Railway Accident Investigation Unit Ireland

INVESTIGATION REPORT

Operational Irregularity, Clontarf Road, 1st May 2024

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Report Description

Report publication

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Report structure

This report is written to conform as closely as possible to the structure set out in the "Commission Implementation Regulation (EU) 2020/572 of 24 April 2020 on the reporting structure to be followed for railway accident and incident investigation reports" having regard to "Directive (EU) 2016/798 of the European Parliament and of the Council of 11 May 2016 on railway safety".

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 to illustrate concepts to non-technical readers.

Further information

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Preface

The RAIU is an independent investigation unit within the Department of Transport which conducts investigations into accidents and incidents on the national railway network including the Dublin Area Rapid Transit (DART) network, the LUAS light rail system, heritage and industrial railways in Ireland. Investigations are carried out in accordance with the Railway Safety Directive (EU) 2016/798 enshrined in the European Union (Railway Safety) (Reporting and Investigation of Serious Accidents, Accidents and Incidents) Regulations 2020; and, where relevant, by the application of the Railway Safety (Reporting and Investigation of Serious Accidents, Accidents and Incidents Involving Certain Railways) Act 2020.

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 or tramline safety regulation or the management of safety.

During an investigation, if the RAIU make some early findings on safety issues that require immediate action, the RAIU will issue an Urgent Safety Advice Notice (USAN) Investigation Report outlining the associated safety recommendation(s); other issues may require a Safety Advice Notice (SAN) Investigation Report. In some instances, after the issuance of an USAN/ SAN Investigation Report, further investigation is not warranted.

The RAIU may investigate and report on accidents and incidents which under slightly different conditions might have led to a serious accident.

The RAIU may also carry out trend investigations where the occurrence is part of a group of related occurrences that may or may not have warranted an investigation as individual occurrences, but the apparent trend warrants investigation.

The RAIU investigation shall analyse the established facts and findings (i.e. performance of operators, rolling stock and/or technical installations) which caused the occurrence. The analyses shall then lead to the identification of the safety critical factors that caused or otherwise contributed to the occurrence, including facts identified as precursors. An accident or incident may be caused by *causal, contributing* and *systemic factors* which are equally important and should be considered during the RAIU investigation. From this, the RAIU may make 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.

Summary

At approximately 21:42 hours (hrs) on the 1st May 2024 an Iarnród Éireann (IÉ) Signalman signed on-duty for a night shift on the Central Workstation of Central Traffic Control (CTC). The Signalman had qualified two months earlier and was on only their second night shift working alone.

At approximately 23:30 hrs there was an *axle counter* fault after the passage of a train at Lansdowne Road Station which resulted in delays and late running to the last services returning to the depots and stabling locations. Services resumed at 00:28 hrs.

On the night, four *Absolute Possessions* (referred to as a T3 Possessions in this report) were planned to be taken that night for maintenance and enhancement works, in the Central Workstation area, which was under the control of the Signalman. Trackside, each T3 Possession is under the control of a Person In Charge of Possession (PICOP).

One of the T3 Possessions, identified by the Possession Plan Reference Number (PPRN) MH/CF/1, was between Clontarf Road and Malahide on the Dublin to Belfast mainline, and also included the Howth branch. The PPRN provided details of the *protecting signals* and *possession limits.*

At 00:51 hrs, the PICOP contacted the Signalman to start the process of taking this T3 Possession PPRN MH/CF/1. The Signalman saw that a passenger train (23:00 hrs passenger service from Bray to Howth (Train E950)) was enroute to Howth Station (within the T3 Possession limits) and therefore could not provide *signal protection* and agreed to contact the PICOP later.

At 01:00 hrs, after detraining passengers at Howth, the now empty train, operating as Train F015 (the 00:20 hrs Howth Station to Fairview Depot) departed Howth.

At 01:08 hrs the Signalman started the process of granting the T3 Possession by putting in place the signal protection. The Signalman then contacted the PICOP to advise this was in place and gave permission to the PICOP to place the *detonator protection. During this time, t*he Signalman did not see the presence of Train F015, passing Killester, still inside the limits of the T3 Possession.

At 01:10 hrs the PICOP called the Handsignalman, positioned at Clontarf Road Station, in a *place of safety,* to tell them to place their detonator protection. As they were talking, the Handsignalman saw a train (Train F015) approaching the location where they were about to place the detonator protection; and informed the PICOP. The Handsignalman and the PICOP took no immediate actions in notifying the Signalman of the irregularity.

Train F015 passed from the area under signal protection and into Fairview Depot with the driver of Train F015 (Driver F015) being unaware of the incident.

The cause of the operational irregularity was that the Signalman on the Central Workstation, whilst carrying out the process for the granting of signal protection of T3 Possession PPRN MH/CF/1, did not establish that Train F015 was in the T3 Possession limits before granting signal protection.

The RAIU have identified the following possible causal factors (CaF) which may have resulted in the incident:

- CaF-01 – The Signalman did not carry out a thorough and systematic check of the T3 Possession limits before granting signal protection;
- CaF-02 – The Signalman did not successfully apply the *non-technical skills* that would allow them to carry out the thorough and systemic checks required;
- CaF-03 – The Signalman did not apply *track blocks* before granting signal protection, which would have identified that Train F015 was still within the limits of the T3 Possession; although noting this does not appear to be a clearly defined requirement.

The following contributory factors (CoF) were identified:

- CoF-01 – At the time of the incident, as a result of an earlier signalling fault at Lansdowne Road, the Signalman had to grant multiple delayed T3 Possessions; meaning that the Signalman's workload was now heightened;
- CoF-02 – The Signalman had limited experience of managing multiple T3 Possessions concurrently and did not apply the workload management skills for such situations effectively;
- CoF-03 – The previous night, the Signalman successfully carried out the night shift unsupervised, which may have given the Signalman a false sense of confidence in being able to manage multiple T3 Possessions.

The RAIU have identified the following systemic factors to the incident:

- SF-01 – The documentation around the application and use of track blocks is not robust in terms of how and when they should be used;
- SF-02 – The limited capability of the current signalling simulator has prevented the realistic simulation of managing multiple possessions, likely to be encountered on CTC Workstations.

- SF-03 – The assessment process does not require the targeted assessment of signalmen managing T3 Possessions in the workplace despite the identified risk potential and their frequent occurrence.

The RAIU investigation has resulted in the following safety recommendations:

- Safety Recommendation 2025001-01 – IÉ-IM to revise the initial signalman training to include additional experience of T3 Possessions working under actual workload conditions;
- Safety Recommendation 2025001-02 – IÉ-IM to revise the competence management system to include the assessment of granting and managing T3 Possessions under actual workload conditions;
- Safety Recommendation 2025001-03 – IÉ-IM to review operational procedures, signalman training and competency management, to include clear guidance to CTC Signalmen on the use of the track block function or alternative techniques for checking during the granting of T3 Possessions.

The RAIU also made a number of safety recommendations as a result of additional observations:

- Safety Recommendation 2025001-04 – IÉ-IM to ensure that the information recorded in the *Train Register* is consistent with the information required to be recorded in the IÉ Rule Book;
- Safety Recommendation 2025001-05 – IÉ-IM to review the IÉ Rule Book instructions, and associated training materials, applicable to IÉ-IM staff, for actions to be taken, in situations where a safe system of work is compromised;
- Safety Recommendation 2025001-06 – IÉ should review their current documents that reference drugs and alcohol testing with a view to clearly addressing how staff should be managed where it has been decided drugs and alcohol testing is required i.e. should staff who are in safety critical roles be stood down until after a negative drugs and alcohol test;
- Safety Recommendation 2025001-07 – IÉ-IM to review the contingency manning arrangements for its signalling centres to ensure safety critical tasks continue to be performed safely, if required.

Contents

RAIU Investigation and its context

Decision & motivation to investigate this occurrence

1 On the 1st May 2024, the RAIU on-call investigator received a notification of an operational irregularity on the *Up line* in the Clontarf Road area on the Dublin to Belfast mainline.

2 The RAIU conducted a preliminary examination and the RAIU's Chief Investigator made the decision to conduct a full investigation into the incident, given its impact on railway safety (*Article 20* (2)(c) of Directive (EU) 2016/798, Article 20, Obligation to Investigate), as under slightly different circumstances the incident may have led to serious accident with the potential for a fatality or serious injuries, due to the risk of track workers being struck by Train F015.

Scope & limits of investigation

3 The RAIU have established the scope and limits of the investigation as follows:

- Establish the sequence of events leading up to, during and after the incident;
- Identify any other precursors which led to the incident;
- Establish, where applicable, causal, contributing and systemic factors;
- Examine the rules and processes around granting T3 Possessions;
- Review the training of staff involved in the incident;
- Examine the work environment and equipment of the Central Workstation.

Technical capabilities & investigation methods

4 The RAIU's Chief Investigator allocated RAIU Senior Investigators, trained in accident investigation, to conduct this investigation, as appropriate.

5 During the investigation, the RAIU collated evidence through the submission of Requests for Information (RFIs) to the IÉ-IM Safety Department, the IÉ-RU Safety Department and site visits. Related to this investigation, the RAIU collated and logged the following evidence:

- Statements and interviews from personnel involved in the incident;
- Photographs taken of the Central Workstation;
- IÉ Rule Book;
- IÉ-IM Train Signalling Regulations and General Instructions, issued 2021;

- IÉ-IM Professional Signallers Handbook, issued 2022;
- IÉ-IM CTC Signalman's Manual October, issued 2024 (to be referred to as the CTC Manual);
- IÉ-IM Person Track Safety (PTS) Handbook GB400/8/02, v 1.0, 2023 (to be referred to as the PTS Handbook);
- IÉ-IM voice data recorder communications on the night of the incident;
- IÉ-IM training and competency assessment records for the Signalman;
- IÉ-IM Interlocking data logger records;
- IÉ *Assetwatch* replay;
- IÉ-IM signalling scheme plans;
- IÉ-IM Site Safety Co-ordination Sheet;
- IMO-SMS-030 Competency Management Signallers, Level Crossing Controllers and Gatekeepers, Version 1.0, operative since the 24/10/2016 (to be referred to as IMO-SMS-030);
- IMO-SMS-033, Safety Critical Communications, Issue 2, published in 2018 (to be referred to as IMO-SMS-033);
- IÉ Shared Services HR-QMS-006-005 Issue 6 Drug and Alcohol Testing, issue 6.0, issued on the 21/02/2019 (to be referred to as HR-QMS-006-005).

Communications & evidence collection

6 Communications were conducted through established processes (such as RFIs).

7 Relevant stakeholders were issued the draft investigation report for comment; comments were reviewed and responses on their comments returned. In this instance the stakeholders were: IÉ-IM, IÉ-RU and the Commission for Railway Regulation (CRR)[1].

8 All relevant parties co-operated fully with the RAIU investigation; with no difficulties arising.

[1] The CRR is the National Safety Authority (NSA) for the Republic of Ireland and is responsible for the regulatory oversight of the Safety Management System (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.

Description of the occurrence & background information

Description of the occurrence type

9 The incident involved an operational irregularity involving signal protection on the Up line near Clontarf Road Station on the 1st May 2024. In terms of categorisation, the EU Agency for Railways categorisation for this occurrence is an: Incident – Traffic Operations and Management.

Background to the occurrence

10 The operational irregularity occurred to the North of Clontarf Road Station located on the north east side of Dublin (see Figure 1). The route concerned forms part of the DART, suburban and Intercity networks.

