



Railway Accident Investigation Unit

Ireland



INVESTIGATION REPORT Trend Investigation: Possession incidents on the Iarnród Éireann network

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Reader guide

All dimensions and speeds in this report are given using the International System of Units (SI Units). Where the normal railway practice, in some railway organisations, is to use imperial dimensions; imperial dimensions are used and the SI Unit is also given.

All abbreviations and technical terms (which appear in italics the first time they appear in the report) are explained in the glossary.

Descriptions and figures may be simplified in order illustrate concepts to non technical readers.

Report preface

The RAIU is an independent investigation unit within the Railway Safety Commission (RSC) which conducts investigations into accidents and incidents on the national railway network, the DART network, the LUAS, heritage and industrial railways in Ireland. Investigations are carried out in accordance with the Railway Safety Directive 2004/49/EC and the Railway Safety Act 2005.

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.

The purpose of RAIU investigations is to make safety recommendations, based on the findings of investigations, 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.

Report summary

In 2012 Iarnród Éireann (IÉ) had four *possession* related *incidents* within the space of one week. These incidents led to the RAIU to initiate a trend investigation on the 27th February 2012.

The scope of the trend investigation included the four aforementioned incidents and all other relevant reported possession incidents that occurred between January 2009 and January 2013.

Initial analysis of these incidents identified recurring issues with possession planning therefore this investigation has focused on the management and execution of possession planning. Due to the recurring nature of these issues the RAIU have also examined how IÉ manage internal post incident recommendations previously made in the area of possession management.

Contributory factors in relation to possession *incidents* identified were:

- The *Control Room* Process is not fully adhered to in all meetings in that the protection arrangements associated with the occupational safety risks are not discussed;
- The continued planning and implementation of Back-to-Back possessions has introduced practices that are non-compliant with prescribed instructions in the IÉ Rule Book for fog signal protection.
- The consistent booking of pre-established possessions with regards to work, limits and duration has led to possession protection being arranged to coincide with these limits instead of an assessment taking place on a site by site basis;
- The *Weekly Circular* is currently ineffective for communicating actual works that are to be undertaken on a given day/night due to the current practices of booking and cancelling of possessions;
- Late alterations to possession arrangements are not always communicated to relevant staff and have also in some cases led to inadequate possession protection.

The underlying factors were:

- There is no standardised procedure on the requirements and frequency of possession planning meetings and prescribing staff to be involved;
- The procedure for closing out IÉ recommendations has not been effective with regards to planning and Back-to-Back possessions.

The RAIU has made six new safety recommendations as a result of this investigation:

- IÉ (Infrastructure Manager) should develop a formal possession planning meeting framework that is consistent through the IÉ network;
- IÉ (Infrastructure Manager) should review the application of Back-to-Back possessions and implement actions to eliminate any informal practices that do not comply with IÉ Rule Book;
- IÉ (Infrastructure Manager) should establish a possession planning procedure that ensures protection arrangements are based on the work to be delivered and are verified by a suitable member of staff and formally communicated to all relevant personnel;
- IÉ (Infrastructure Manager) should monitor and review entries into Section “Engineering works requiring absolute possessions – Section T Part III” of the Weekly Circular to ensure that the information published in this document is accurate and credible;
- IÉ (Infrastructure Manager) should review the current process for late changes to possessions to ensure changes to possession arrangements are verified by a suitable member of staff and formally communicated to all relevant personnel;
- IÉ (Infrastructure Manager) should undertake a review of possession incidents that have occurred over the last four years to ensure that reports are completed and recommendations are identified and addressed.

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The incidents

Summary of the incidents

- 1 To allow certain types of engineering works to be undertaken in a safe environment normal train movements are required to be stopped at pre-arranged locations and times. To do this railway lines are blocked by taking a possession either in accordance with Section T3¹ of the Rule Book, or if the location involved is a siding Section T4².
- 2 Between the 18th and 23rd February 2012 there were four reported possession incidents on the Iarnród Éireann (IÉ) network, as follows:
 - Possession *protection breach* at Clonsilla Station on the 18th February;
 - Possession protection breach at Dromod on the 18th February;
 - *Points run through* at Boyle on the 23rd February;
 - Possession protection breach at Limerick Junction on the 23rd February.
- 3 The number of these incidents within a one week period prompted the RAIU to review past possession incidents. Fourteen other incidents of interest were identified in the previous three years, of these seven involved points run through, five involved possession protection breaches; one involved staff working without protection and one involved the resetting of *axle counters* with a vehicle still in the possession.
- 4 Five other incidents occurred in 2012 after this investigation started (in March 2012); two involved points run through, one a derailment, one a possession protection breach and one involved a *On Track Machine* (OTM) passing over a level crossing without appropriate permission.
- 5 To date IÉ have completed investigations into eleven of these twenty-three incidents .

General description of the railway

Infrastructure

- 6 The lines involved range from single track bidirectional lines to two track predominantly unidirectional lines. The majority of the track is flat bottom *continuously welded rail* (CWR)

¹ Sometimes referred to as a TIII or absolute possession.

² Sometimes referred to as a TIV.

mounted on concrete sleepers in ballast. No factors in relation to the condition of the track were found to have contributed to the incidents.

Rolling stock

- 7 The rolling stock involved in the incidents reviewed were *engineering trains*, OTMs or *Road Rail Vehicles* (RRVs); the movement of these vehicles for possessions should be in accordance with the IÉ Rule Book. None of the incidents identified any technical rolling stock issues.

Signalling and communications

- 8 In relation to possessions, signalling limits are protected using two and three aspect *colour light signals*, controlled by the *Controlling Signaller* (which will be referred to as the Signaller for the remainder of this report). These are referred to as *protecting signals*, and are normally put to red on all approaches to the possession by the Signaller.
- 9 The means of communication between the Signaller and protection staff on the IÉ network is via telephone (including mobile telephone and signal post telephone).

Operations

- 10 Sections Q and T Part 3 of the IÉ Rule Book, sets out the procedures for controlling vehicle movements and operations within a possession.
- 11 Information of planned possession work, including durations and locations, is published in the Weekly Circular which is then disseminated in hardcopy to safety critical IÉ personnel.

Fatalities, injuries and material damage

Fatalities and injuries

- 12 There were no fatalities, major or minor injuries as a result of these incidents.

Material damage

- 13 Material damage occurred to IÉ rolling stock and infrastructure in a small number of the incidents due to points being driven through in the wrong direction and one incident of a slow speed derailment.

Parties and roles involved in the incident

Parties involved in the incidents

14 IÉ is the *railway undertaking* (RU) that owns and operates mainline railway services in Ireland. IÉ is also the *railway infrastructure manager* (IM), managing the design, installation, testing, inspection, maintenance, renewal and operation of the railway's physical assets. The IÉ network is primarily divided into three Divisions (Dublin, Athlone and Limerick Junction). These Divisions are further sub-divided into a number of *Regions* which themselves consist of several *Chief Civil Engineer (CCE) Locations*.

