poor communications	Communications
Shanclough Level Crossing	XX062	15.01.15	Driver used mobile to EO; not SPT	Spatial Awareness; Communications
Gortovogher	XE098DD	19.12.13	Signal not lit, not seen	Spatial Awareness Communications