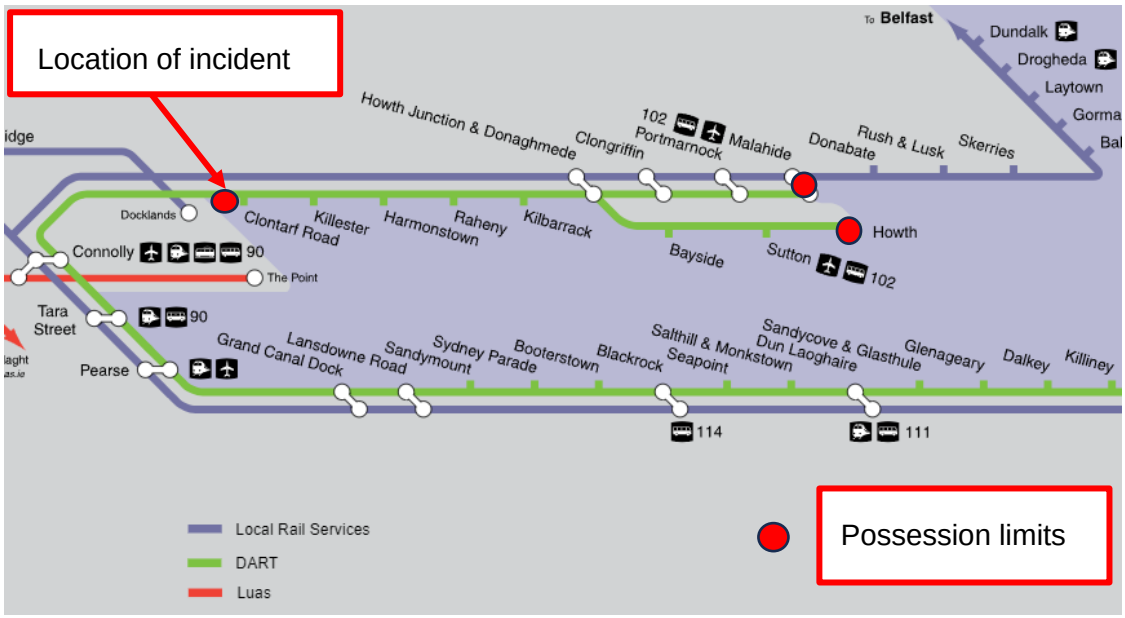

Figure 1– Location of the incident

11 Engineering work was scheduled to take place that night on the line in T3 Possession PPRN MH/CF/1 between Clontarf Road Station and Malahide Station, also incorporating the Howth branch. The main engineering activity planned was the removal of contaminated *ballast* to improve track drainage using road-rail vehicles (RRVs).

12 The weather at the time of the incident was dry, with temperatures around 7 ºC.

Deaths, injuries & material damage

13 There were no injuries or damage as a result of the incident.

Parties and roles associated with the incident

Parties involved in the incident

IÉ-IM

14 IÉ–IM is the infrastructure manager who owns, maintains and operates the railway infrastructure in Ireland and operates under a Safety Authorisation certificate issued by the CRR. The IM Safety Authorisation is issued in conformity with Directive (EU) 2016/798, S.I. No 476 of 2020 and Commission Regulation (EU 2018/762). The authorisation was renewed on the 24th March 2022 for a period of five years (valid at the time of the incident).

15 The IÉ-IM department directly involved in the incident and relevant to this investigation is the IÉ-IM Operations Department – which operates the signalling system, employs the signalmen, monitors the operation of the network and provides the first level of response to incidents. The network is controlled from CTC and several other local signalling control locations.

16 The IÉ-IM Chief Civil Engineer's (CCE) Department, who own and maintain the track and structures, were also involved in the incident as the works in the T3 Possession were CCE Department works.

IÉ-RU

17 IÉ–RU is the railway undertaking who operated the scheduled Dart service Train F015 that was involved in the incident. IÉ-RU also employed Driver F015 and maintained the rolling stock involved.

18 The IÉ-RU operates under a Safety Certificate issued by the CRR. The IÉ-RU Safety Certificate was renewed on 23rd March 2023 for a period of five years (valid at the time of incident).

Roles involved in the incident

19 The IÉ-IM roles involved, directly and indirectly in the incident, are as follows:

- The Signalman – A CTC Signalman who operates the signalling system and is certified competent under the IÉ-IM operations competence management system. The Signalman first qualified in January 2024 on the Central Workstation and was also qualified on the North & East Workstation and the Suburban Level Crossing Workstations;
- PICOP – PICOP for the T3 Possession PPRN MH/CF/1. Employed by and certified competent by the IÉ-IM CCE Department with over twenty years' experience working as a PICOP. The PICOP had last been assessed competent on 10th February 2024 to perform their duties and thus was in date on their two-yearly competence cycle;
- Handsignalman[2] – Employed by and certified competent by the IÉ-IM CCE Department with over thirteen years' experience working as a Handsignalman. The Handsignalman had last been assessed on the 18th January 2022 and was in date on their three yearly competence cycle;
- Traffic Executive – The on-call Traffic Executive, responsible for managing the competence of signalmen through applying the competency management system;
- CTC Duty Manager – The on-call duty manager for CTC, who is responsible for the management of any incidents and accidents affecting safety or service delivery.

20 The following IÉ-RU role was involved in the incident:

- Driver F015 – Driver of Train F015 (the 00:20 hrs Howth Station to Fairview Depot). Driver F015 was certified competent under IÉ-RU's competence management system and issued with a valid train Driving Licence and Complementary Certificate.

[2] PICOP must appoint a Handsignalman if it is not possible to achieve a minimum distance of 400 metres between the protecting signals and the detonators. This applied to the detonator protection at Clontarf Road.

Rolling stock

21 Train F015 (the 00:20 hrs Howth to Fairview Depot) was formed of a four-car class 8520 DART Electrical Multiple Unit (EMU), comprising vehicles 8527, 8627, 8628, 8528 (see Figure 2 for example of 8520 DART EMU).

22 The maximum permitted speed of the train formation is 110 kilometres per hour km/h (68 miles per hour).

23 The 8520 series DART are equipped with Automatic Train Protection and the Global System for Mobile Communications – Railway (GSM-R) train radio system.

Figure 2 – 8520 series DART EMU

Infrastructure – General description and operations

24 The railway at the north end of Clontarf Road Station is a double track line that is signalled for movements in both directions. Immediately north of the station is a *crossover* connecting the north entry / exit of Fairview Depot and two pairs of crossovers between the Up and *Down lines* (see Figure 3).

Figure 3 – Image of the location looking in the Down direction.

25 The incident occurred between the 1 ¼ mile post (MP) and 1 ½ MP. Mileage on the route involved is measured from the buffer stops at Connolly Station, Dublin.

26 At the location trains towards Connolly Station are described as being in the Up direction, with movements towards Dundalk / Belfast and Howth being in the Down direction.

27 The maximum permissible speed on the Up line was 70 mph (110 km/h) for passenger trains. The maximum permissible speeds on the Down line are 70 mph (110 km/h) reducing to 45 mph (70 km/h) at the location of the incident. DART vehicles are restricted to a maximum of 60 mph (100 km/h) or the more restrictive speed. The crossovers located north of the station are restricted to 15 mph (24 km/h) for movements crossing between the Up and Down lines. Movements entering Fairview Depot are restricted to 5 mph (8 km/h).

Signalling, Communications & Operations

General description

28 The signalling at the location is three and four aspect colour light signalling controlled from the Central Workstation at CTC, Connolly, Dublin. Train detection is through axle counters.

29 The GSM-R train radio system enables direct communication between train drivers and the signalman.

Staffing of the Central Workstation

30 The Central Workstation is double manned between 06:48 hrs and 22:48 hrs covering the period when most passenger services operate. The normal arrangement is for one signalman to be the Controlling Signalman and to operate the signalling controls and for the second signalman to be the Communications Signalman who makes and receives telephone and radio calls and assists the Controlling Signalman.

31 Between 22:48 hrs and 06:48 hrs only a single signalman is rostered to the Central Workstation.

Overview of Central Workstation at CTC

32 The Central Workstation control area extends between:

- Portmarnock / Malahide to Killiney / Shankhill;
- East Wall Junction to North Wall freight Yard;
- Broombridge to Docklands and Connolly (Maynooth line);
- Cabra to Glasnevin Junction (Phoenix Park line).

33 The whole control area of the Central Workstation is displayed on the "overview screens" displayed at the higher level (i.e. top screens in Figure 4). At the lower level, the "detail view screens" are displayed (i.e. bottom screens in Figure 4), which have additional information such as point numbers and track circuit numbers.

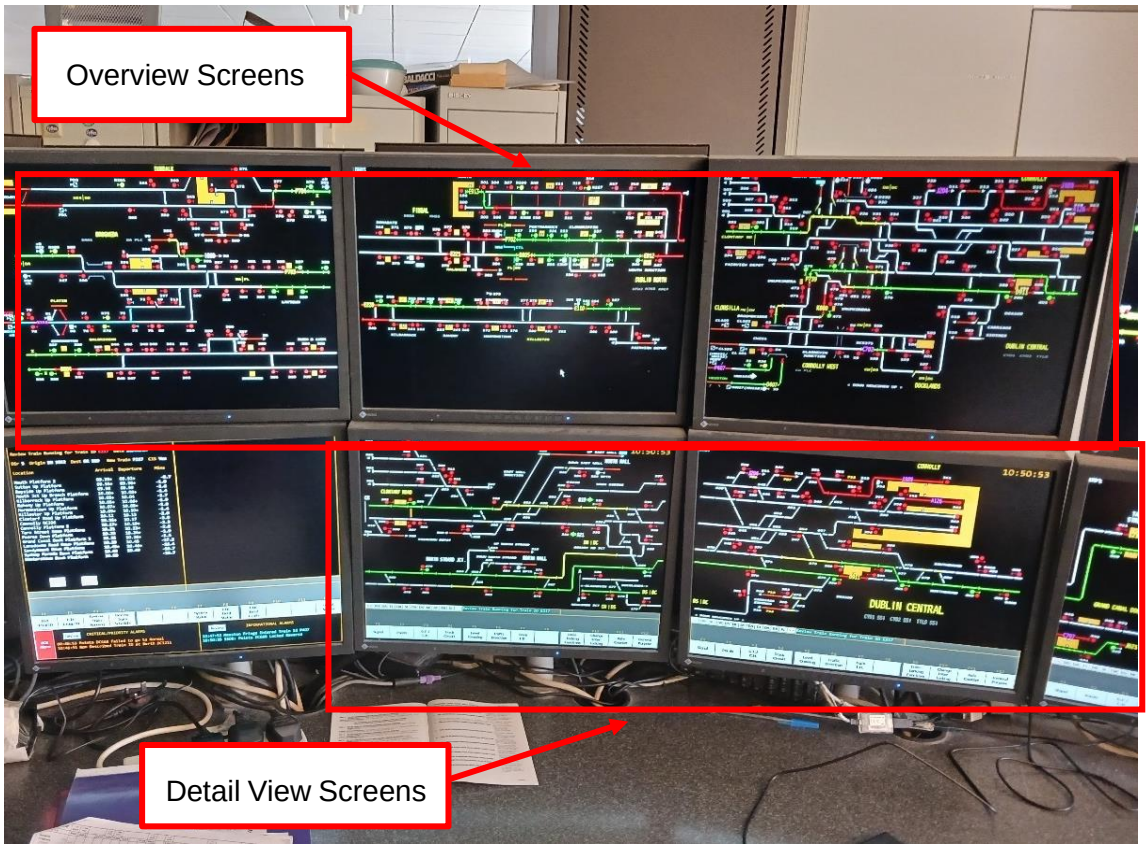

Figure 4 – View of the workstation showing the overview and detail view

34 The detail view screens display an interlocking area selected by the signalmen when needing to carry out a specific task in that area by positioning a cursor over assets using a tracker-ball and using buttons on the bottom of the screen or the keyboard. Certain functions are only available on the detail view screen (e.g. removing track blocks). The interlocking area selected on the detail view area is centred on the middle of the three lower screens with some overlap of other interlocking areas displayed.

35 Other peripheral screens include those for alarms, train running information, hot-axle box detectors and communications equipment.

36 A telephone and radio communication unit are located on each side of the Central Workstation permitting incoming calls via a direct line and from signal post telephones. The unit also permits radio calls to be made directly with trains and well as emergency broadcasts to all trains in an area.