15 The primary IÉ departments associated with these incidents are the:

- CCE Department – responsible for the design, inspection, maintenance and renewal of the railway's infrastructure;
- Intercity and Commuter Network (ICCN) Department – responsible for the operation of trains on the mainline, excluding the DART network. This includes the supervision of train drivers and control of train movements through Centralised Traffic Control (CTC) Dublin and the Regional controlling cabins;
- DART is responsible for the operation of electric trains on the Dublin Suburban network. This includes the supervision of drivers and the control of movements on the Dublin South Eastern Network.

Roles involved in the incidents

16 The roles involved in the planning and delivery of possession incidents are as follows:

- IÉ Infrastructure Manager (IIM) – Responsible and accountable for all aspects of the management of the production activities within a Division: including track, structures, plant and machinery safety; occupational safety operations and supplier operations;
- Regional Manager (RM) – Responsible and accountable for all aspects of the management of the production activities within a Region: including track, structures, plant and machinery safety; occupational safety operations and supplier operations;
- Permanent Way Inspectors (PWI) – Responsible for the day to day track inspections and maintenance activities for both track and structures at a CCE Location;
- Chief Permanent Way Inspectors – Responsible for the supervision of the PWIs and related works within a Division;
- Infrastructure Production Plan Manager (IPPM) – The custodian and owner of the Iarnród Éireann Infrastructure Production Plan, the focus of this being to assign resources (e.g. OTM's) efficiently in order to ensure the timely execution of production priorities that could, if not delivered timely, give rise to operational inefficiencies and Safety Risks;

- OTM Planner – Part of the IPPM's Team who work with Divisional Planners and RMs to plan the movements and work schedule of OTMs;
- Divisional Planners – Part of the IPPM's Team who work in conjunction with other members of this team, IIMs and RMs to plan maintenance work;
- Signalling Electrical and Telecoms (SET) Supervisor – Responsible for overseeing and guiding SET workplace activities in their designated CCE Location;
- Capacity Allocator – A member of staff based in the Operations Planning office in Connolly, liaises with personnel from a number of departments to compile the Weekly Circular, allocate short and long term train paths and grant possessions (including alterations);
- Mobile Ganger – Responsible for the management of a work group;
- Protection Staff – Staff including the *Person In Charge Of Possession* (PICOP), or *Engineering Supervisor* (ES) and *Handsignalmen* who all have duties prescribed in Part T3 of the IÉ Rule Book establish a protected working environment.

Other parties not directly involved in the incidents

- 17 The RSC is the national safety authority, which is responsible for the regulatory oversight of railway safety in Ireland in accordance with the Railway Safety Act 2005 and European railway safety directive. On the 24th February 2012 the RSC requested an *Improvement Plan* under Section 76 of the Railway Safety Act and subsequently served an *Improvement Notice* under Section 77 IÉ as a result of possession incidents. Further to this the RSC undertook a Post Incident Inspection (PII) into incidents at Lavistown Level Crossing (XC133) on the 29th to 31st March 2012 and a derailment at Drogheda Depot on the 04th July 2012.
- 18 Bridgeway Consulting Ltd. were commissioned by IÉ to review possession management arrangements within the CCE Department, including a review of the IÉ Rule Book, IÉ's Safety Management System (SMS) and planning, training, competence assessment, communications, worksite arrangements and culture associated with possessions. This review was part of the actions taken by IÉ to address the Improvement Notice issued by the RSC. Bridgeway Consulting Ltd. Report 'Review of Possession Management Arrangements within the Chief Civil Engineer's Department' was published in September 2012 and shall be referred to as the Bridgeway Review for the remainder of this report.
- 19 Until March 2013 IÉ Safety and Security department were functionally separate from the other IÉ departments (including CCE and ICCN) and were responsible for audit, investigation, policy and procedures in accordance with the IÉ SMS.

External circumstances

- 20 There were no common external circumstances (e.g. weather conditions) identified that contributed to these incidents.

RAIU Investigation

RAIU decision to investigate

21 In accordance with the Railway Safety Act 2005 the RAIU investigates incidents and accidents on the national railway. Given that there were four incidents in the period of one week and given that under slightly different circumstances, some of these incidents, may have led to serious accidents where there could have been potential for fatalities, serious injuries and extensive damage, the RAIU have made the decision to conduct one investigation incorporating all the known incidents between January 2009 and January 2013.

Investigation and evidence

22 During this investigation the RAIU collated and logged the following evidence:

- Witness testimonies from IÉ personnel;
- Weekly Circulars - An initial random sample of Weekly Circulars was taken by the RAIU from the 52 in the period between May 2012 and May 2013;
- Possession information - Random samples of weekly possession data was received for the period between May 2012 and May 2013;
- Data on the number of *flyer* application made in the period between May 2012 and May 2013;
- IÉ Rule book printed 24th November 2007;
- IÉ short and long term planning processes associated with possessions;
- Other testimonies from members of the RU with information pertaining to the incidents or operation procedures;
- IÉ investigation reports into possession incidents;
- IÉ audit reports;
- IÉ *standards*, procedures and other documentation;
- The Bridgeway Review.

Scope of investigation

23 The RAIU must establish the scope of the investigation to ensure that only pertinent information is recovered and reviewed. Therefore, for this trend investigation, the RAIU have defined the following scope:

- Establish the high level sequence of events of the possession incidents between January 2009 and January 2013;
- Establish, where applicable, *causal factors* (CF), *contributory factors* (CoF) and *underlying factors* (UF);
- Establish if any of these factors reoccur;
- Examine the relevant elements of the safety management system.

Focus of RAIU Report

24 Initial analysis of possession incidents between January 2009 and January 2013 identified recurring issues with possession planning. Therefore, this investigation has focused on the management and execution of possession planning. Due to the recurring nature of these issues the RAIU have also examined how IÉ manage internal post incident recommendations.

Evidence

Possession planning

25 There is no IÉ standard to specify the requirements and frequency of possession planning meetings. However, an informal framework of meetings has been adopted by IÉ.

