Rail Accident Investigation Branch

Report writing for RAIB – Challenges and techniques

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Principal Inspector
31 October 2017

The audience

- RAIB's reports are written for the public and the industry
- They must be accessible to the informed layman, without 'dumbing down'
- They must be accurate and complete

The writers

- RAIB's reports are written by the investigators themselves
- More than one investigator may contribute sections of the text
- They are reviewed by colleagues and managers

The template

Rail Accident Investigation Branch

- Reports need a structure that is well defined but flexible
- The RAIB template has been developed over the whole life of the Branch
- It is intended to guide reports into a format which is logical, clear, comprehensive and consistent

Key facts and analysis

Background information

Add any background information that is needed to help the reader's understanding of the causal factors

29. {add text}

30. {add text}

Identification of the immediate cause

31. {describe the immediate cause} *[Do not preface this with 'The immediate cause was…..]*

32. {add text to describe the evidence that this was the immediate cause, if necessary}

Identification of causal factors

33. The accident occurred due to a combination of the following causal factors:

    a. {add text identifying the first top level factor} (paragraph 34)
    b. {add text identifying the second top level factor} (paragraph 41)
    c. {add text identifying the third top level factor} (paragraph 48)

    Each of these factors is now considered in turn.

Broad subject area 1 *[this should be the subject (eg 'the condition of the track' or 'the actions of the driver') that encompasses top level causal factors (may be one or more) - should never read as a conclusion but should instead simply introduce the reader to the subject that is to be discussed]*

34. {Add headline that states the first top level factor – single sentence or short paragraph}. *This text should be a repeat of 33 a. If there is some doubt about the presence of this factor, or its relevance to the cause of the accident, it should be qualified by the words 'It is probable/possible that this factor was linked to the cause of the accident'*

35. {Add facts and analysis supporting the above}

The analysis

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- The **immediate cause** of an accident is the factor that directly resulted in the occurrence of the accident or incident (it is often simply a statement of the inevitability of the accident, eg ‘the person was standing in a position where they could be struck by the approaching train’).
- Factors that describe the key accident causation themes which contributed to the occurrence of the accident or incident are referred to as **causal factors**. Avoiding or eliminating a causal factor would have prevented the occurrence.
- Factors that are associated with the overall management systems, organisational arrangements or the regulatory structure are referred to as **underlying factors**.
- An element discovered as part of the investigation that did not have a direct or indirect effect on the outcome of the accident, but which deserves scrutiny is referred to as an **observation**.

The style guide

Rail Accident Investigation Branch

- The style of a report should be unobtrusive, so that there is no barrier between the reader and the content.
- RAIB's house style has been developed from good practice used in the Civil Service and elsewhere
- Clarity and consistency are fundamental