Information displayed at the Central Workstation

Track Sections

37 The track sections on the Central Workstation screens can display (see Figure 5):

- Red – This indicates the track section is “occupied” by the presence and passage of trains through the control area; this is accompanied by the alpha-numeric train ID (e.g. Train F015) over the track section;
- White – The track section is “unoccupied”;
- Yellow – Where a route has been called up to a signal at danger (red) but the track sections (see Figure 5) beyond the signal are required to be clear form the *overlap* or where the route has been called but the signal has not yet cleared;
- Green – Where a route has been called[3] and the signal has cleared to a proceed aspect (yellow, double yellow or green);
- Blue (Cyan) – A track block is applied on the track section.

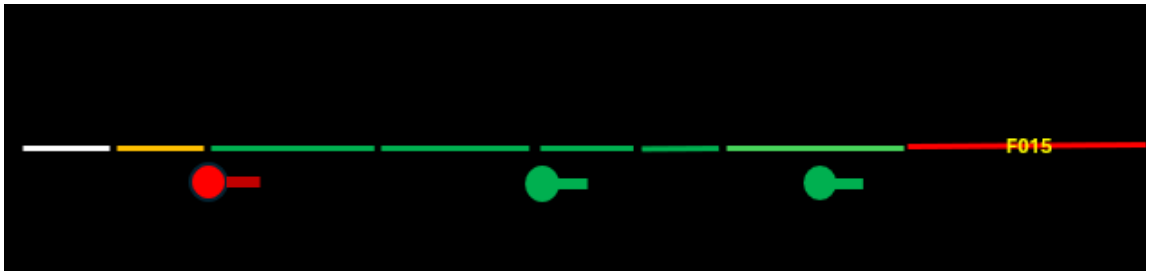

Figure 5 – Example of a route set through to a signal at danger (all signals are stop signals)

[3] Called is the term used when the route is requested to the interlocking either by the auto-route or the signalman. If the conditions are correct, the route will be set and the signals will clear.

38 In terms of the track blocks, the signalman can manually select track sections and apply track blocks to visually show where the line is under T3 Possession; they are displayed as blue lines, see Figure 6.

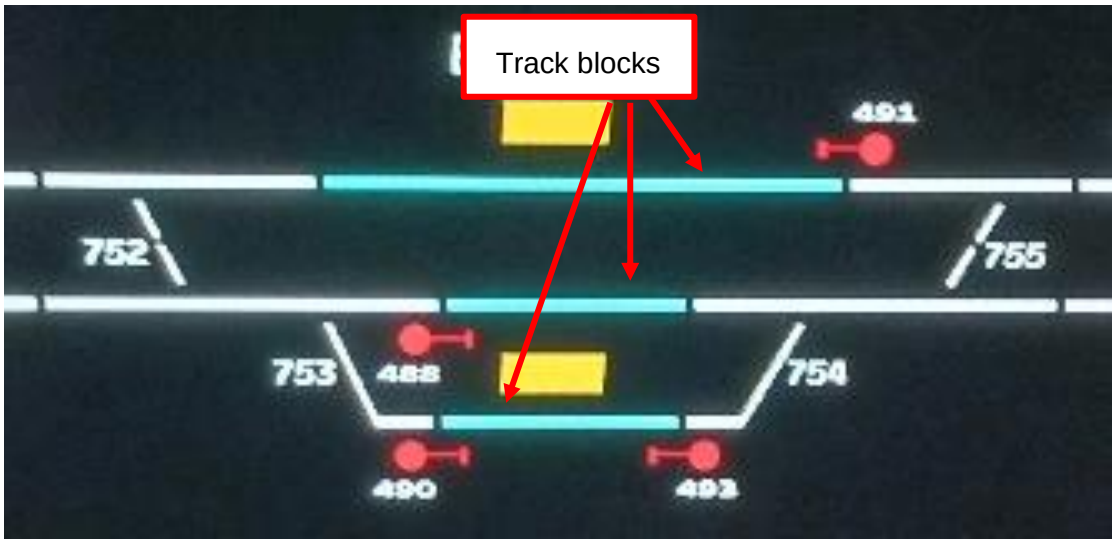

Figure 6 – An example of a track blocks applied (blue)

39 As described in the CTC Manual (Section 04-03), track blocks inhibit signal requests into an area. If an attempt is made to apply a track block when a track section is occupied by train, a message will be displayed at the bottom of the screen, and the track section colour will display as magenta (purple). Using track blocks also suppresses alarms which can frequently activate when the line is under T3 Possession. Track blocks can only be applied or removed on a detail view screen.

Signal Icons

40 For controlled signals, the colour of the signal icon indicates a simplified indication of the signal aspect displayed in real time (see red circle in Figure 7).

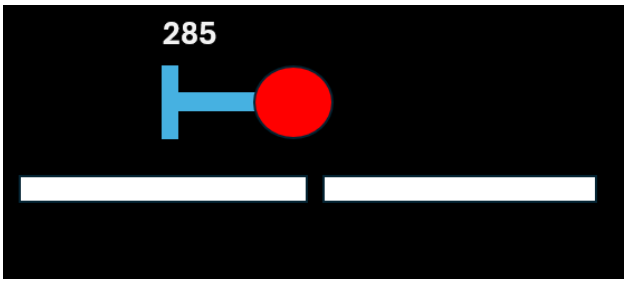

Figure 7 – A signal icon with a reminder applied

41 On the CTC workstations, when reminder appliances are applied by the signalman, this is indicated by the post of the signal icon on the display turning blue (see Figure 7). This can be done in conjunction with track blocks, as described in paragraph 38. The term ‘entrance block’ is also used in the CTC Manual in place of the term reminder appliance.

Arrangements for Absolute Possessions of the Line

What are T3 Possessions

42 As set out in Section T, Part 3, of the IÉ Rule Book, a T3 Possession of the line must be arranged when *engineer's trains* or on-track machines are to be used and it is not practicable to regulate their movements in connection with the work by the normal signalling system. A T3 Possession of the line may also be arranged where extensive engineering work is to take place, not involving engineer's trains or machines.

43 It is possible for there to be multiple T3 Possessions with different work activities in each CTC workstation control area. Where this occurs, planned start times are typically staggered.

Introduction to T3 Possession protection

44 The arrangement of a T3 Possessions is a multi-step process, as outlined in the IÉ Rule Book, for ease of understanding, this section of the report, presents the process in the order it occurs and not the order it is presented in the IÉ Rule Book; for the same reason some requirements/ instructions have been omitted which are not relevant to this incident. In addition there are some further relevant instructions included from the IÉ Train Signalling Regulations and General Instructions to Signalmen.

45 To ensure the safety of movements within a T3 Possession:

- Normal train signalling is suspended on any line blocked by a T3 Possession;
- The T3 Possession must be protected by signals being maintained at danger;
- Detonator protection must be provided at the possession limits;
- Only engineer’s trains are permitted to enter the T3 Possession;
- All movements within the possession must be authorised by the person specified in the IÉ Rule Book;
- A train may cross the T3 Possession provided the arrangements have been agreed beforehand and notified to the PICOP and the signalman.

PPRN

46 To assist the process of both planning and the setting up T3 Possessions, pre-planned T3 Possessions are used, each with a unique PPRN and an accompanying map. As both PICOPs and signalmen have access to the list of PPRNs and maps, both can quickly determine the protecting signals and points, length of the T3 Possession, etc, see Figure 8 for the PPRN diagram associated with the incident.

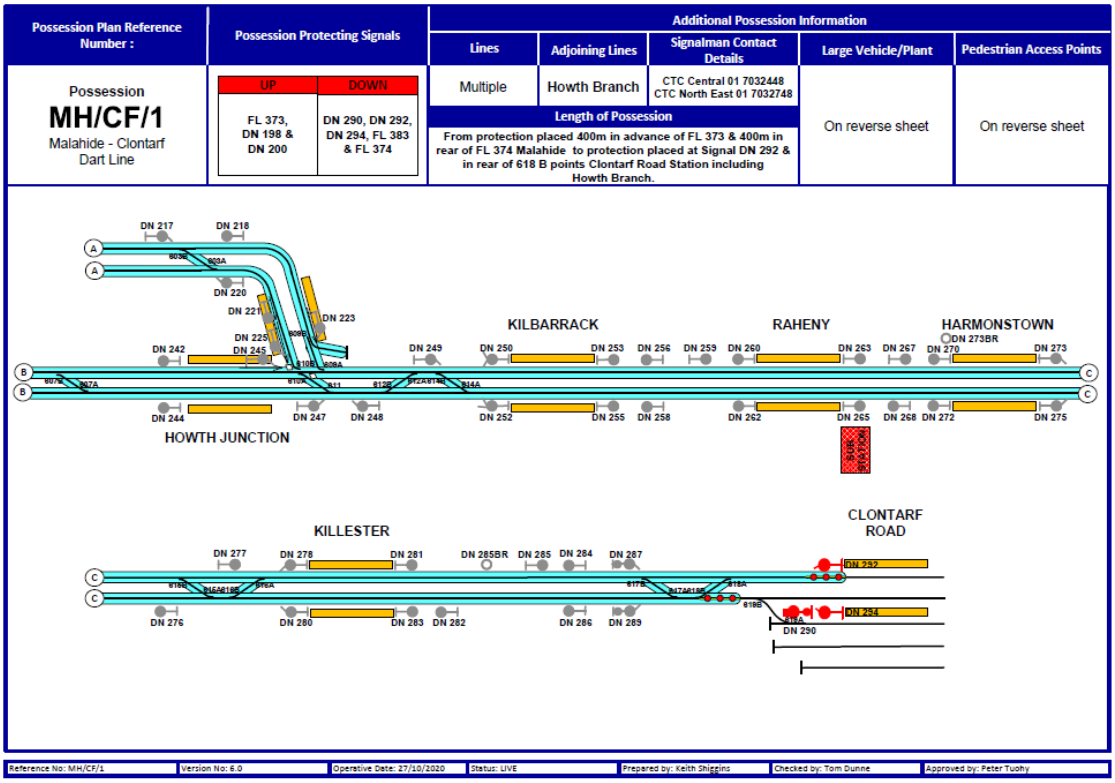

Figure 8 – PPRN MH/CF/1

IÉ Rule Book – General Instructions

47 According to Section T, Part 3 – General Instructions (Parts 8.1 to 8.7), are as follows:

- Appointment of PICOP;
- Appointments of Engineering Supervisors (ESs);
- Length of T3 Possession (this is indicated on the PPRN);
- Protection of T3 Possession:
  - Protection must be provided by maintaining a stop signal at danger in rear of the portion of line on which the possession will be taken; this signal must be capable of being controlled to danger from the signal box;

- Detonator protection must be provided at: each end of the possession and any line joining the possession at a junction;
- In certain circumstances, the PICOP must arrange for a Handsignalman to be positioned at the detonator protection;

- Indication of work sites – This is done through the placement of marker boards/ lights;
- Communications within T3 Possessions – In the interests of safety as well as efficiency, it is essential that communication is readily available between the PICOP and the following persons: Signalmen, ESs; Handsignalman (where provided); persons at protecting detonators;
- Movements within T3 Possessions – Provides information on movements within or entering / leaving work sites.

What you must do when taking the T3 Possession – PICOP

48 According to Section T, Part 3, What you must do before taking the possession (9.3), the PICOP must:

- Check the details of the possession to be taken with the signalman controlling the signal(s) leading to the line to be blocked, including the PPRN detailed on the possession map;
- Agree with the signalman the time when the arrangements for taking the possession may start;
- Make sure that any additional equipment or facilities needed for communication within the possession are available.

49 According to Section T, Part 3, Checking that the signal protection is provided (9.4.1), the PICOP must check that the signal protection is provided and that reminder appliances are in use.

What you must do before arranging the T3 Possession – Signalman

50 According to Section T, Part 3, What you must do before arranging the possession (11.1), the signalman must:

- Check the details of the possession with the person to act as PICOP;
- Agree the time when the arrangements for taking the possession may start.

What you must do when arranging the T3 Possession – Signalman

51 According to Section T, Part 3, How you must arrange signal protection (11.2.1), the instructions for the signalman are as follows:

- At the time you have agreed with the PICOP you must provide signal protection;
- You must place or maintain at danger the signal in rear of the portion of line on which the possession is to be granted;
- Arrange for all other controlled signals applicable to the line under possession to be placed to danger;
- Use the necessary reminder appliances.