26 These meetings are discussed below in the order in which they occur, starting with the meeting furthest from the delivery date of the work:

- Annual Plan Meeting – Senior CCE personnel establish the parameters and timing of large scale works using inputs from Division management staff (IIM and RM). Planning of these large projects will then be undertaken by CCE in collaboration with each Divisions management staff;
- 8-Week Planning Meeting – Division management staff (including SET supervisor), Division Planners, OTM Planner and the PWIs identify and plan general maintenance and possession work;
- Division Approval and Submission Plan Meeting – In general, every three to four weeks the divisional plan is verified by the RMs and PWIs before the confirmed works are sent to the Divisional Planner for submission to the Centralised Planning Team and Capacity Allocator;
- Management *Control Room* Meetings – Led by the IIM and attended by the Divisional management staff (including SET supervisor). The meetings promote the sharing of information including what work is being delivered, where it is taking place and when. This allows the local management staff to identify potential conflicts or resource issues and take action before the planned work is started;
- Local Control Room Meeting – Led by the relevant PWI this meeting is used to confirm the works to be delivered, how this work is to be delivered, the protection limits, the protection staff to be used and any other relevant information e.g. movements of plant;
- Works Briefings – A standardised briefing undertaken by the PWI (or appropriate representative), prior to works being undertaken. It is not required that staff who are providing support activities to the delivery of the work attend these briefings e.g. SET staff and Plant operators;
- On Site Briefings – Further briefings may be carried out on site in accordance with the requirements of the IÉ Rule Book.

27 Three of these meetings have standardised elements:

- Both the Management Control Room and the Local Control Meetings are a part of the IÉ Control Room Process which has high level requirements in *standard* CCE-SMS-001 'CCE

Safety Management System' and is defined as "a visualization room where the local supervisory/management team make prioritized decisions related to Maintenance production plans, progress reporting of different measures of performance, reviews of plans and revising actions to meet those plans, occupational safety risks and asset safety risks and the appropriate risk mitigation actions";

- The Works Briefing which has a requirement for the staff to verify the briefing has occurred by signing a standardised form.

28 General consistency in this framework was demonstrated by the three Divisions. However, some differences were identified, these are:

- The 8-Week Planning Meeting – Athlone have a number of small meetings between the relevant PWIs, CPWIs, RMs and Divisional Planners; whereas in Limerick Junction a larger meeting is held involving the majority of the Divisions infrastructure maintenance management personnel including SET; and in Dublin the meeting is held as an extension of the Management Control Room Meeting;
- The process of and staff responsible for making a Weekly Circular application to the Capacity Allocator differed between divisions. For example in certain Divisions the Capacity allocator received submissions from the Divisional Planner or the Chief Permanent Way Inspector. Whereas in other divisions the Capacity Allocator would contact the individual PWIs directly for this information;
- Management and Local control rooms both occur at a minimum frequency of weekly in each division. However, some regions hold meetings more frequently;
- Local Control Room – In some Regions the mobile gangers attend the meetings as they may be acting as PICOPs for the works. However, it is not compulsory for PICOPs to attend these meetings, therefore the PICOPS may not always attend;
- Works Briefings – A number of PWIs deliver a weekly briefing discussing all of the works being undertaken; this is accompanied by site specific briefing immediately prior to the work being delivered undertaken by the person responsible for the management of the works on the night. Other PWIs arrange formal briefings each night at set locations in advance of the works being carried out.

29 In relation to the standardisation of Management Control Room meetings the requirements of CCE-SMS-001 'CCE Safety Management System' were not consistently complied with in that not all requirements were discussed. For example the mitigation of Occupational Safety Risks by planning possession protection was not always undertaken.

- 30 Possession protection arrangements were also rarely discussed at the higher level management meetings. These arrangements would generally be pre-set or established by the PWI and briefed at Local Control Meeting or Works Briefing.
- 31 Works Briefings have a standardised form which attendees of the meetings must sign, however, there is no formal requirement for staff who are providing support activities, to the delivery of the work, to attend these briefings, e.g. SET staff and plant operators.
- 32 An IÉ Safety and Security Department investigation into possession irregularities between Inchicore and Sallins on the 18th January 2011 identified “no standard on planning possessions currently exists. The planning process is predominantly focused on the actual work to be carried out within various worksites and does not detail protection, movements or what signalmen control the different areas within the possession”. From this the following IÉ safety recommendation was made: “The CCE with the involvement of other stakeholders, should develop a standard for the planning of possessions. This standard should include, but not be confined to, issues such as the nature of work, protection arrangements, signalling control, the taking and handback arrangements, location of the worksites, resources required – (plant, equipment and people), management of the possession and worksites and access and egress arrangements for both people and plant.” This recommendation was repeated in the investigation into the protection breach at Charleville Station on the 11th June 2011.
- 33 IÉ have stated that these IÉ safety recommendations will be addressed by actions resulting from the Bridgeway Review which was published in September 2012. However, no information was submitted to identify actions taken prior to the Bridgeway Review which was initiated in February 2012.
- 34 It should also be noted that the variation in possession planning meetings had been identified by IÉ in an internal audit carried out in 2007 which stated: “No formalised system exists between the Operations and Infrastructure Departments to arrange, control and sanction T3 Possessions. Various instructions have been issued and changed over the years and it is custom and practice rather than written procedure that regulates this process.”

Late changes to possession arrangements

- 35 Where changes to possession arrangements or a new possession is required after the publication of the Weekly Circular, an internal memorandum is sent to the Operations Planning office with details of the alterations requested. These applications are commonly known as ‘flyers’ and are requested by the IIM in “exceptional circumstances”.

- 36 On average forty applications per month on the IÉ network were made in the year proceeding May 2012.
- 37 An IÉ Safety and Security Department investigation into possession protection breach between Drogheda and Balbriggan on the 21st March 2010 identified the “common practice of altering possessions at short notice” and “The driver was not advised about the alteration to the possession advertised in the Weekly Circular”.
- 38 The findings from this internal investigation report led to the following IÉ safety recommendations being made: “CCE & General Manager ICCN to implement a system which will communicate late alterations of absolute Possessions to train crews”. This safety recommendation was recorded as closed by IÉ due on implementation of a new process. Although documentation was submitted to the RAIU no formal standard or procedure was identified and there was no information on communicating late alterations to train crews.
- 39 This report also identified “the common practice of altering absolute possessions at short notice” as an underlying cause in the investigation.
- 40 An IÉ Safety and Security Department investigation into possession protection breach at Charleville Station on the 11th June 2011 identifies that when the work planned for the night of the incident was cancelled at short notice other works were arranged which involved the use of a RRV. The RRV was mounted in a siding which was outside the limits of the possession and not under possession. The lack of protection in place at the sidings was identified as a causal factor in the incident.
- 41 In addition to this incident another IÉ investigation report into a derailment at Drogheda Depot on the 4th July 2012 where a late alteration was made to the planned works by including a new worksite for the maintenance of points. The report identified that the possession was not protected in accordance with the IÉ Rule Book and this was a causal factor to the derailment.

Volume of planned possessions

- 42 As mentioned previously, each Division submit information on the planned possessions to the Capacity Allocator, which in turn is published in the Weekly Circular. The Weekly Circular is used to communicate these planned possessions arrangements (location, protecting signals, times and work) to relevant staff, see Figure 1 for an extract of the Weekly Circulars.