The illustrations

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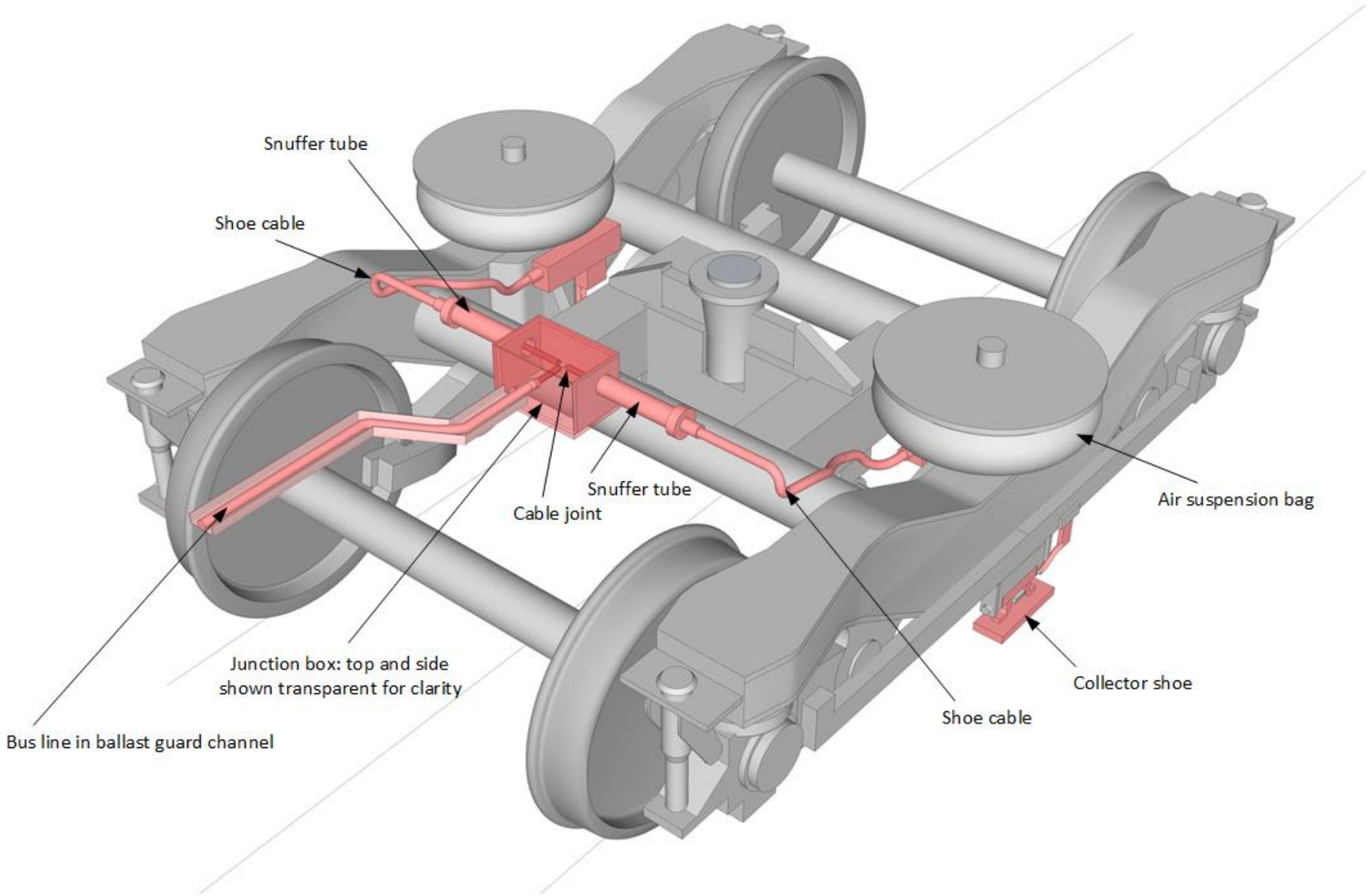
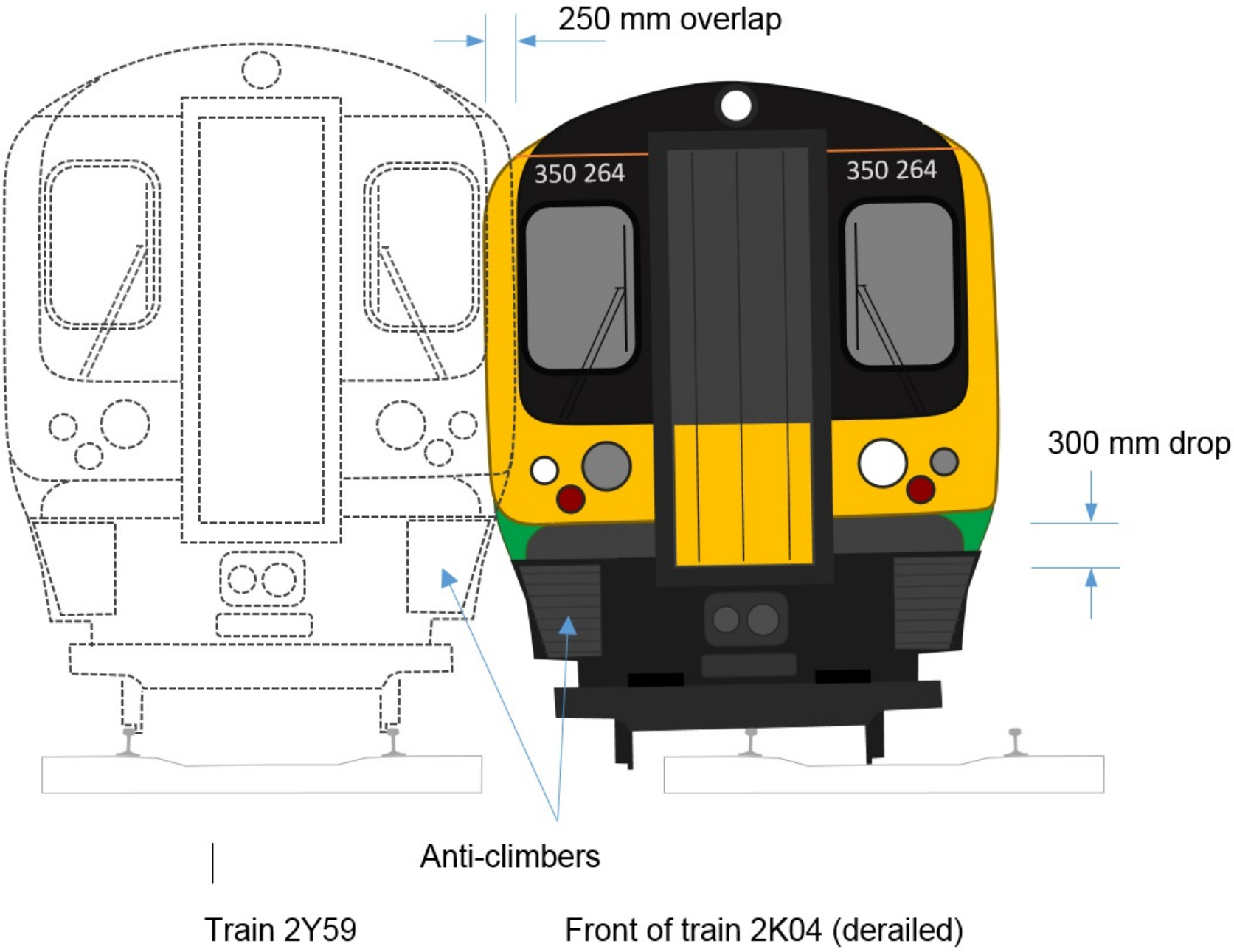
- A good diagram can save pages of text
- RAIB makes use of several types of graphics software, according to the abilities and preferences of inspectors.
- Pictures need captions and labels, which must complement and not obscure.
- Photographs may not be clear enough to tell the story