52 To provide signal protection, the signalman must place the relevant possession protecting signals at danger, these are included in the PPRN MH/CF/1, see circled in Figure 9.

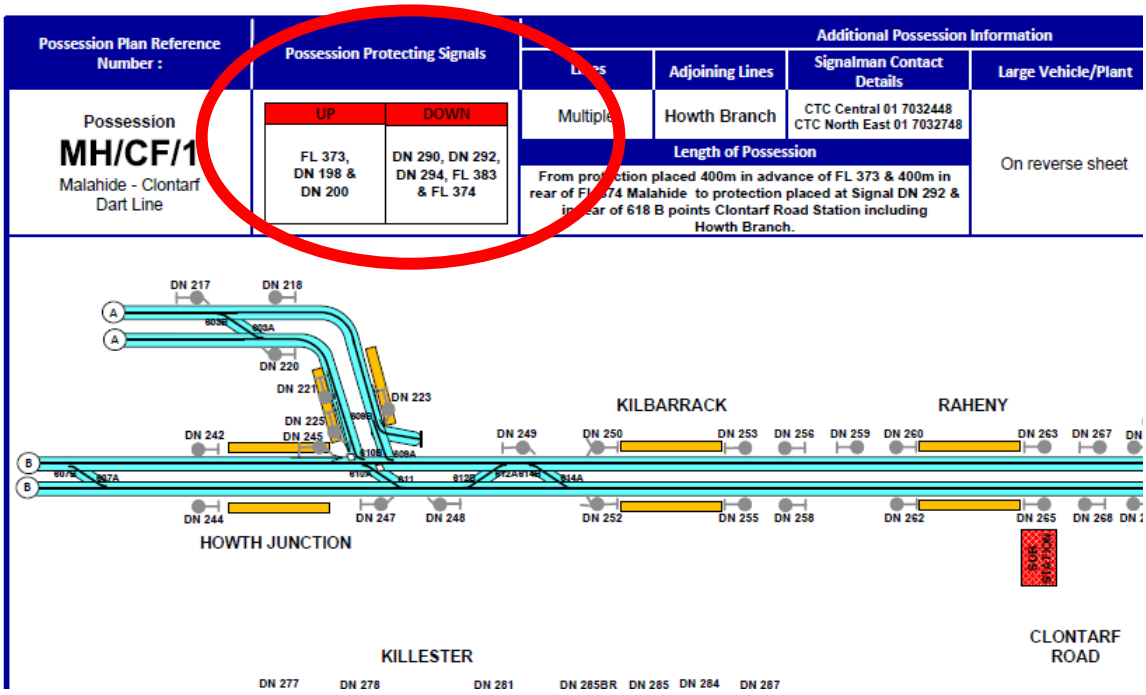

Figure 9 – Protecting signals for PPRN MH/CF/1

Arranging for detonator protection to be provided – PICOP

53 According to Section T, Part 3, Arranging for detonator protection to be provided (9.4.2), after signal protection has been arranged, the PICOP must ensure that detonator protection is provided.

When you must make an entry in the Train Register – Signalman

54 According to Section T, Part 3, When you must make an entry in the Train Register[4] (11.2.3) before entering the details of the arrangements in the Train Register, the signalman must: Complete the signal protection; and obtain the PICOP's assurance that the necessary protection is provided. The signalman must then make an entry in the Train Register as follows:

> (Down)(Up) ..... line
> from detonators placed ahead of signals/points
> Nos .....
> to detonators placed in rear of signals/points
> Nos .....
> has been taken possession of by .....
> (name of PICOP) at ..... (hours)"

55 The PICOP is required to countersign this entry. Where the PICOP is unable to come to the signal box because of the distance involved, the signalman must obtain the PICOP's name and location and enter that with the time after the Train Register entry.

56 On completion of the entry to the Train Register, the signalman must then tell the PICOP that the possession has been granted.

---

[4] It is normal practice for the Train Register entry to be made using a printed stamp (see below) into the Train Register book. While the details on the stamp were inputted correctly on the night of the incident, the difference in requirements for something so significant to safety is unusual; therefore, the RAIU consider this to be an additional observation AO-01 (paragraph 170), which warrants a safety recommendation, Safety Recommendation, 2025001-04 (paragraph 183). The stamp is as follows:

> Section T3 Absolute Possession Taken Up
> PPRN (Possession Plan Ref No……...
> PICOP……
> Speaking from……..
> Signal Protection Granted at……Hrs
> T3 Possession Granted at……Hrs
> Recorded by Signalman……..

When you must sign the Train Register – PICOP

57 According to Section T, Part 3, When you must sign the Train Register (9.4.4), after arranging the necessary signal protection and after receiving advice that the protection arrangements are complete, the signalman is required to enter the details of the arrangements in the Train Register. The PICOP must countersign this entry. Alternatively, where it is not practicable to go to the signal box because of the distance involved, the PICOP must ask the signalman to read out the entry. Provided the PICOP is sure it is correct, the PICOP must then give their name, place from where they are speaking and the time. The signalman will enter these details in the Train Register on the PICOP's behalf.

Train Signalling Regulations and General Instructions to Signalmen

58 The Train Signalling Regulations and General Instructions contains instructions which supplement the IÉ Rule Book on arranging protection.

59 Section 6.2 details when reminder appliances must be used, which includes on signals protecting a portion of line over which the normal passage of trains is stopped.

60 It is also stated that "where provided, you must additionally use any special equipment to indicate the limits of a possession or isolation".

61 The RAIU consider that track blocks could be considered as "special equipment" as they inhibit signals being cleared into an area and provide a visual indication (change of colour and message) paragraphs 38 and 39).

Professional Signallers Handbook

62 The Professional Signallers Handbook is issued to signalmen which contains key principles and techniques as well as the competency criteria against which signalmen are assessed. Its content is stated to amplify the core rules and must be considered mandatory. The tasks and duties of signalmen in normal, degraded and emergency conditions are divided up into units. Each unit has "demonstrate and explain" criteria for the technical skill or task and the non-technical skills to be assessed. A performance statement explains how the non-technical skills are applied to the tasks in each unit.

63 Unit 3.4 – Provide Protection for Trains and Engineering Possessions contains the following criteria relevant to the incident to be demonstrated (i.e. observed or simulated) over the cycle:

A – Establishing and confirming requirements with relevant person(s);

B – Agreeing and applying relevant protection arrangements according to relevant procedures and the type of possession being implemented.

64 The accompanying performance statement contains the following commentary on the task of granting possessions: Engineering work and possessions form a large part of a signalman's work. To ensure this work runs to schedule and safely, attention to detail and a systematic and thorough approach in reviewing the possessions planned for your *interlockings* are of key importance. The introduction of possession maps and PPRNs for the various interlockings help in this area. Be prepared and organised for the calls from the PICOP so that the possession setup procedure runs smoothly and without incident. Professional communication with various colleagues will require some or all of the skills of clarity, listening, sharing information, and, on occasion, assertiveness. You will have to check and recheck reminder appliances and blocking functions[5] to ensure that the engineering work is protected as set down in the procedures for the full extent of the T3 Possession.

65 The specific non-technical skills identified in Unit 3.4 for the PICOP requesting the signal protection for the placement of detonator protection and confirming the detonator is in place and granting the T3 Possession are:

- Attention to detail;
- Anticipation of risk;
- Listening clarity;
- Systematic and thorough approach;
- Checking.

[5] Entrance blocks perform the same function as reminder appliances. The term reminder appliance is used in the IÉ Rule Book but in the CTC Manual and on the workstations, the entrance block function is used to fulfil the rules relating to reminder appliances.

66 The Professional Signallers Handbook also contains content on workload management and identifies this as one of the seven non-technical skill categories. In Key Principle 4 - Maintaining a Professional Approach & Taking the Lead, it states that: At times you will not be able to accommodate all the requests you receive. These will be many and varied, but you must assess and decide upon the correct and safe procedure in accordance with the procedures and act accordingly. Sometimes this will lead you to decline requests. Don't be afraid to say no if you do not feel it is safe to allow the request. Never allow yourself to be intimidated into any actions that would result in the safe operation of the railways being degraded in any way, other than as allowed for in the procedures.

67 In Key Principle 4 – Avoiding possession irregularities, some of the potential incidents that can occur within a possession from signalman error are identified, this including trains entering or leaving a possession when not authorised.

The CTC Manual

68 The CTC Manual provides information on the workstations functionalities and describes how to carry out specific tasks. In describing how to apply reminder appliances (using the entrance block function) it also states, "when feasible, the signal blocking function should be used with the (track circuit) block function".

The Training of Signalmen

Selection

69 Signalmen are selected using criteria defined in OPC-SMS-024, Selection of CTC Signallers. This details the stages of selection including psychometric assessment, aptitude tests and interviews undertaken.

Initial training

70 Signalmen are trained internally at the Inchicore Training Centre in Dublin with training divided into Module 1: Induction and Foundation training and Module 2: Workplace practical experience and training; these are described in IMO-SMS-030.

71 The Module 1 (Track Circuit Block basic course) lasts six weeks in total and is delivered by trainers who are currently or were previously competent as signalmen. Training follows training and lesson plans which typically involve going through the IÉ Rule Book, Train Signalling Regulations and General Instructions, General Appendix and Safety Critical Communications training materials. The lesson plan content relevant to this investigation is covered on the Track Circuit Block basic course training plan in week four. A simulator is provided in training centre but is not planned for use on the Track Circuit Block.

72 Module 2 training is undertaken in the workplace in the “live” environment with a mentor signalman both demonstrating to and supervising the trainee carrying out tasks. Each trainee completes a “CTC Signalman’s Training Schedule” detailing the experiences gained during workplace training. Some simulator sessions are also undertaken using the simulator in CTC during Module 2.

73 The training simulators replicate an *Emergency Control Panel* (ECP) installation which are used to locally control of part the CTC control area in certain situations. Each ECP controls one or more interlockings and has a much smaller control area than a CTC Workstation. As a result, only the detail view is displayed on a smaller number of screens.

74 The ECP simulator can be set to represent the Sligo Line ECP (Maynooth to Sligo) or Waterford and Tralee routes from the junction with the mainline. An additional screen and control console is provided for the trainer or assessor to create situations and scenarios for the signalmen.

Initial assessment and certification

75 At the end of their Module 2 training period, the trainee signalman is assessed by multiple assessors before having their certificate issued by a Traffic Executive. Section 7.2 of IMO-SMS-030 states that the "trainee must be assessed on all the performance criteria and underpinning knowledge requirements relevant to the work and location the trainee will be required to perform when qualified".

76 Signalmen are assessed against criteria defined in the IÉ-IM Professional Signallers Handbook. The technical tasks performed by a signalman are divided into seven units, with an additional unit to assess non-technical skills. Each unit is further sub-divided into elements and has performance ("demonstrate") criteria and accompanying knowledge ("explain") criteria.

Assessment and Competency Management of Signalmen

77 Once qualified, new signalmen are placed on a Post Qualifying Assessment (PQA) cycle lasting one year, with a minimum of four assessment events and a summary assessment. The same performance criteria in the Professional Signallers Handbook are also used on the planned assessments.

78 IMS-SMS-030 defines requirements on the minimum duration and content of formal assessments (Section 10.2). This requires that particular attention must be paid to ensuring competence in the application of procedures for emergencies, degraded operations and other out-of-course situations which may occur infrequently, with simulation being permitted where relevant. There is no specific requirement to include T3 Possessions in the scope of assessments in this cycle.

79 Each formal assessment must include safety critical communications as part of the assessment. In addition these are also assessed for safety critical communications separately (in accordance with IMO-SMS-033) through a random download of recorded calls three times per annum.

Training and competency management of the Signalman involved in the incident

80 The Signalman commenced training in July 2023, starting with Module 1 classroom training between then and late September 2023. The Signalman recalled the simulator being used during this time in accordance with the lesson plan for taking engineering T3 Possessions.