Section	Signals	Up Only Down Only Up & Down Single	Times		SLW	Days of the Week	Work Description	Miles		Office Use ONLY
			From	To				From	To	
DUBLIN-BELFAST-DUBLIN (CONTD.)										
Malahide-Drogheda Incl. Mosney Loop	ND374 to DA318	Down	01.00 01.00	05.30 07.50	No No	_,2,3,4,5,6,7 -----7	Track Repairs Platform Works	10	31	*/DN/079
Drogheda-Malahide Incl. Skerries & Balbriggan Loop	DA319 to ND373	Up	23.10 00.01	24.00 05.30	No No	1,2,3,4,5,6,7 -,2,3,4,5,6,7	Track Repairs, Platform Works	29	10	*/DN/080
Through Drogheda	DA318 to FP208	Down	01.00 01.30	04.30 07.30	No No	_,2,3,4,5,6,7 -----7	Track Repairs, Relay Down Platform	29	30	*/DN/081
Through Drogheda	FP208 to DA319	Up	01.00 01.30	04.30 07.30	No No	_,2,3,4,5,6,7 -----7	Track Repairs, Relay Down Platform	30	29	*/DN/082
Drogheda Yard	DA294 to Buffer Stop Platform 3	Platform 3	00.30 00.30	04.30 07.30	No No	_,2,3,4,5,6,7 -----7	Track Repairs	31¾	31½	*/DN/083
Drogheda-Dundalk	FP208 Pts to FP201 pts	Down	21.50 01.10	23.20 05.30	No No	1,2,3,4,5,6,7 -,2,3,4,5,6,7	Track Repairs	32	54	*/DN/084

Figure 3 – Extract from weekly circular showing sequential possessions

Amalgamation of possessions

52 Comparing information supplied on possessions actually taken to the information in the Weekly Circular examples were identified where possessions were taken from limits which were different to those published. For example it was common for possessions running sequentially on the same line to be amalgamated into one possession meaning that the possession taken differed from the published information. In addition to this all possessions on areas with double track are shown in the Weekly Circular separately on the Up and Down lines although often these possessions were taken as one.

Back-to-Back possessions

53 Section 9.4.2 of the IE Rule Book requires that for each possession fog signal protection arrangements are to be provided as follows:

- In rear of the possession, fog signals to be placed 400m ahead of the stop signal in rear to be maintained at Danger. Where there are points or crossings between that signal and the possession, fog signals to be placed 400m ahead of those points and crossings;
- Ahead of the possession, fog signals to be placed 400m on the approach to the stop signal ahead of the possession. Where there are *trailing points* or crossings between that signal and the possession, fog signals to be placed 400m on the approach to those trailing points or crossing.

54 Figure 4 illustrates the requirements as set out in the IE Rule Book at the protecting in rear of the possession.

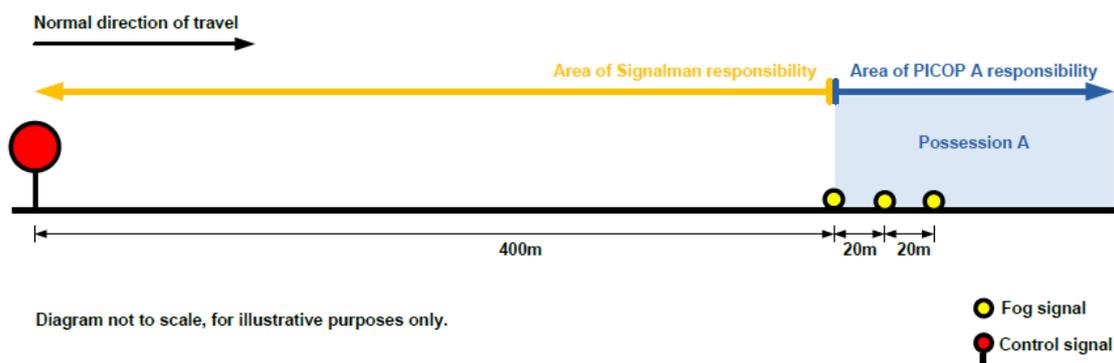


Figure 4 – Protection arrangement at limit in rear of the possession as set out in the IÉ Rule Book

55 The Weekly Circular indicates that there are some cases where possessions have been planned that interfaced at protecting signals; these possession arrangements are referred to informally as 'Back-to-Back' possessions in IÉ.

56 An IÉ CCE Investigation into possession a protection breach between Howth Junction and Portmarnock on the 27th September 2009 identified Back-to-Back arrangements were in place at the time of the incident.

57 Figure 5 shows the layout of fog signal protection that was established during this incident at the protecting signal interface (where sequential possessions met). This arrangement is non-compliant with the requirements of the IÉ Rule Book shown in Figure 4. Instead of three being placed 400m from a protecting signal they are arranged in close vicinity with two being placed one side of the signal and one the other.

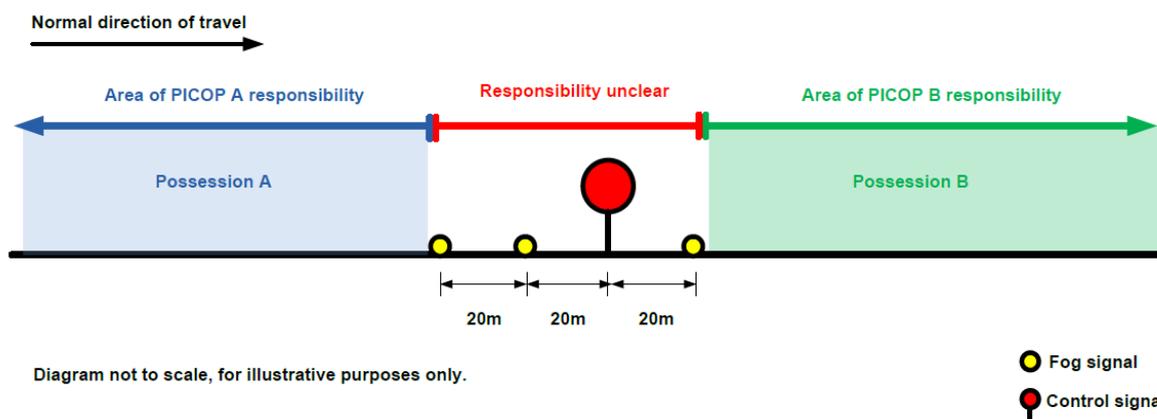


Figure 5 – Fog signal arrangement identified at possession interface for incident on 27th September 2009

58 By comparing Figures 4 and 5 it can be seen that this informal arrangement alters areas of responsibility from the instructions given in the IÉ Rule Book and creates an area where responsibility for movements is unclear (illustrated by the red section) in the vicinity of the protecting signal.