Snuffer tube
Shoe cable
Cable joint
Snuffer tube
Air suspension bag
Junction box: top and side
shown transparent for clarity
Collector shoe
Shoe cable
Bus line in ballast guard channel


250 mm overlap
350 264
350 264
300 mm drop
Anti-climbers
Train 2Y59
Front of train 2K04 (derailed)

The review

- Analysis: are the conclusions supported by evidence?
- Content: is the descriptive material clear and sufficient?
- Presentation: is the quality of the writing up to standard?
- Text: are the grammar, spelling and punctuation correct?

The summary

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- The only part that many people will read
- Should be under one page, but can be longer if the report is complex
- Likely to be used as the basis for press reports and magazine articles
- If the report is good, the summary is easy to write
- The converse is also true- if it is hard to summarise a report, there may be something wrong with the logic

Other approaches

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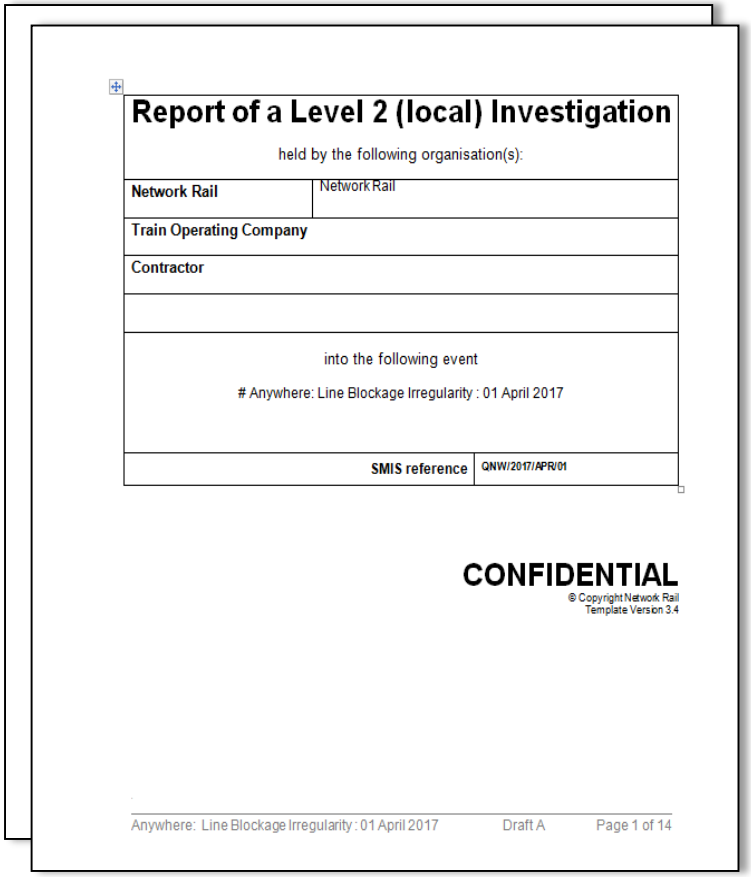
- Sometimes you have to use a closely defined format
- Terms used (eg “underlying cause”) may have a different meaning
- Jargon terms (eg “bow tie”) may be acceptable if they are in general use in the organisation and if everyone understands them
- It is still possible to produce a clear and effective report