81 During the Module 2 training the Signalman observed or took part in the granting of T3 Possessions on multiple occasions. The Signalman's training incorporated two one-week blocks of night shifts, giving further exposure to T3 Possessions. The second of these weeks was undertaken at the Signalman's own request.

82 The progress of the trainee was assessed multiple times by CTC Traffic Executives in the workplace and through simulations. The Signalman was assessed on T3 Possessions twice in a simulated environment.

83 After a final round of assessments the Signalman qualified on the 26th January 2024 and a Certificate of Competence was issued (approximately twelve weeks before the incident); with the Signalman commencing shifts on the Central Workstation.

84 After qualifying the Signalman was placed on a PQA twelve-month assessment cycle. The assessments delivered between the start of the cycle and the date of the incident were:

- 12th February 2024 – Formal Assessment 1 (within one month of qualifying);
- 19th April 2024 (carried out in the morning) – An additional assessment for qualifying assessment on the North & East Workstation;
- 19th April 2024 (carried out in the afternoon) – Formal Assessment 2 (within three months of qualifying) on the Central Workstation.

85 As Signalman had been recruited as a relief signalman[6], there was a need to qualify on the North & East Workstation. Training on this took place between the 12th February 2024 and the 16th February 2024, with a qualifying assessment at the end of that week.

86 The Signalman then returned to working the Central Workstation from the 20th February 2024 for the next seven weeks until the date of the incident.

87 The first safety critical communications assessment (in accordance with IMO-SMS-033) was carried out on the 18th April 2024, when a single call was assessed and received the top grade.

88 In the assessment cycle up to the point of the incident, the Signalman had not been assessed on the assessment criteria contained in Unit 3.4, Provide Protection for Trains and Engineering Possessions (paragraph 63), of the Professional Signallers Handbook.

89 The Signalman had no recorded incidents between qualifying and the date of the incident.

[6] Relief staff do not follow a pre-planned base roster but are rostered as required.

Instructions in relation to incidents in safe systems of work

90 IÉ Rule Book, Section B, What you should do if you become aware of anything unsafe (1.2 of 1.0 – Safety of Trains) requires:

- If you can remove a hazard quickly, do so provided you will not endanger yourself;
- Otherwise, carry out the emergency procedure for stopping trains;
- If you become aware of something which causes you concern for safety but is not of immediate danger, tell the Signalman or Person in Charge as quickly as possible

91 IÉ Rule Book, Section B, What you must do if there is an irregularity in observing these instructions (2.5.5 of 2.0 – Personal Safety for Working on Rail Vehicles), does include the following instruction for situations for when an irregularity occurs:

- Warn anyone who may be endangered to stand well clear;
- Tell the Designated Person[7] immediately.

92 The PTS Handbook is issued to all track workers (contractors and IÉ staff) and contains mandatory requirements. In Section 5.1, Keep to the Safe System, the instructions states: If you have any doubts about the safe system of work, make sure you are in a position of safety then tell the Track Safety Co-ordinator (TSC)[8].

[7] The Designated Person is responsible for implementing a safe system of work on rail vehicles.

[8] In this case, the Handsignalman was not working under a TSC, as permitted under the IÉ Rule Book.

Post Incident Drugs and Alcohol Testing

93 The requirement to test staff for drugs and alcohol after an operational incident is defined in HR-QMS-006-005, Drug and Alcohol Testing. Section 1 of Appendix 2 requires that screening should be undertaken “Following a safety critical incident (whether accident or other incident where there are reasonable grounds to suspect that the actions or omissions of an individual were pertinent to the incident”. Of the examples listed b (ii) includes “Serious Possession Incidents”.

94 There is no specific guidance in HR-QMS-006-005, for instances when it has been decided that a drugs and alcohol testing is required for a staff member; on whether the staff member should be relieved of duty while they wait for testing.

95 There is only a requirement to suspend from duty for a positive drugs test or removed from safety critical duties (Section 4.4 and 4.5).

96 There is also a requirement to “ensure the welfare of the testing candidate by making appropriate arrangements” after testing has occurred.

97 However, Section 4.5, Fitness, of IMO-SMS-030 states: “Signallers, level crossing controllers and gatekeepers must not take up duties or remain on duty if there is good reason to suspect that their judgement, decisions, reactions or physical condition might impair their ability to work safely. This hazard must be mitigated through monitoring and assessments and the employee’s duty to report any concerns that may affect their ability to perform their duties safely”.

Events before, during and after the incident

Events before the incident

98 The Signalman commenced training in July 2023 and passed as competent on 26th January 2024.

99 The Signalman worked for twelve weeks on the Central Workstation, except for one week as a result of other training twelve weeks before the incident (paragraphs 83 and 85) and competency assessments occurred , as required (paragraph 84).

100 The night before the incident was the first time the Signalman had worked alone. The Signalman had worked without incident on that night.

101 At 21:42 hrs on the 30th April 2024, the Signalman signed on duty on the Central Workstation.

102 On the night of the incident, there were three T3 Possessions planned in on the Central Workstation area on the Site Safety Co-ordination Sheet. In addition other T3 Possessions in neighbouring control areas also generated calls (the planned T3 Possessions normally have staggered start times to spread signalmen's workloads). In addition to liaising with the PICOPs, the Signalman was required to carry out tasks in relation to the electrical isolations of the Overhead Line Equipment (OHLE) and contact the three signalling locations that fringe[9] the Central Workstation (Clonsilla Signalman, Heuston Signalman and North & East Workstation).

103 At 22:00 hrs, the signalman working the previous shift, signed off duty and departed, leaving the Signalman working alone.

104 At approximately 23:20 hrs axle counters failed after the passage of a train at Lansdowne Road Station. This required Signalling, Electrical and Telecommunications (SET) staff to attend to *scotch and clip* the points, resulting in delays to services through the area.

105 At 00:51 hrs, the PICOP phoned the Signalman to commence the process of taking the T3 Possession. The Signalman did not grant signal protection at this stage, specifically mentioning the late running of Train E950 (which would later form Train F015) which was approaching Howth Station and which would need to return empty to Fairview Depot.

[9] Fringe is a term used to describe the operational boundary between signalling control areas.

106 At 00:56 hrs, the Signalman contacted the North & East Workstation at CTC to request signal protection at the northern end of T3 Possession MH/CF/1 (possession protecting signals FL373, DN198, DN200, FL383 and FL374 see Figure 10 for a section of PPRN MH/CF/1), in the Howth and Malahide areas, see pink circles in Figure 11.

Possession Protecting Signals	
UP	DOWN
FL 373, DN 198 & DN 200	DN 290, DN 292, DN 294, FL 383 & FL 374

Figure 10 – PPRN

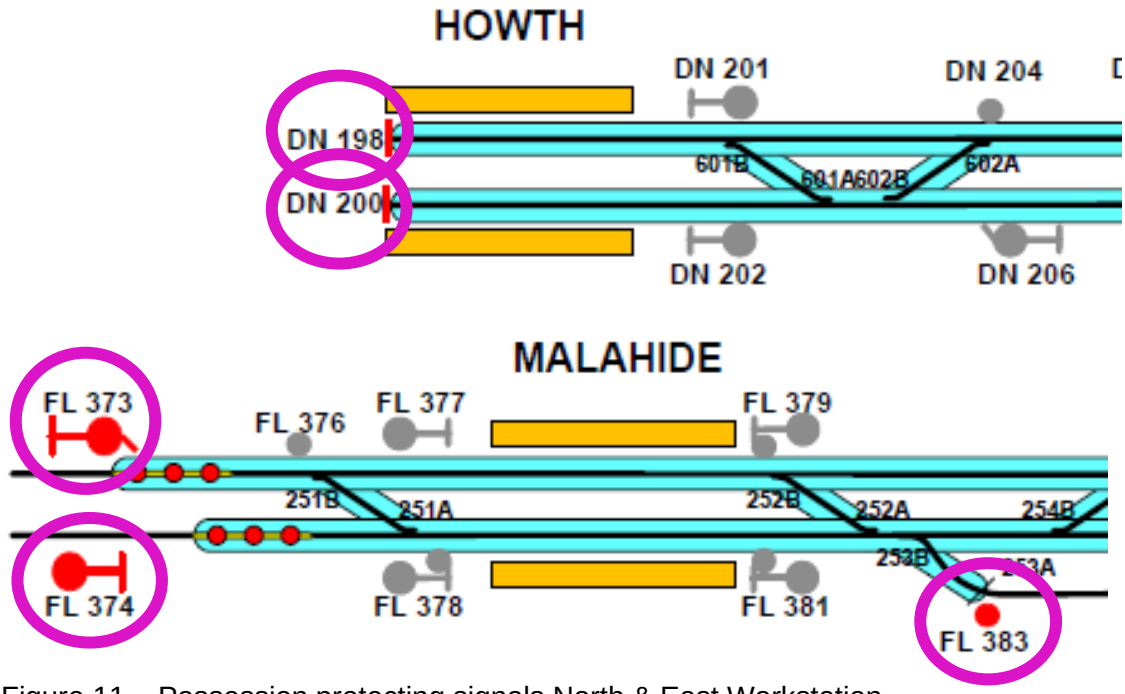

Figure 11 – Possession protecting signals North & East Workstation

107 At 00:58 hrs the SET Department contacted the Signalman after attending the earlier axle counter failure (see paragraph 104) to carry out an axle counter re-set.

108 At 01:00 hrs, Train F015 departed Howth Station, heading for Fairview Depot.

109 Between 01:00 hrs and 01:06:59 hrs, the Signalman was in telephone conversations with the PICOPs for two other T3 Possessions; and also staff at Connolly Station to confirm all required shunts of stabled trains had been completed for the morning.

110 At 01:07:10 hrs, the signalling system automatically called the route for Train F015 into Fairview Depot, placing crossovers 617 and 619 into *reverse*. The Handsignalman at Clontarf Road Station heard the points operate and concluded that a train was imminent.

Events during the incident

111 At 01:08:14 hrs the Signalman commenced the process of granting the T3 Possession by applying the reminder appliance on Signals DN290, leading out of the north end of Fairview Depot (see Figure 12). Two seconds later, at 01:08:16 hrs, Train F015 passed Signal DN281 at Killester, see Figure 12.

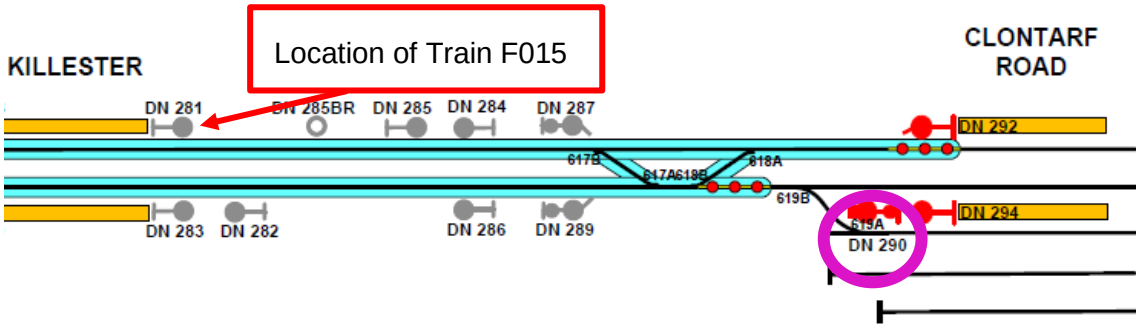

Figure 12 – 01:08:14 hrs to 01:08:16 hrs

112 At 01:08:26 hrs, reminder appliance placed on Signal DN292, on the southbound line, Clontarf Road Station, see Figure 13.