59 The following IÉ safety recommendations were made after the possession incident on the 27th September 2009:

- Possessions should be suitable and sufficient to cover the task; Back-to-Back possessions should only be used when absolutely necessary;
- The safety manager to review the practice of RRVs moving between Back-to-Back possessions and consider developing a procedure to control and authorise such movements.

60 In addition to this the investigation into the protection breach at Charleville Station on the 11th June 2011 identified Back-to-Back arrangements in place at the time of the incident and the following IÉ safety recommendation was made:

- The Chief Safety and Security Officer should review Section T of the IÉ Rule Book in relation to possessions for engineering work in order to give clear guidance on the arrangements for adjacent or 'Back-to-Back' possessions to rectify any non-compliance with the Rules and Regulations.

61 IÉ closed both of the recommendations from the 2009 investigation report through the implementation of the Control Room Process. Information was requested on actions taken by IÉ to address the second of these recommendations and the additional recommendation made in the 2011 report, both of which required a review into the practice of taking 'Back-to-Back' possessions. However, although the 2009 recommendation was recorded as closed, no suitable evidence was submitted to the RAIU.

62 IÉ provided information detailing a protection arrangement that allowed possessions to be taken from interfacing signals that would comply with the requirements of the Rule Book. This arrangement is shown in Figure 6.

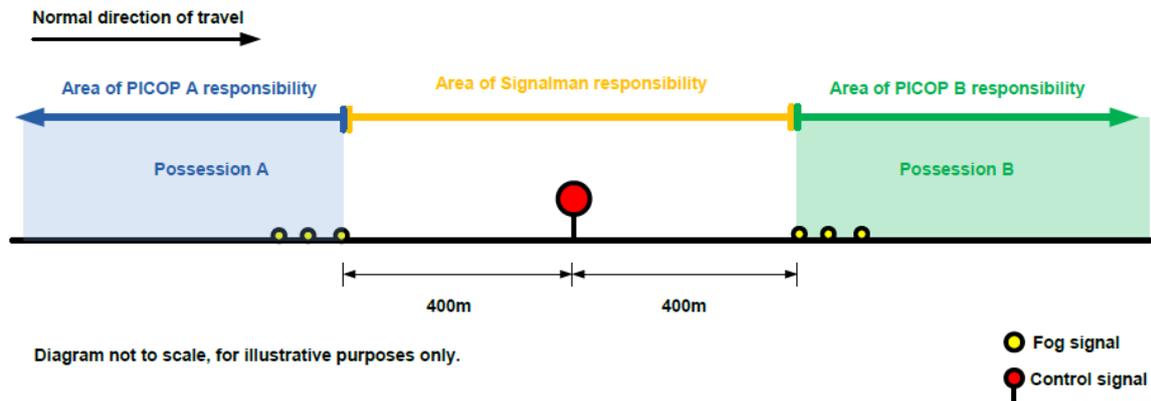


Figure 6 – “Back-to-Back” fog signal arrangement at the protecting signal interface submitted by IÉ

63 Additional evidence obtained by the RAIU identified that even when fog signal protection was provided in accordance with the Rule Book, the practice of direct communication between the PICOPs to control the movements of vehicles between possessions was used. Again this is not in accordance with the IÉ Rule Book as the Signalman no longer controls movements past the protecting signal.

64 It was also identified that the possession limits stated in the Weekly Circular are not confined to signals. Evidence was obtained which demonstrated the *fouling points* of two sets of *points* being used as the possession limit between two Back-to-Back possessions.

65 The RAIU requested that IÉ demonstrate how fog signal protection could be established in these circumstances in accordance with Rule Book requirements. However no suitable information was submitted.

66 During the RAIU investigation it was found that IÉ still use the practice of Back-to-Back and there was evidence to indicate that the application was not always in accordance with the Rule Book requirements.

IÉ investigation reports on possession incidents

67 After an incident a remit to investigate is issued by the relevant safety manager as prescribed in standard IE-SMS-007, Policy and Principles for Reporting and Investigating of Accidents and Incidents. The standard also prescribes whether the investigation should be managed by the department directly affected or the Safety and Security Department.

68 In relation to the internal IÉ investigation reports that were requested into the twenty-three possession incidents it was noted that:

- Eleven of the incidents had published reports available;
- Four of the incidents were not allocated with investigation remits;
- Eight of the incidents with remits issued had no final investigation report available despite the twelve week timescale established in the remits, for submission to the issuing officer, being exceeded.

69 IÉ investigation reports identified that causal factors were consistently linked to possession protection issues or actions of one of more IÉ personnel; and contributory factors related to long and short term planning, establishment and maintenance of possession protection and the performance of staff.

70 Completed investigation reports demonstrated recurring IÉ safety recommendations in relation to planning of possession works.

Analysis

Possession planning

- 71 There are no IÉ standardised procedures on the requirements and frequency of possession planning meetings. As a result the different Divisions have adopted an informal framework of meetings (paragraph 25).
- 72 This informal framework of meetings has led to variation between the meetings; with no set agendas and list of required attendees (paragraph 28).
- 73 The requirements of the Management Control Room Meeting set out in CCE-SMS-001 'CCE Safety Management System' require occupational safety risks (such as protection arrangements) and their appropriate risk mitigation actions be addressed. However, it was found that these meetings again focus on the resource required with little to no discussion on the protection arrangements (paragraph 29) which are either standardised or established independently by the PWI.
- 74 It is not compulsory for PICOPs to attend Local control room meetings, therefore the PICOPS may not always attend (paragraph 28).
- 75 Two previous internal IÉ investigation reports, carried out in 2011, have identified the issues surrounding the planning of possessions stating that "no standard on planning possessions currently exists" and identifies that the meetings that do occur "focused on the actual work to be carried out within various worksites and does not detail protection". These findings resulted in IÉ safety recommendations being made in both investigation reports in relation to the standardisation of possession planning and specifically requires that protection arrangements be addressed in these meetings (paragraph 32).
- 76 IÉ have stated that these recommendations will be addressed by actions resulting from the Bridgeway Review undertaken in 2012. However, there was no evidence of actions being taken in 2011 to close these recommendations (paragraph 33).
- 77 The variation in possession planning meetings had also previously been identified by an IÉ audit in 2007, however, no actions have been introduced to date to formalise the system (paragraph 34).