Using a company template

Jimmy Pettitt
Route Accident & Assurance Investigator
Network Rail LNW

A guide to writing a Local Investigation Report



Report of a Level 2 (local) Investigation

held by the following organisation(s):

Network Rail	Network Rail
Train Operating Company	
Contractor	

into the following event

Anywhere: Line Blockage Irregularity : 01 April 2017

SMIS reference	QNW/2017/APR/01

CONFIDENTIAL

This guide will assist you to understand how to write a good investigation report.

The guide will cover each section of a local investigation report to help you understand what is required, what good looks like and what shouldn't be included.

The guide will cover the following sections:

- **A - Event summary, conclusions, recommendations and local actions**
- **B Purpose**
- **C Details**
- **D People Involved**
- **E List Of Evidence Used**
- **F Factors Discussed**
- **G Behavioural Cause**
- **H Incident factor causal analysis**
- **I Signatures**
- **J Appendices**

• Summary, immediate cause & underlying causes(s)

This section gives a brief summary of what happened and details the immediate cause/behavioural cause(s) identified

A. Event summary, conclusions, recommendations and local actions

A1. Summary of the accident/incident

A1.1. On 01 April 2017 at 00:10, a possession of the line for engineering work was taken for the purpose of carrying out ultrasonic inspections, track maintenance and ballast regulation in the Anytown area.

A1.2. An On Track Machine (OTM) booked into the possession arrived at the signal protecting the possession and the driver brought the train to a stand.

A1.3. The driver had a brief conversation with the signaller on duty regarding movements within the possession but no authority was given to pass the signal.

A1.4. The driver then spoke to the Person in Charge of the Possession (PICOP) who authorised the driver to pass the signal at danger and proceeded into the possession.

A1.5. The incident came to light when the signaller observed the train movement and made an emergency call to stop the train.

A2. Immediate cause

The driver of 6J00 passed AA12 signal at danger without the authority of the signaller (see section F1 of this report).

A3. Behavioural cause (using fair culture flowchart)

A3.1. The behavioural cause of the driver passing the signal without the correct authority has been identified as a contravention (see section F1 & G of this report).

A4. Underlying causes

A4.1. The poor quality of communications between the driver of [redacted] Anytown (see section F1 of this report).

A4.2. The PICOP authorised the driver to pass the signal at danger (see section F2 of this report).

A4.3. The Driver of 6J00 was thinking about an issue not relating to the task of driving the train (see section F3 of this report).

The summary is a brief description of the event.

You don't need to include technical details such as ELR, mileages etc. these will be included in the body of the report.

In this hypothetical example, we explain how a driver passed a signal without the signaller's authority resulting in a SPAD.

Just state the fact here , the detail and reasons why are discussed within the report.

Watch out for your formatting! A2.1 is missing here

State the behavioural cause(s) here and signpost to where they are discussed. There may be more than one identified!

Here we have a behavioural cause for the driver but not the PICOP or signaller.

Don't forget to signpost where your discussion and evidence to back up your conclusions is contained within the report.

Section A.5: Bow Tie control failures

What is a Bow Tie? Bow Tie risk assessment method

Business Critical Rules use the Bow Tie method to visualise our complex risks in an easy to understand way.

A Bow Tie starts by looking at the top risk event – or something that is likely to cause harm. It then visualises the things that might cause the top risk event, the threats, and the consequences of it happening.