113 At 01:08:38 hrs, Train F015 was on the *berth track* of Signal DN285, see Figure 13.

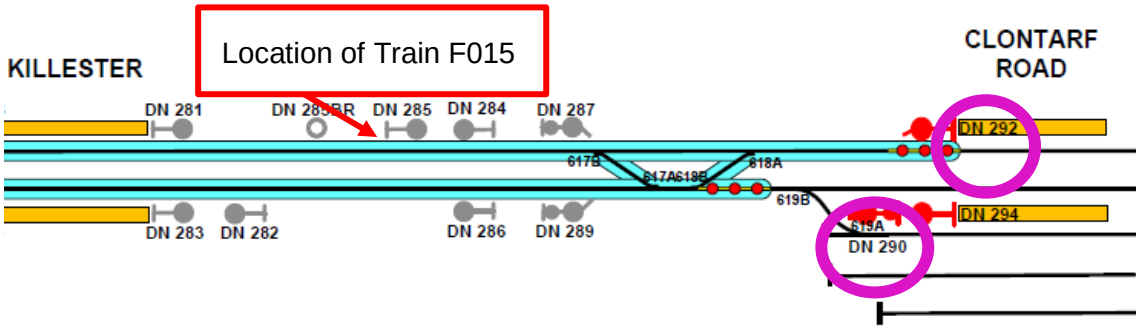

Figure 13 – 01:08:26 hrs to 01:08:38 hrs

114 At 01:08:41 hrs, a reminder appliance is placed on Signal DN294, northbound line, Clontarf Road Station, see Figure 14.

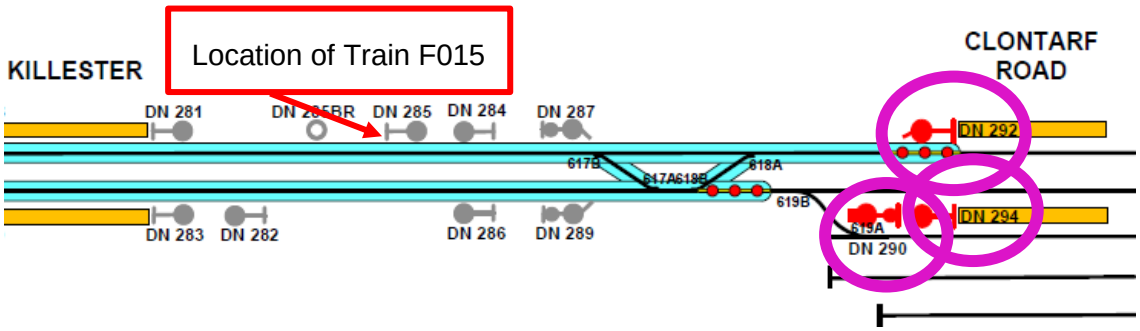

Figure 14 – 01:08:41 hrs

115 This was the last reminder appliance to be placed by the Signalman, track blocks were not applied to act as a reminder of the extent of the T3 Possession[10] (paragraph 38).

116 Train F015 would have been continuously visible on the overview screens, see Figure 15, whilst these tasks were performed.

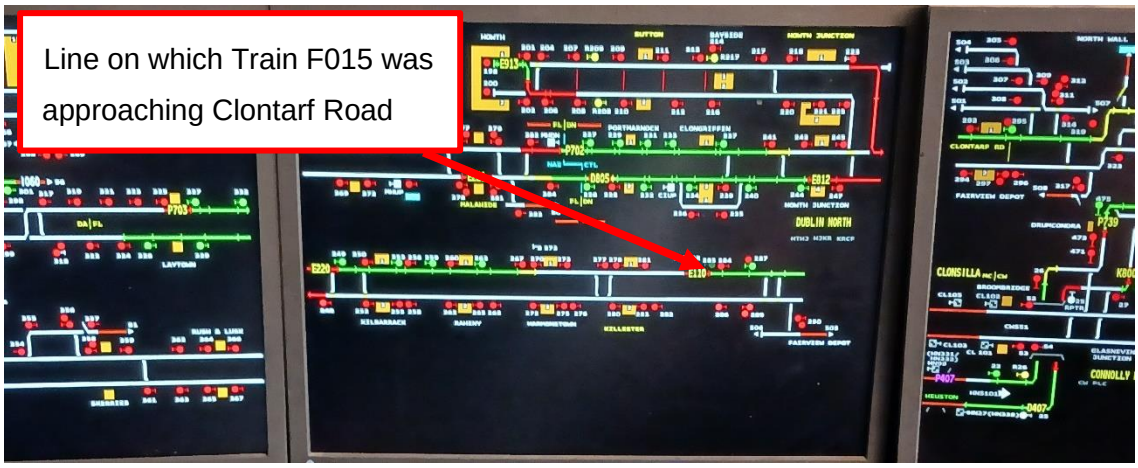

Figure 15 – Train F015's approach to Clontarf Road station on the overview screen

117 At the time of the last reminder appliance being placed for Signal DN294 (paragraph 114), assuming that this interlocking area was selected to do this, the Signalman's attention would have been centred on the middle of the three lower screens (see Figure 16). At this time, Train F015 would have been visible, but only on the lower part of the left-hand side detail view screen i.e. the Signalman would have to look at the screen on the left to see Train F015.

Figure 16 – Possible screen view for the Signalman

[10] It was identified, during the RAIU investigation, that track blocks are not used consistently by CTC staff during T3 Possessions.

118 At 01:08:50 hrs some nine seconds after the last reminder appliance was applied, the Signalman commenced a telephone call to the PICOP to confirm the T3 Possession limits and to grant signal protection. This call lasted for one minute and seven seconds and concluded at 01:09:57 hrs. The transcript of the call was as follows:

PICOP: Hello.

Signalman: Hello [Name]?

PICOP: It is yes.

Signalman: Central Signaller CTC. Map reference what was it…?

PICOP: Mike-Hotel-Charlie-Foxtrot-One.

Signalman: And the signals?

PICOP: On the Up and Down road FL373, DN1908, DN200, DN290, DN292, DN294, FL383, FL374[11].

Signalman: So Map ref Mike-Hotel-Charlie-Foxtrot-One, FL373, DN1908, DN200, DN290, DN292, DN294, FL383, FL374.

PICOP: That's correct

Signalman: I can confirm that you have signal protection at 0-1-0-9[12].

PICOP: Thank you.

119 The call was conducted at a fast pace by the Signalman; the T3 Possession protecting signal numbers, listed on PPRN Map MH/CF/1, facilitating this. The Signalman subsequently stated on interview that they were rushing to complete the tasks as a result of the mounting workload.

[11] All signal numbers spoken phonetically, through all calls.

[12] Referencing the time of granting protection.

120 During the time of the call, Train F015 passed Signal DN285 and Signal DN287 and was now approaching crossover 617 (see Figure 17).

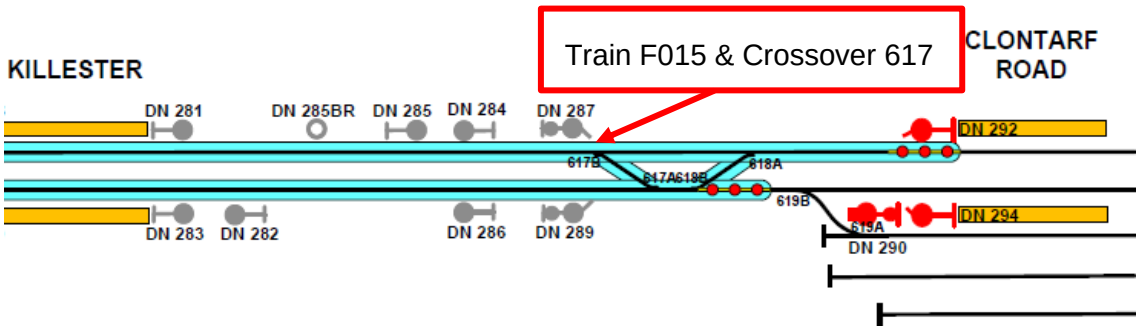

Figure 17 – 01:09 hrs

121 When the call between the PICOP and the Signalman ended, the PICOP then contacted the two Handsignalmen, one at Clontarf Road Station (who was located in a place of safety at the end of Platform 1) and one at Malahide to give them permission to place the detonator protection and possession limit boards.

122 As the PICOP started the conversation with the Handsignalman at Clontarf Road Station, the Handsignalman saw a train (Train F015) approaching in the Up direction from Signal DN287 and told the PICOP[13].

123 This confused both parties, as the Handsignalman assumed the PICOP was mistaken and signal protection hadn't been granted, and the PICOP wondered why a train was in the section after signal protection was granted. Neither party suggested or took any immediate action to stop the train (Train F015).

124 Despite realising there was an irregularity with signal protection, the PICOP and Handsignalman then agreed to place the T3 Possession protection consisting of three detonators and possession limit boards on each line after the passage of the train (Train F015). From the Handsignalman's position, the Handsignalman was able to see the train (Train F015) enter the Fairview Depot sidings.

125 Between 01:10 hrs and 01:12 hrs, Train F015 cleared crossovers 617 and 619 from the mainline and into Fairview Depot.

126 During this time, the PICOP made or received one or more phone calls, before phoning the Signalman.

[13] Driver F015 did not see anything unusual during the approach to Fairview Depot from Signal DN287. Train F015 travelled at an average of 12 mph (20 km/h) over this section of line before slowing to 5 mph on entry to the depot sidings.

127 At 01:24 hrs the PICOP contacted the Signalman and advised that placing the T3 Possession detonator protection had been delayed by the presence of the train (Train F015). The call is transcribed as follows:

> Signalman: Central Signalman CTC, pass your message.
>
> PICOP: Hello Signalman, it's PICOP [NAME]. There's… urr… a bit of a delay placing the detonator protection.
>
> Signalman: (repeating fast) Bit of a delay, putting down detonator protection.
>
> PICOP: Yes, as I was telling the Handsignalman, the train was coming towards him. From Fairview there… That's why he didn't put it down until it was into the depot.
>
> Signalman: ...from Fairview into the depot...
>
> PICOP: Yeah, yeah, when I rang him and told him I had signal protection at 0-1-0-9, he said I can't put it down [NAME], there's a train coming towards me.
>
> Signalman: Bear with me two seconds, I'll give you a ring back okay.

Events after the incident

128 The Signalman did not grant the possession after ending the call.

129 At 01:30 hrs the Signalman then self-reported the incident to the Traffic Executive who mobilised to CTC arriving at approximately 02:00 hrs. The Traffic Executive in turn advised the CTC Duty Manager[14][15].

130 The CTC Duty Manager arranged a post-incident drugs and alcohol test and decided to attend site, arriving at 02:30 hrs.

131 The decision was made to permit Signalman to continue working while being supervised by the Traffic Executive as there was no other person competent on site to operate the Central Workstation and relieve the Signalman.

132 At 02:12 hrs, the Signalman granted T3 Possession PPRN MH/CF/1 (the T3 Possession related to the incident).

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[14] It should be noted that the Signalman was prompt in self-reporting the incident and when requested to continue with their duties, while supervised, worked diligently until the end of their shift, which should be commended.

[15] IÉ determined that the Signalman had made or received seventy-one calls between 00:24 hrs and 01:30 hrs.

133 At 02:29 hrs, the PICOP (hereafter PICOP 2) for a different T3 Possession (PPRN CYSTNGNP1) contacted the Signalman to advise that detonator protection was in place after having received signal protection earlier in the night (referred to in paragraph 109).

134 After the T3 Possession was granted, the PICOP 2 immediately requested a T4 Possession[16] from the Signalman. The transcription of the call from this point is as follows:

Signalman: Can you call out those signals there for me?

PICOP 2: Delta November 3-3…. Delta-Charlie-6-4-1, Delta-Charlie-6-5-5.

Signalman: So fouling points Delta-November-6-3-3, Delta-November-6-3-7, fouling point Delta-Charlie-6-4-1 and.…(pause)… The wash, the shed and the sidings? Right, I'll call you back when that T4 has been granted okay?

PICOP 2: …(pause) Sorry….

Signalman: Okay, I'll call you back when I've got them blocked up…

PICOP 2: Okay… (pause)…Okay…

Signalman: Bear with me two seconds…

[Inaudible conversation in the background between Signalman and second person, and the CTC Traffic Executive. The phone is then handed to the CTC Traffic Executive.

Traffic Executive: How are you doing? The signal person will ring you back when the T4 is protected okay.

PICOP 2: Okay.

Traffic Executive: Alright, Thank you, bye bye.