Late changes to possession arrangements

- 78 The internal IÉ investigation report into the protection breach between Drogheda and Balbriggan found that where a flyer application was made, the changes were not fully communicated to the relevant staff (paragraph 37).
- 79 Based on the findings of the incident between Drogheda and Balbriggan, IÉ made a safety recommendation in relation to the adequate communication of late alterations to relevant staff (paragraph 37). This recommendation was recorded as closed. However, although documentation was submitted to the RAIU no formal standard or procedure was identified and there was no information on communicating late alterations to train crews (paragraph 38).
- 80 There is also no requirement for staff who are providing support activities to the delivery of the works, e.g. SET staff and plant operators attend Work Briefings (paragraph 31). This results in not all staff having the full details of the works on site or not being informed of any late changes or alterations to possession works.
- 81 The report into the breach between Drogheda and Balbriggan also identified “the common practice of altering absolute possessions at short notice” as an underlying cause in the investigation (paragraph 39).
- 82 The Charleville and Drogheda incidents are both examples where a late alteration in planned works led to a worksite not being protected in accordance with the rule book (Paragraph 41).

Block booking of possessions

- 83 Comparing the number of possessions planned in the Weekly Circular with the actual number of possessions taken it can be seen that less than 10% of planned possessions, on the IÉ network, are actually used (paragraph 43).
- 84 It can also be seen from the Weekly Circular that generic work descriptions have been adopted and used over long periods of time (paragraph 44), e.g. terms like ‘Hired Plant’ are consistently used by the Limerick Division, which gives little information to what works are actually being carried out.
- 85 There is a system in place for the cancelation of a T3 possession however it not utilised by staff and is therefore ineffective, given that the Signaller does not know whether a possession is going to occur until a call is made to the Signaller for the taking of a possession (paragraph 45).
- 86 The RAIU cannot definitively establish why this system of block booking of possessions has been adopted; it does appear that the system of booking large volumes of possessions allows the CCE

Department undertake short notice reactive work (such as urgent defect repairs) without the need for a flyer application to be made for a new possession.

87 A 2007 IÉ audit previously highlighted the above issues with the block booking of possessions stating “These practices undermine the credibility of the weekly circular as an accurate account of what is happening on the ground” (paragraph 46). However, no actions have been introduced to date to change this practice.

88 In relation to the durations of possession, some possessions are of short durations (less than 30min), which, given the time required to ‘take’ and ‘give back’ a possession (paragraph 48), means that limited work can be done in these possessions; and although this seems to make the short possessions redundant, they are consistently booked.

89 In relation to possession limits, the same limits are consistently used and standardised possession limits have become the norm over time, which has resulted in the Capacity Allocator giving these limits special reference numbers (paragraph 51). This has further reinforced the standardisation of possession limits, leading to staff block booking possessions using these now recognised limits consistently, meaning that planning of protection limits is not led by the requirements of the work to be undertaken but instead grouped into pre-established limits

Back-to-Back possessions

90 The Weekly Circular demonstrates that possessions are sometimes planned to interface at protecting signals, resulting in Back-to-Back possessions (paragraph 53). There is evidence to suggest the practice of planning possessions to interface at protecting signals may have been influenced by the standardisation of protection limits (paragraph 51).

91 The fog signal arrangement identified in Figure 5 is not in accordance with the IÉ Rule Book and alters the areas for responsibility prescribed in the IÉ Rule Book (paragraph 58).

92 The informal communication practices have also been identified that result in the Signaller no longer giving the permission for movements past the protecting signal and the red aspect is ignored when operators are instructed to move between possessions by PICOPs. This means that signal protection established in this manner is non-compliant with the IÉ Rule Book and ineffective (paragraph 63).

93 IÉ have submitted information to identify how possessions with the same interfacing signal can be established in accordance with the Rule Book. However, it would appear that establishing

possessions in this manner has contributed to practices being developed that are non-compliant with the Rule Book (paragraphs 58 and 63).

94 As a result of an IÉ investigation into a possession incident where a Back-to-Back practice was being utilised, IÉ made the following safety recommendations:

- Possessions should be suitable and sufficient to cover the task Back-to-Back possessions should only be used when absolutely necessary;
- The safety manager to review the practice of RRVs moving between Back-to-Back possessions and consider developing a procedure to control and authorise such movements.
- The Chief Safety and Security Officer should review Section T of the IÉ Rule Book in relation to possessions for engineering work in order to give clear guidance on the arrangements for adjacent or 'Back-to-Back' possessions to rectify any non-compliance with the Rules and Regulations'.

95 The first of these recommendations allows for the use of Back-to-Back possessions despite the protection arrangement identified in the report being non-compliant with Section 9.4.2 of the Rule Book (paragraph 58).

96 IÉ have stated that the Control Room Process closes these safety recommendations; the RAIU findings have previously demonstrated that these Management Control Room Meetings do not sufficiently address onsite protection arrangements (paragraph 29). The Control Room Process does also not appear suitable to address the second recommendation which requires the production of a procedure.

97 As a result of IÉ closing these safety recommendations, prior to effective actions being taken, the practice of Back-to-Back possessions is still in use despite there being no formal procedures and evidence that the current execution of these possessions is not always in accordance with IÉ Rule Book (paragraph 66).

IÉ investigation reports on possession incidents

98 Twelve out of the twenty-three incidents reviewed in the initial analysis did not have finalised reports (paragraph 67).

99 The recurring nature of the possession planning safety recommendations in IÉ investigation reports would indicate that these safety recommendations have not been addressed in an effective manner (paragraph 70).

100 Continuing informal practices regarding Back-to-Back possession would also indicate that the application of the Control Room Process has not been effective to closing safety recommendations made regarding this practice (paragraph 66).

Conclusions

Possession planning

101 There is no standardised procedure on the requirements and frequency of possession planning meetings which has led to an informal framework being adopted; and although there is some consistency in the framework of meetings the agendas and lists of attendees are varied throughout the Divisions (paragraph 71 and 72).

102 The requirements of the Management Control Room Meetings are set out in CCE-SMS-001; 'CCE Safety Management System' however, the RAIU found that these meetings focus on the actual work to be done, with little discussion on the protection arrangements, which are either standardised or established independently by the PWI. This has also been identified in two previous IÉ investigation reports in 2011 and in an internal IÉ audit in 2007 (paragraph 75).

103 There is also an adherent reliance on this Management Control Room Meeting to address IÉ safety recommendations in relation to protection arrangements, despite protection arrangements not always being discussed at these meetings (paragraph 96).

104 PICOPs are fundamental to the delivery of possession works however their involvement in the planning meetings is not mandated (paragraph 74)

Late changes to possession arrangements

105 The current use of flyer applications is not always effective, in that, not all the relevant parties are given this information (paragraph 78), this has resulted in a safety recommendation in relation to the communications of late alterations to affected staff. However, no formal standard or procedure was identified and there was no information on communicating late alterations to train crews (paragraph 79).

106 There is also no formal requirement for staff who are providing support activities, to the delivery of the work, to attend works briefings, e.g. SET staff and plant operators (paragraph 80).

107 Incidents at Charleville and Drogheda provide evidence that the planning system did not suitably assess the protection arrangements required after the late alteration (paragraph 82).