Finally it identifies the controls to be put in place to mitigate the risks and shows who is responsible and accountable for those controls.

As lead investigator you need to check if there is a suitable Bow Tie published here:

list of published Bow Tie risk assessments

And if so document what barrier(s) or control(s) failed to allow the top event or consequence to occur.

Section C: Details

This section describes the location where the incident occurred and any trains, vehicles, equipment or infrastructure that was involved.

C. Details

C1. Description of the location

C1.1. Rugby train station serves the town of Rugby in Warwickshire, England. It opened during the Victorian era in 1885 replacing earlier stations situated a little further west.

C1.2. Since the closure of the station on the now-abandoned Great Central Railway route through the town, it is Rugby's only station. Between 1950 and 1970 the station was known as Rugby Midland before reverting to its original title.

C1.3. Rugby station is at the centre of two important junctions of the West Coast Main Line (WCML) connecting London to Birmingham and the North West, England and Scotland.

C1.4. The Rugby-Birmingham-Stafford Line to Birmingham is a short distance west of the station. East of the station, the Northampton Line diverges at a junction from the direct line to London. Until the 1960s it also had routes to Leicester, Peterborough East and Leamington Spa (Avenue) but these have all since closed.

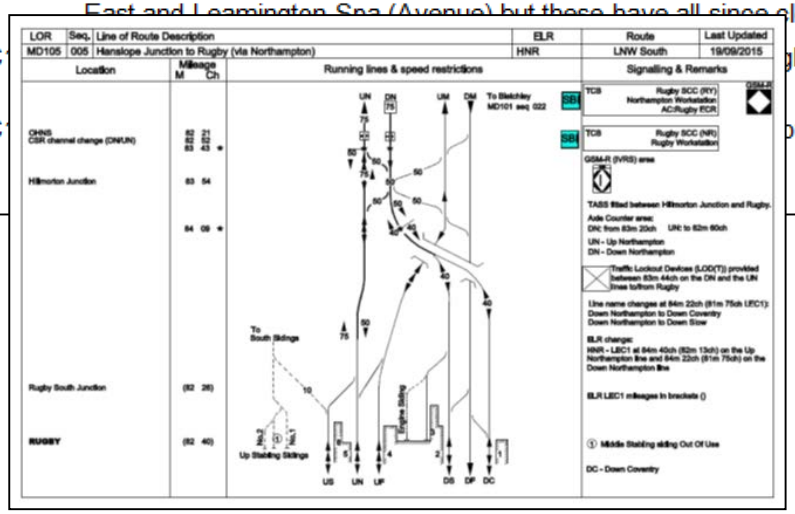
C… …ghly half a mile nor…

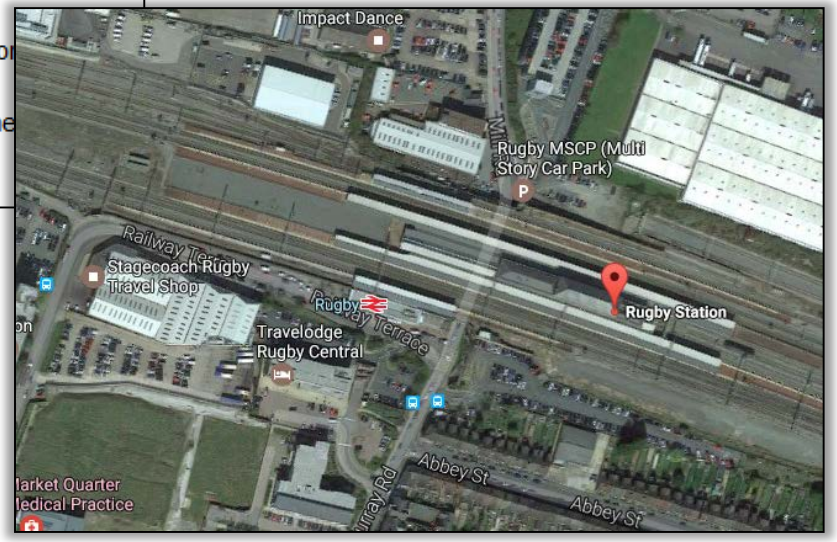
C… …oventry lines in the…

In this example the incident takes place in the Rugby area, the reader may not be familiar with the area so a diagram is always useful.

Include an extract of the Sectional Appendix if possible, a Google map is also a good way of showing the location.