135 At approximately 03:00 hrs drugs and alcohol testing took place on site. The Signalman was asked if they were okay[17] and if they were okay to continue working and advised that they would receive a professional discussion and corrective coaching for the incident. The Signalman agreed to carry on, supervised, but when subsequently interviewed, considered that their ability to focus on the task had been affected by the incident.

136 At 06:42 hrs the Signalman completed their shift and was relieved by another signalman.

[16] T4 Possession, Protection of Engineering Work in Sidings.

[17] It should be noted that the CTC Duty Manager and the Traffic Executive took some very positive actions in terms of checking the welfare of the Signalman, which should be commended.

Previous occurrences

137 The only other recorded instance known to the RAIU where signal protection has been granted with a train present in the signal section was the operational irregularity on the 28th March 2024 between Ballybrophy and Lisduff. This incident is currently under investigation by the RAIU.

Analysis

CTC Workstation and Features

138 The layout of the Central Workstation screens features both overview and detail view screens (see Figure 16). When setting reminder appliances on Signals DN 290, DN292 and DN294 it is likely that this task was carried out on the centre detail view screen (paragraphs 34 and 117) and so that is where the Signalman's focus would have been directed immediately before the incident.

139 Train F015 would not have been visible on this screen i.e. the screen used for selecting Signals DN290, DN292 and DN294, but may have displayed on the left-hand detail view screen (again, this was dependent on the interlocking that was selected).

140 However, the position of Train F015 was continuously displayed to the Signalman throughout the incident on the overview screens and Train F015 had been observed by the Signalman earlier (paragraph 105).

141 The key features of the Central Workstation relevant to arranging T3 Possessions are reminder appliances and track blocks (paragraphs 38 and 40); with reminder appliances used on the night of the incident (paragraphs 111, 112, 114), see Figure 18 for how this would be displayed on the Central Workstation.

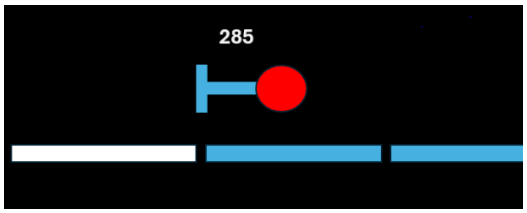

Figure 18 – A reminder appliance icon and track block and track block applied.

142 Had the Signalman used the track block function, the Signalman would have had to select and block each track section of the lines under T3 Possession, meaning, the Signalman would have had to click on the track section Train F015 was on, and so would have been very likely to have seen Train F015, and so stopped the process of arranging signal protection.

IÉ Rule Book and other instructions

143 The IÉ Rule Book sets out the process for putting in place a T3 Possession and there are associated techniques for signalmen in the Professional Signallers Handbook, along with the performance statement and competence criteria relating to T3 Possession tasks.

144 The Train Signalling Regulations and General Instructions to Signalmen in terms of reminder appliances states that these "must be used on signals protecting a section of line over which trains have been stopped" (paragraph 59). It also states that signalmen must use "special equipment where provided, to indicate the limits of possession or isolation" (paragraph 60); this reference does not specifically use the term "track block" or "blocking function".

145 The more recent Professional Signallers Handbook does however refer to the use of "blocking functions" in connection with the protection of T3 Possessions (paragraph 64). The intent of this has been confirmed by IÉ to primarily apply to signal reminder appliances, as the term "entrance block" is used in the CTC Manual and on the CTC Workstation screens; the application of the term "blocking function" to applying "track blocks" is not clearly established and is uncertain (footnote 5).

146 The CTC Manual states that track blocks should be used "when feasible" in conjunction with signal reminder appliances (paragraph 68). The "when feasible" instruction, is not qualified further and is not explicitly linked to T3 possessions.

147 However, it was identified that it that track blocks are not used consistently by CTC staff during T3 Possessions (footnote 10). This may be due to a combination of a different interpretations of the written instructions and differences in training and enforcement through competency assessment. The additional workload in placing and removing track blocks may also be a factor.

The training and assessment of the Signalman

148 The recently completed training and qualification of the Signalman had included the rules and procedures for taking and giving up T3 Possessions (paragraph 71); multiple simulations for granting T3 Possessions (paragraph 71 and 80); and exposure to managing T3 Possessions through practical training (paragraph 81). At the end of the Module 2 training, the Signalman had requested a further week of mentoring on nights to gain further experience of granting and giving up T3 Possessions (paragraph 81).

149 The training materials do not, however explicitly reference the use of the track block function and how it should be used.

150 The training materials do not also reference the Professional Signallers Handbook, in particular content relating to workload management and other non-technical skills (paragraph 65). It is possible that had emphasis been placed on the key principles when teaching the rules of T3 Possessions, the Signalman may have been more inclined to decline or defer requests as the workload increased.

151 The assessments covering T3 Possessions both before and after qualification were carried out on the ECP type signalling simulator with its limited capability (paragraph 72). As the signalmen routinely manage multiple T3 Possessions concurrently on the Central Workstation, the existing simulator assessments are unlikely to effectively test the key non-technical skills of workload management and conscientiousness required to perform under pressure in the actual workplace (paragraph 72).

152 After qualification the Signalman had only been rostered for one night shift (the previous night) before the shift on which the incident occurred (paragraph 100). As most T3 Possessions occur on night shifts, this also meant that there had been limited assessment opportunities to assess managing T3 Possessions under actual conditions after qualifying.

Actions of the Signalman

153 Between 00:51 hrs and 01:08 hrs the Signalman carried out an axle counter re-set and had undertaken tasks in relation to three separate respective T3 Possessions including liaising directly with the PICOPs (paragraphs 105 to 110).

154 The volume of planned possession activity of the night of the 30th April / 1st May was considered typical for the Central Workstation. However, on the night of the incident, the actual workload heightened for a critical period before the incident. The late running Train F015 and another train resulted in three of the T3 Possessions being set up in parallel over twenty minutes (paragraph 109). Without disruption on the network, the start times for the T3 possessions are typically staggered over a longer time period (paragraph 102). In the case of MH/CF/1, the start time was dependent on Train F015 having returned to Fairview Depot.

155 The level of activity was higher than the Signalman had previously experienced whilst working alone on a night shift dealing with the task of granting T3 Possessions. In the time period between 01:06 hrs and 01:30 hrs, IÉ logged seventy-one phone calls either made or received by the Signalman (footnote 15).

156 At 01:08 hrs without any prompting from the PICOP the Signalman commenced the process of granting signal protection for the T3 Possession PPRN MH/CF/1 by applying reminder appliances whilst Train F015 was within the possession limits (paragraph 111,112,114).

157 At the time of the incident, the Signalman was conscious of the impact of the delays and was attempting to complete multiple tasks to avoid further delays (paragraph 119). The decision to progress with granting signal protection for T3 Possession PPRN MH/CF/1 at that time was made by the Signalman and not immediately influenced by the PICOP or others.

158 The reason why the Signalman either did not see Train F015 is likely to have been because they did not carry out a thorough and systematic check of the full section of line to be protected by the T3 Possession area before contacting the PICOP. Systematic and thorough checking is identified in the Professional Signallers Handbook as a non-technical skill that is aligned to the task of implementing signal protection (paragraph 64).

159 While reminder appliances were used, track blocks were not applied by the Signalman before the signal protection was granted (paragraph 115). Had the Signalman attempted to apply track blocks throughout the protection limits it is very likely that Train F015 would have been seen (paragraph 142).

Actions of the PICOP and Handsignalman

160 Neither the Handsignalman or the PICOP (through contacting the Signalman) attempted to stop Train F015 or immediately report the incident to the Signalman, even though they realised an irregularity had occurred (although noting, they were confused about the presence of Train F015). Instead they agreed to place the detonator protection, etc, after the passage of Train F015 (paragraph 124); with the PICOP only notifying the Signalman after this was done (paragraph 126).

161 While it is acknowledged that the IÉ Rule Book and PTS Handbook do include some alerting requirements, these are not specific to track access, with all notifications directed at different parties i.e. signalman, person in charge, designated person or TSC (paragraphs 90 to 92).

The response to the incident

162 After the incident being reported the CTC Duty Manager arranged for drugs and alcohol testing to take place (paragraphs 93 and 94).

163 As there was no other person competent available to operate the Central Workstation, the Signalman was required to continue working, while supervised by the Traffic Executive (paragraph 130). During this period the Signalman granted two T3 Possessions; however, the Signalman appears to become confused, and overwhelmed, when the PICOP 2 further requests a T4 Possession; and the Signalman passes the call over to the Traffic Executive (paragraph 133). Whilst steps were taken to mitigate the hazard, the Signalman was clearly affected by the incident (paragraph 130).

164 IMO-SMS-030 states that Signalmen must not remain on duty if there is good reason to suspect that their judgement, decisions, reactions or physical condition might impair their ability to work safely (i.e. hazard); but then continues that this hazard must be mitigated through monitoring; and, also relies on the employee to report any concerns that may affect their ability to perform their duties safely (paragraph 97). Again, after the issue with the T4 Possession, further consideration should have been given to standing down the Signalman.

165 There is no specific guidance in HR-QMS-006-005 or IMO-SMS-030 on whether a staff member should be relieved of duty if it is decided that a drugs and alcohol test is required. There is only a requirement to suspend or remove from duties/ safety critical duties for a positive drugs test (Section 4.4 and 4.5)[18].

[18] The RAIU consider that when drugs and alcohol testing is required, a person, performing safety critical work, should not remain on duty or be removed at the earliest opportunity. The RAIU consider this to be an additional observation, AO-03 (paragraph 170), which warrants a safety recommendation, Safety Recommendation 2025001-06 (paragraph 185).

Conclusions

Causal, contributing, and systemic factors

166 Between 01:08 hrs and 01:10 hrs on the 1st May 2024, the Signalman on the Central Workstation carried out the process for the signal protection of T3 Possession PPRN MH/CF/1. During this process the Signalman did not establish that Train F015 was in the T3 Possession limits before granting signal protection.

167 The RAIU have identified the following possible causal factor which may have resulted in the incident:

- CaF-01 – The Signalman did not carry out a thorough and systematic check of the T3 Possession limits before granting signal protection (paragraph 158);
- CaF-02 – The Signalman did not successfully apply the non-technical skills that would allow them to carry out the thorough and systemic checks required (paragraph 151);
- CaF-03 – The Signalman did not apply track blocks before granting signal protection, which would have identified that Train F015 was still within the limits of the T3 Possession, although noting this does not appear to be a clearly defined requirement (paragraphs 142 and 146).

168 The following contributory factors were identified, in terms of the Signalman not establishing that Train F015 was within the limits of the T3 Possession that they granted:

- CoF-01 – At the time of the incident, as a result of an earlier signalling fault at Lansdowne Road, the Signalman had to grant multiple delayed T3 Possessions; meaning that the Signalman's workload was now heightened (paragraph 154);
- CoF-02 – The Signalman had limited experience of managing multiple T3 Possessions concurrently and did not apply the workload management skills for such situations, effectively (paragraphs 152, 155 and 148);
- CoF-03 – The previous night the Signalman successfully carried out the night shift unsupervised, which may have given the Signalman a false sense of confidence in being able to manage multiple T3 Possessions (paragraph 152).

169 The RAIU have identified the following systemic factors to the incident:

- SF-01 – The documentation around the application and use of track blocks is not robust in terms of how and when they should be used (paragraph 149);
- SF-02 – The limited capability of the current signalling simulator has prevented the realistic simulation of managing multiple possessions, likely to be encountered on CTC Workstations (paragraphs 148 and 151);
- SF-03 – The assessment process does not require the targeted assessment of signalmen managing T3 Possessions in the workplace despite the identified risk potential and their frequent occurrence (paragraph 151).