Block booking of possessions

108 Less than 10% of planned possessions on the IÉ network are actually used (paragraph 83).

109 The use of generic work descriptions (paragraph 84) and block booking of standardised possession limits (paragraph 89) has become the norm in relation to planning possessions.

110 The system in place for the cancellation of planned possessions is not utilised (paragraph 85), and the system of block booking possessions appears to have been developed to facilitate the need to carry out any urgent defect repairs (paragraph 86).

111 The issues surrounding the block booking of possessions has previously been identified in an internal IÉ audit (2007) which questions the credibility of the Weekly Circular, however, no effective actions have been taken by IÉ to resolve these issues (paragraph 87).

112 Possessions of short duration are continually booked even though they appear redundant and the work that could be achieved is very limited (paragraph 88).

Back-to-Back possessions

113 IÉ currently use the practice of Back-to-Back possessions (and at the time of publication of this report still use this practice). However, aspects of this practice can lead to non-compliances with the IÉ Rule Book with regards to the establishment of fog signal protection and areas of responsibility (paragraph 91).

114 This practice has also resulted PICOPs adopting an informal approach to communications for the movement of vehicles past control signal protecting adjacent possessions (paragraph 92).

IÉ investigation reports on possession incidents

115 IÉ investigation reports have exceeded their prescribed timescale (paragraph 98).

116 The repetition of IÉ safety recommendations in planning and the continued informal practices regarding the application of Back-to-Back arrangements indicate that system for closing out IÉ safety recommendations has been ineffective in these areas (paragraph 99 and 100).

Contributory and underlying factors associated with these incidents

117 The nature of this RAIU trend investigation has resulted in no immediate cause or causal factors common to all of the incidents being identified, however, a number of contributory and underlying factors have been identified.

118 Contributory factors in relation to possession incidents identified were:

- CoF-01 – The Control Room Process is not fully adhered to in all meetings in that the protection arrangements associated with the occupational safety risks are not discussed;
- CoF-02 – The continued planning and implementation of Back-to-Back possessions has introduced practices that are non-compliant with prescribed instructions in the IÉ Rule Book for fog signal protection;
- CoF-03 – The consistent booking of pre-established possessions with regards to work, limits and duration has led to possession protection being arranged to coincide with these limits instead of an assessment taking place on a site by site basis;
- CoF-04 – The Weekly Circular is currently ineffective for communicating actual works that are to be undertaken on a given day/night due to the current practices of booking and cancelling of possessions;
- CoF-05 – Late alterations to possession arrangements are not always communicated to relevant staff and have also in some cases led to inadequate possession protection.

119 The underlying factors identified were:

- UF-01 – There is no standardised procedure on the requirements and frequency of possession planning meetings and prescribing staff to be involved;
- UF-02 – The procedure for closing out IÉ recommendations has not been effective with regards to planning and Back-to-Back possessions.

Relevant actions taken or in progress

Actions taken by IÉ

120 IÉ have advised the RAIU that the following actions have taken place in relation to possession management:

- In 2012 IÉ appointed Bridgeway Consulting Ltd, to carry out a top to bottom review of the management of possessions. A comprehensive report was produced which made a number of recommendations as to how the process could be improved in the areas of: Rule book, Safety Management, Planning, Training, Competency, Communications, Risk Assessment, Compliance and Company Culture;
- IÉ took immediate action on certain specific areas and developed a programme to address the remainder, it is anticipated that all of the recommendations will be fully addressed and new systems and processes substantially rolled out by the second to third quarter of 2014.

Safety recommendations

General description

121 In accordance with the Railway Safety Act 2005 (Government of Ireland, 2005a) and the European railway safety directive (European Union, 2004), recommendations are addressed to the national safety authority, the RSC. The recommendation is directed to the party identified in each recommendation.

122 As a result of the RAIU investigation six new safety recommendations are made.

New safety recommendations related to the incidents

123 There is no standardised procedure on the requirements and frequency of possession planning meetings (UF-01) which has led to an informal framework being adopted which has led to variations in the planning process. Therefore the RAIU make the following safety recommendation to improve planning procedures.

IÉ (Infrastructure Manager) should develop a formal possession planning meeting framework that is consistent through the IÉ network.

124 The continued planning and implementation of Back-to-Back possessions has introduced practices that are non-compliant with prescribed instructions in the IÉ Rule Book for fog signal protection (CoF-02). To ensure that IÉ comply with the IÉ Rule Book and to eliminate the non-compliant practices, the RAIU have made the following safety recommendation:

IÉ (Infrastructure Manager) should review the application of Back-to-Back possessions and implement actions to eliminate any informal practices that do not comply with IÉ Rule Book.

125 A number of the possession incidents reviewed involved errors in maintaining a safe system of work in accordance with Section T3 of the IÉ Rule Book. Protection planning as a function is not formalised with regards to process or individual accountability in current IÉ procedures. In addition to this the Management Control Room does not currently mandate the discussion of possession arrangements and in many cases these are pre-established (CoF-01 and CoF-03). The following safety recommendation is made to improve possession protection planning procedures:

IÉ (Infrastructure Manager) should establish a possession planning procedure that ensures protection arrangements are based on the work to be delivered and are verified by a suitable member of staff and formally communicated to all relevant personnel.

126 The credibility of the Section entitled “Engineering works requiring absolute possessions – Section T Part III” of the weekly circular has been adversely affected by current IÉ practices with regards to booking and cancelling possessions. This has led to the Weekly Circular becoming ineffective for communicating actual works that are to be undertaken on a given day/night (CoF-04). The following safety recommendation is made to improve communication of possession arrangements:

IÉ (Infrastructure Manager) should monitor and review entries into Section “Engineering works requiring absolute possessions – Section T Part III” of the Weekly Circular to ensure that the information published in this document is accurate and credible.

127 Late alterations to planned possession arrangements have contributed to incidents due to changes not being communicated effectively and unsuitable possession protection arrangements being established (CoF-05). The following safety recommendation is made to improve establishment and communication of possession arrangements:

IÉ (Infrastructure Manager) should review the current process for late changes to possessions to ensure changes to possession arrangements are verified by a suitable member of staff and formally communicated to all relevant personnel.

128 The process of requesting investigation reports from IÉ identified that a number of investigation reports had remits issued but no finalised report. It was also identified that recommendations regarding possession protection planning and Back-to-Back possessions have been closed out by the application of the Control Room Process without being suitably addressed (UF-02). To ensure that IÉ identify and address issues arising from possession incidents the RAIU have made the following safety recommendations:

IÉ (Infrastructure Manager) should undertake a review of possession incidents that have occurred over the last four years to ensure that reports are completed and recommendations are identified and addressed.