Here we see Microsoft Word has underlined WCML in green.
Choose ‘ignore’ on this to improve the look or add it to your dictionary.





Section C: Details continued

This section lists a description of any trains, vehicles, equipment or infrastructure involved.

C2. Description of the train(s) and rail vehicles involved

C2.1. The train involved was a Plasser & Theurer AFM2000 RT Automatic Finishing Machine (ballast cleaner), unit number DR77111 (see figure 3).

C2.2. AFM 2000 RT machine, number DR77111, was manufactured in 2006 by Plasser and Theurer. It is approximately 47 metres long over five two-axle bogies. It has a tare weight of 108 tonnes and capacity to carry up to 18 tonnes of ballast

C2.3. 77111 had a 3 monthly inspection on 16 February 2017 with no issues identified.

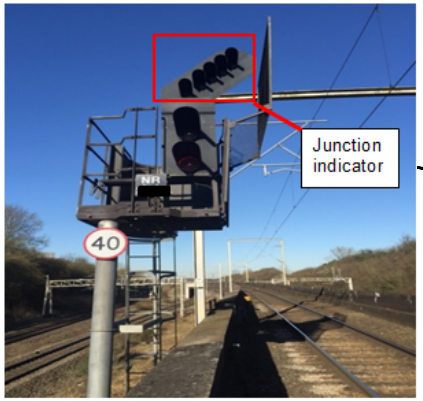
Figure 3: stock image of a Plasser & Theurer AFM2000

C3. Description of the infrastructure and equipment involved

C3.1. AA12 signal was commissioned in 2008 and is a two aspect colour Dorman Light Emitting Diode (LED) type signal with a junction indicator mounted above the main aspect.

C3.2. The junction indicator consists of a row of white lights angled to the right (as the diverging route is to the right).

C3.3. When the highest speed route is set, the indicator is not illuminated, when a diverging route is set, the junction indicator is illuminated.



C2 details any trains or road vehicles involved.
It is good practice to include a picture of the train or road vehicle (the actual train involved is preferred but a stock image of the same model is ok, just let the reader know it is a stock image).

The level of detail required will depend on how relevant the train is to the investigation report. For a SPAD the performance and characteristics of the train will be discussed in greater detail within the report.

Here we include a description of the signal but this could also be a PLB, hand trolley or some other equipment relevant to the investigation.

Annotate the image if needed to further clarify the equipment

Section F: Factors discussed

This section should contain the most detail within the report.

F. Factors discussed

F1. Why did the driver pass the signal at danger?

F1.1. The investigation team discussed why an experienced, competent train driver would accept authority from a person other than a signaller to pass a signal at danger protecting a possession.

F1.2. After arriving at the signal protecting the possession the driver and the signaller had a casual conversation about various topics including the weather, football and working shifts. The call lasted for 7 minutes and 12 seconds.

F1.3. During the call some discussion took place as to the movements the driver would complete once inside the possession.

F1.4. Shortly afterwards the driver then spoke with the PICOP whose last instruction to the driver was to "pass the signal at danger and drop down to the dets".

F1.5. The investigation panel believe that the familiarity between the driver and signaller (during the casual discussion at the signal) led to the driver to make an assumption the authority to enter the possession had been agreed between the PICOP and the signaller beforehand. The driver's perception of this authority was confirmed when the PICOP gave him verbal permission to pass the signal.

F2. Why did the PICOP authorise the driver to pass the signal?

F2.1. An interview was held on 06 April 2017 with the PICOP to determine the reason they instructed the driver to pass AA1 signal at danger.

F2.2. The PICOP stated that as an earlier conversation had taken place discussing permission to enter the possession (with the signaller), and he advised the signaller "I'll give you a call back once he's in" and the signaller said "ok" he mistook this agreement for an authority to advise the driver to pass the signal at danger.

The driver when questioned knew the limits of their responsibility and that only a signaller can authorise a driver to pass the signal protecting a possession.

F3. Did the location of the detonator protection contribute to the SPAD?

The factors discussed should contain a section for each 'underlying cause' and any 'other safety related' event listed in section A of the report.

It's good practice to order them in a logical sequence in line with the order of the underlying causes etc.

This will help your reader find the right discussion for each causal factor.
Use the remit issued by the DCP as a guide to what you need to discuss.