Additional Observations

170 Although not causal, contributing or systemic to the incident, the RAIU makes the following additional observations:

- AO-01 The wording and information on the stamps used in the Train Register in CTC is inconsistent with the IÉ Rule Book wording in Module T Part Three (footnote 4);
- AO-02 – Neither the PICOP or the Handsignalman took any actions to stop Train F015 despite releasing an irregularity had occurred and did not immediately report the incident to the Signalman (paragraph 160). There does not appear to be any clear instructions in the IÉ Rule Book or the PTS Handbook on actions to take for this particular scenario (paragraph 161);
- AO-03 – The Signalman involved in the incident remained on duty whilst awaiting drugs and alcohol testing (paragraph 163). There is no specific guidance in HR-QMS-006-005 or IMO-SMS-030 on whether a staff member should be relieved of duty, if it is decided that a drugs and alcohol test is required (paragraph 165).

Measures taken by IÉ-IM since the incident

Measures taken with the Signalman

171 After the incident a review of the Signalman's actions were undertaken by the CTC Traffic Executive and CTC management and the provisions of document IM-SMS-022 Safety Culture Strategy were applied. This describes the application of a "Just Culture". The outcome of the process using the error categorisation model was that the Signalman had made a "mistake" and were aware of the error, how it occurred and how to prevent a re-occurrence.

172 With the agreement of the Signalman, a week of mentored night shifts was undertaken to gain further experience, develop skills and gain confidence in managing T3 Possessions.

173 A post-incident review was undertaken between the Signalman and the human factors team in IÉ, with the recommendation resulting that a "finger tracing" error prevention technique be adopted for checking T3 Possessions. Finger tracing involves using a finger to guide a Signalman's eyes over the relevant track sections; this *kinaesthetic* approach enhances learning by connecting visual and motor aspects, making it easier to process information and improve comprehension.

174 The incident was reviewed with the PICOP and their manager and the actions in relation to standing down the Handsignalmen when it was clear an incident had occurred were discussed.

175 IÉ-IM also carried out their own internal investigation into the incident (Report of Investigation: Possession protection arrangement granted with train in section, 1st May 2024, Report No: R0204-25-06, published on the 11th February 2025), making one safety recommendation, namely: The Head of IÉ-IM Operations to review the support provided to newly qualified CTC Signalmen specifically in relation to working nights, and to explore feasibility of increasing the duration of mentor support on night work until the CTC Traffic Executives are satisfied that the support of a mentor is no longer required.

Future Developments at National Traffic Control Centre (NTCC)

176 In 2025, the signalling control centre will start to migrate to the new purpose-built NTCC, located at Heuston Station, Dublin. This project that has been underway for several years and will result in several changes of relevance to this investigation.

177 The workstation control areas will be reduced in size for many areas and are planned to be single manned, with the exception of the Central Workstation.

178 The new NTCC will include a simulator suite capable of replicating each of the individual workstations to be provided on site. This will have the capability to simulate more complex scenarios and permit simulations that are closer to the workload of the busier workstations. This will be available for both initial training and subsequent assessment activity of experienced Signalmen.

Safety Recommendations

Introduction to safety recommendations

179 In accordance with the European Union (Railway Safety) (Reporting and Investigation of Serious Accidents, Accidents and Incidents) Regulations 2020), RAIU safety recommendations are addressed to the NSA, the CRR, and directed to the party identified in each safety recommendation.

Absence of safety recommendations due to measures in progress

180 As the new NTCC will include a simulator suite capable of replicating and simulating more complex scenarios for workstations (paragraph 178), the RAIU do not consider a further safety recommendation is warranted in terms of the provision of an advanced simulator, as this project is currently ongoing.

Safety recommendations as a result of this incident

181 The Signalman had limited experience of the Signalman in managing the granting multiple T3 Possessions in real-life workload conditions despite the identified risks associated with this activity (paragraph 67). To ensure signalmen have the required skills in managing T3 Possessions in real-life workload conditions, the RAIU makes the following safety recommendation to address SF-03 (paragraph 168), as follows:

Safety Recommendation 2025001-01

IÉ-IM to revise the initial signalman training to include additional experience of T3 Possessions working under actual workload conditions.

Safety Recommendation 2025001-02

IÉ-IM to revise the competence management system to include the assessment of granting and managing T3 Possessions under actual workload conditions.

182 It was identified that the Signalman had not seen Train F015, when setting up signal protection. The RAIU makes the following safety recommendation to address CaF-01 and CoF-02 to assist Signalmen in carrying out this task:

Safety Recommendation 2025001-03

IÉ-IM to review operational procedures and signalman training and competency management to include clear guidance to CTC Signalmen on the use of the track block function or alternative techniques for checking during the granting of T3 Possessions.

Safety recommendations as a result of additional observations

183 The wording and information on the stamps used in the Train Register in CTC is inconsistent with the IÉ Rule Book wording in Module T Part Three (paragraph 170). The RAIU consider the following safety recommendation is warranted to address AO-01, as follows:

Safety Recommendation 2025001-04

IÉ-IM to ensure that the information recorded in the Train Register is consistent with the information required to be recorded in the IÉ Rule Book.

184 After the initial incident had occurred, the PICOP and Handsignalman continued to place the detonator protection. As the IÉ Rule Book does not define a general requirement to suspend work or return to a place of safety for those working on the infrastructure Consequently, the RAIU make the following safety recommendation to address AO-02 (paragraph 170), as follows:

Safety Recommendation 2025001-05

IÉ-IM to review the IÉ Rule Book instructions, and associated training materials applicable to IÉ-IM staff, for actions to be taken, in situations where a safe system of work is compromised.

185 The Signalman involved in the incident was required remain on duty without having undergone drugs and alcohol testing. There is no specific guidance in HR-QMS-006-005 or IMO-SMS-030 on whether a staff member should be relieved of duty if it is decided that a drugs and alcohol test is required. The RAIU consider the following safety recommendation is warranted to address AO-03 (paragraph 170), as follows:

Safety Recommendation 2025001-06

IÉ should review their current documents that reference drugs and alcohol testing with a view to clearly addressing how staff should be managed where it has been decided drugs and alcohol testing is required i.e. should staff who are in safety critical roles be stood down until after a negative drugs and alcohol test.

Safety Recommendation 2025001-07

IÉ-IM to review the contingency manning arrangements for its signalling centres to ensure it has the ability to relieve staff of duty, to ensure safety critical tasks continue to be performed safely, if required.

Additional Information

List of abbreviations

AO	Additional Observations
CaF	Causal Factors
CCE	Chief Civil Engineer
CoF	Contributory Factors
CRR	Commission for Railway Regulation
CTC	Central Traffic Control
DTE	District Traffic Executive
ECP	Emergency Control Panel
EMU	Electric Multiple Unit
EU	European Union
GSM-R	Global System for Mobile Communications - Railway
hr	hour
IÉ-IM	Iarnród Éireann Infrastructure Manager
IÉ-RU	Iarnród Éireann Railway Undertaking
km	kilometre
km/h	kilometres per hour
m	metre
MP	Mile Post
mph	miles per hour
NSA	National Safety Authority
NTCC	National Train Control Centre
OHLE	Overhead Line Equipment
PICOP	Person In Charge of Possession
PPRN	Possession Plan Reference Number
PQA	Post Qualifying Assessment
PTS	Personal Track Safety
RAIU	Railway Accident Investigation Unit
RFI	Request For Information
SET	Signalling, Electrical and Telecommunications
SMS	Safety Management System
TCB	Track Circuit Block
TSC	Track Safety Co-ordinator

Glossary of terms

Accident	An unwanted or unintended sudden event or a specific chain of such events which have harmful consequences. For heavy rail, the EU Agency for Railways divides accidents into the following categories: collisions, derailments, level-crossing accidents, accidents to persons caused by rolling stock in motion, fires and others.
Article 20 of Directive (EU) 2016/798, Obligation to investigation	Article 20 (1) Member States shall ensure that an investigation is carried out by the investigating body referred to in Article 22 after any serious accident on the Union rail system. The objective of the investigation shall be to improve, where possible, railway safety and the prevention of accidents. Article 20 (2) The investigating body referred to in Article 22 may also investigate those accidents and incidents which under slightly different conditions might have led to serious accidents, including technical failures of the structural subsystems or of interoperability constituents of the Union rail system. The investigating body may decide whether or not an investigation of such an accident or incident is to be undertaken. In making its decision it shall take into account: (a) the seriousness of the accident or incident; (b) whether it forms part of a series of accidents or incidents relevant to the system as a whole; (c) its impact on railway safety; and (d) requests from infrastructure managers, railway undertakings, the national safety authority or the Member States.
Assetwatch	A system used by the SET department to monitor signalling asset operation and performance.
Axle counter	A train detection system that detects the entry and exit of train axles within a specific section of track, providing information about the track's occupancy status.
Ballast	Graded stone which is used to hold the track in position (vertically and horizontally) and facilitate drainage.
Berth track	A term used to describe the track section on approach to the signal where a separate track section is provided for the overlap.

Causal Factor	Any action, omission, event or condition, or a combination thereof that if corrected, eliminated, or avoided would have prevented the occurrence, in all likelihood.
Crossover	A pair of co-acting points which allow a train to cross from one line to another.
Contributing Factor	Any action, omission, event or condition that affects an occurrence by increasing its likelihood, accelerating the effect in time or increasing the severity of the consequences, but the elimination of which would not have prevented the occurrence.
Detonator Protection	Protection of an Engineering Possession with three small explosive charges twenty metres apart, with an accompanying possession limit board, positioned beyond a signal or points protecting the possession. A Handsignalman may also be provided as described in the IÉ Rule Book.
Down Line	In this incident, trains travelling towards Belfast are travelling in the Down direction on the Down Line.
Down Side	Being located on the same side of the railway as the Down Line.
Engineer's trains	Trains operated for the purpose of maintaining or constructing the infrastructure. Includes inspection car or mobile on-track machine.
Emergency Control Panel	A signal control panel provided to allow local control to be taken of one or more interlockings.
Incident	Any occurrence, other than an accident or serious accident, associated with the operation of trains and affecting the safety of operation. For heavy rail, the EU Agency for Railways divides incidents into the following categories: infrastructure; energy; control-command & signalling; rolling stock; traffic operations & management and others.
Interlocking	The railway signalling term given to a system composed of signal apparatus (mechanical, electrical or coded logic) that prevents trains encountering conflicting moves through only allowing trains to receive an authority to proceed, when routes have been set, locked and detected in safe combinations.
Investigation	A process 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
Kinaesthetic	Relating to a person's awareness of the position and movement of the parts of the body by means of sensory organs (proprioceptors) in the muscles and joints.
Mile Post	Marks distances.
Non-technical skills	Non-technical skills are those that underpin and enhance technical skills by helping persons to anticipate (prepare for), identify (be aware of) and mitigate (take action to prevent) risks.
Normal and Reverse	In railway signalling, all points are deemed to have a 'normal' and 'reverse' position. Where there is a main or dominant route, this is normally referred to as the 'normal' position.
Overlap	The distance beyond a signal which must be proven to be clear (through train detection) to allow a train to be signalled towards that signal.
Reminder Appliance	A device or control used to remind the Signalman that a particular lever, button or control must not be operated or must be used only under certain conditions.
Scotch and Clip	Term referring to a point clip and scotch used to securely hold points in a position when a point operating mechanism or detection is defective.
Serious Accident	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. For heavy rail, the EU Agency for Railways divides serious accidents into the following categories: collisions, derailments, level-crossing accidents, accidents to persons caused by rolling stock in motion, fires and others.
Signal Protection	Maintaining at danger signals to protect the persons or possession.
Systemic factor	Any causal or contributing factor of an organisational, managerial, societal or regulatory nature that is likely to affect similar and related occurrences in the future, including, in particular the regulatory

	framework conditions, the design and application of the safety management system, skills of the staff, procedures and maintenance.
Train Register	The book in which signalmen record of events and occurrences (including disconnections and T3 Possessions) for a specific signalling workstation (or signal box).
T3 Possession	Absolute possession where there is no operational train movements. Engineering trains On Track Machinery/ road rail vehicle movements are permitted. Planned Engineering Work.
Up Line	Up line is term used to describe the normal direction of traffic on railway routes. Each route has an “Up” and “Down” direction which are to or from a specified location - in this accident for Dublin Connolly station. Mileposts are measured from the same location.

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