Additional information

List of abbreviations

CCE	Chief Civil Engineer
CF	Causal factor
CoF	Contributory factor
CWR	Continuous Welded Rail
DMU	Diesel Multiple Unit
ES	Engineering Supervisor
IM	Infrastructure Manager
IIM	Iarnród Éireann Infrastructure Manager
M	Metre
No.	Number
OTM	On Track Machine
PICOP	Person In Charge of Possession
PWI	Permanent Way Inspector
RAIU	Railway Accident Investigation Unit
RM	Regional Manager
RRV	Road Rail Vehicle
RSC	Railway Safety Commission
RU	Railway Undertaking
SI Units	International System of Units
UF	Underlying factor

Glossary of terms

Accident	An unwanted or unintended sudden event or a specific chain of such events which have harmful consequences including collisions, derailments, level-crossing accidents, accidents to persons caused by rolling stock in motion, fires and others.
Axle counter	Track mounted device that accurately counts passing train axles
Causal factors	Any factor(s) necessary for an incident. Avoiding or eliminating any one of these factors would have prevented it happening.
CCE Location	A grouping of activities or workplaces, typically organized either geographically or organizationally, that are considered as a single area of accountability within the CCE Department.
Colour light signals	Signals that convey movement authority to train drivers by means of coloured lights.
Continuous welded rail	Sections of rail that are welded together.
Contributory factor	Any factor(s) that affects, sustains or exacerbates the outcome of an incident. Eliminating one or more of these factor(s) would not have prevented the incident but their presence made it more likely, or changed the outcome.
Controlling Signalman	The Signalman designated to control a specific section of track.
Control Room Process	Meeting that incorporates a visualisation room where the local supervisory/management team make prioritized decisions related to Maintenance production plans, progress reporting of different measures of performance, reviews of plans and revising actions to meet those plans, Occupational safety risks and asset safety risks and the appropriate risk mitigation actions, initiating practical problem solving for specific problems and controlling the extent of 5S workplace improvement action plans.
Division	Made up of a number of regions and several CCE Locations.
Down direction	The line on which trains normally travel away from Limerick.
Engineering train	A train used in connection with engineering works, e.g. carrying spoil.
Engineering Supervisor	The person nominated to manage the safe execution of works within an engineering worksite. This includes arranging the marker boards and authorising the movements of train in and out of the work site.
Extensive damage	Damage that can be immediately assessed by the RAIU to cost at least €2,000,000 in total.
Fouling point	Location in relation to a set of points where trains on converging tracks would be in contact with each other.
Flyer	Internal Memorandum sent to the Operations Planning Office to request a change to the possession arrangements printed in the Weekly Circular.

Handsignalman	A competent person authorised to control the passage of trains by means of coloured flags and railway in the absence of normal signalling; or in the case of planned work in possessions, authorised to undertake protection of the line.
Immediate cause	The situation, event or behaviour that directly results in the incident.
Improvement Notice	Established in the Railway Safety Act 2005 an improvement notice can be served by the RSC if an inspector is of the opinion that a railway undertaking or other person is contravening or has contravened or is failing to comply or has failed to comply with any of the provisions of this Act or has failed to implement an improvement plan
Incident	Any incident, other than an accident or serious accident, associated with the operation of trains and affecting the safety of operation.
Infrastructure Manager	Organisation that is responsible for the establishment and maintenance of railway infrastructure, including the management of infrastructure control and safety systems.
Mile Post	A post used to denote a location on a railway line using miles from a fixed point known as the 0 milepost.
National safety authority	The national body entrusted with the tasks regarding railway safety in accordance with European directive 2004/49/EC.
On Track Machine	Any piece of specialist railway plant which moves only on the rails and is normally self propelled e.g. ballast cleaners, rail cranes, etc.
Permanent Way Inspector	Permanent Way Inspector is responsible for overseeing and guiding workplace activities in his CCE Location.
Person in Charge of Possession	The competent person nominated to manage the following: <ul style="list-style-type: none">• Safe and correct establishment of the protection for the possession;• Managing access to the possession by the Engineering Supervisor;• Managing the establishment of engineering works in the possession;• Liaising with the Signalman regarding passage of trains in and out of the possession;• Controlling the movement of the train between the protection and work sites;• Ensuring that all the forgoing is correctly removed in reverse sequence and the possession is relinquished and the line handed back to the Signalman.
Points	An assembly of two moveable rails, two fixed rails and other components used to divert vehicles from one track to another.
Points run through	A trailing movement through a set of trailing points that are not correctly set for the movement.
Points split	A facing movement through a set of trailing points that due to a technical failure has led to one or more axles taking an incorrect route.

Possession	<p>A period of time during which one or more tracks are blocked to trains to permit work to be safely carried out one or near the line. Two types of possessions are available and are named after the section of the Rule book that details them. These are:</p> <ul style="list-style-type: none">• T3: A possession taken for an agreed period without the facility to run trains in the area during that period until such time as the holder of the possession decides to relinquish it;• T4: A possession taken in sidings for an agreed period without the facility to run trains in the area during that period.
Protection	<p>The marking of the limits of a portion of line that has been blocked to the passage of trains. This includes the installation of a secondary system of warning (fog signals) to drivers in the event of unauthorised movements in or out of possession limits.</p>
Protection breach	<p>When a train or other vehicle passes it to or out of the limits of a possession without authority.</p>
Protecting signal	<p>A signal that prevents trains from entering a section where conflicting movements may take place; or, in the case of possessions, the signal that is used to protect the possession.</p>
Incident	<p>An accident, serious accident or incident.</p>
Railway	<p>Organisation that operates trains.</p>
Undertaking	
Region	<p>Sub-division Consisting of a number of CCE Locations</p>
Road Rail Vehicle	<p>Any vehicle adapted to operate equally well on road and rail.</p>
Rolling stock	<p>Railway vehicles.</p>
Serious accident	<p>Any train collision or derailment of trains, resulting in the death of at least one person or serious injuries to 5 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, where extensive damage means damage that can be immediately assessed by the RAIU to cost at least €2,000,000 in total.</p>
Serious injury	<p>Any injury requiring hospitalisation for over 24 hours.</p>
Standard	<p>A document that mandates technical, operational or managerial requirements.</p>
Temporary speed restriction	<p>A speed restriction imposed, generally for a short time, usually as a result of engineering work, to guarantee the safe passage of trains.</p>
Track circuit block	<p>A signalling system that uses track circuits to confirm the absence of trains in order to control the movement of trains.</p>
Trailing points	<p>A set of points where two routes converge in the normal direction of traffic.</p>
Underlying factor	<p>Any factor(s) associated with the overall management systems, organisational arrangements or the regulatory structure.</p>

Weekly Circular A document published weekly basis, providing information about engineering works, possessions requested, changes to services and speed restrictions.

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