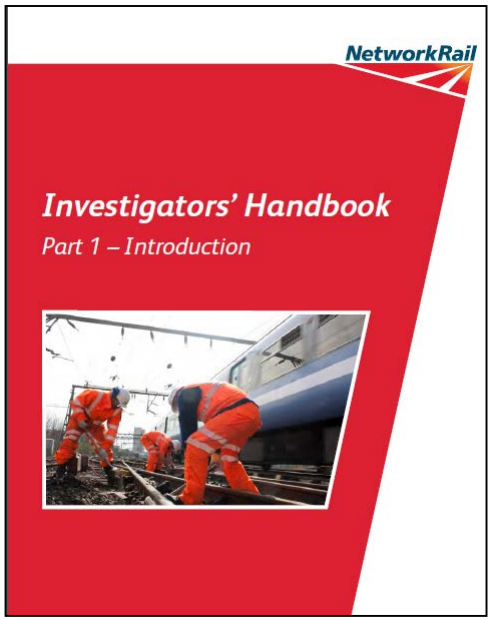
In this paragraph the gender of the signaller has appeared.
Names or gender of individuals involved have no place in an investigation report.

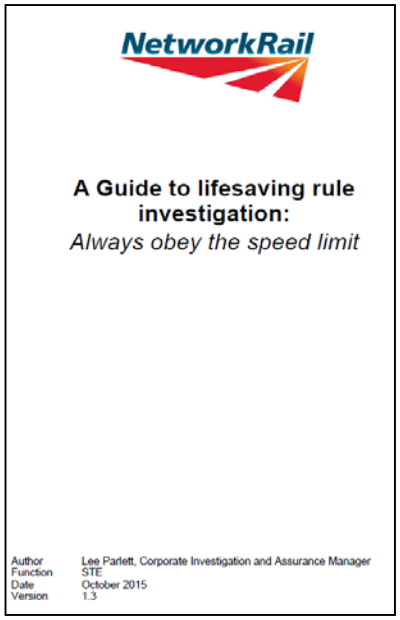
Common pitfalls and errors

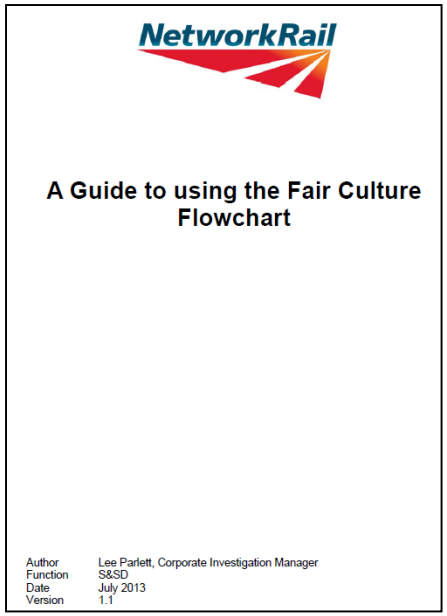
Technical detail in the description of the event	Underlying causes listed without due discussion	Lack of evidence to support a theory
Poor or no referencing in the report	Lack of union observers or suitable subject matter experts	Poor grammar and spelling (remember it's a formal document)
Underlying causes listed as immediate cause	Lack of explanation of technical terms	Names and personal information included in the report

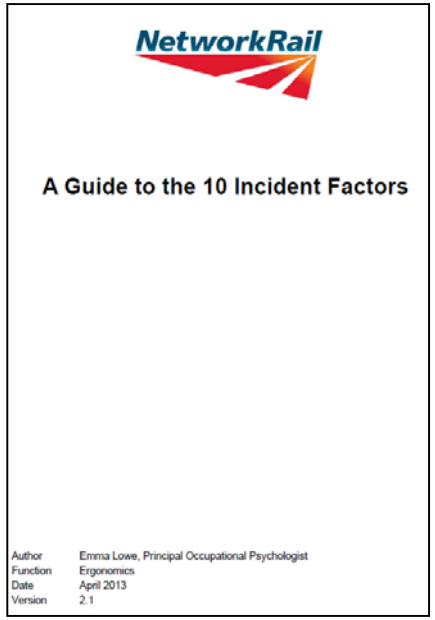
additional support and reading material

accident & Investigation page on Connect









The documents above can be downloaded at:

http://connect/assurance/SafetyAndCompliance/AccidentInvestigation/investigation-guides.aspx

Thank you for listening.

Any questions?