



Rail Accident Investigation Branch

Rail Accidents and Legislation

PWI Lunch and Learn

Jon Graham

Inspector of Rail Accidents

Jonathan.graham@raib.gov.uk

Tuesday, 26 November 2024

Agenda

- A bit of history
- The Cullen Report and creation of RAIB
- Brief introduction to RAIB
- Some notable recent accidents
- Conclusions



For more information visit raib.gov.uk

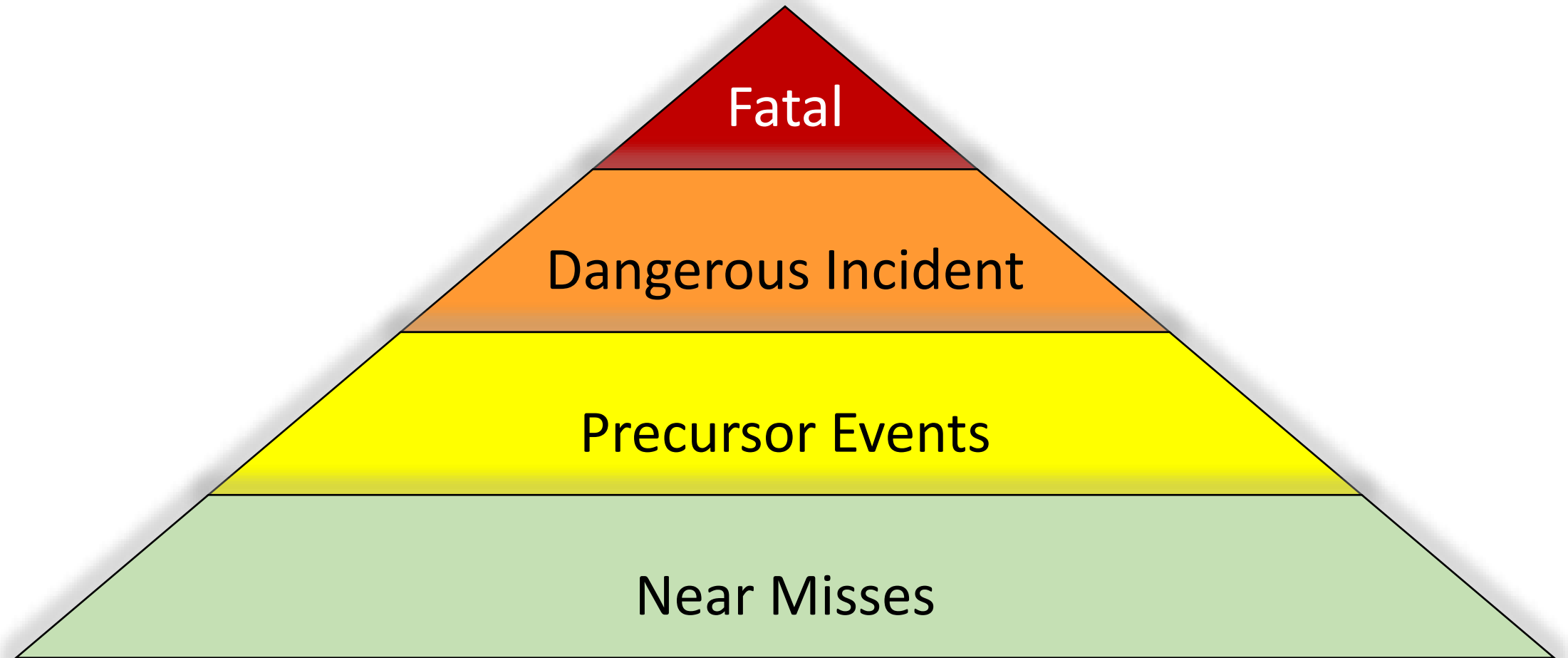
Why bother investigating?

"Those who cannot remember the past are condemned to repeat it."

George Santayana

Reason in Common Sense (1905)

One of many models...



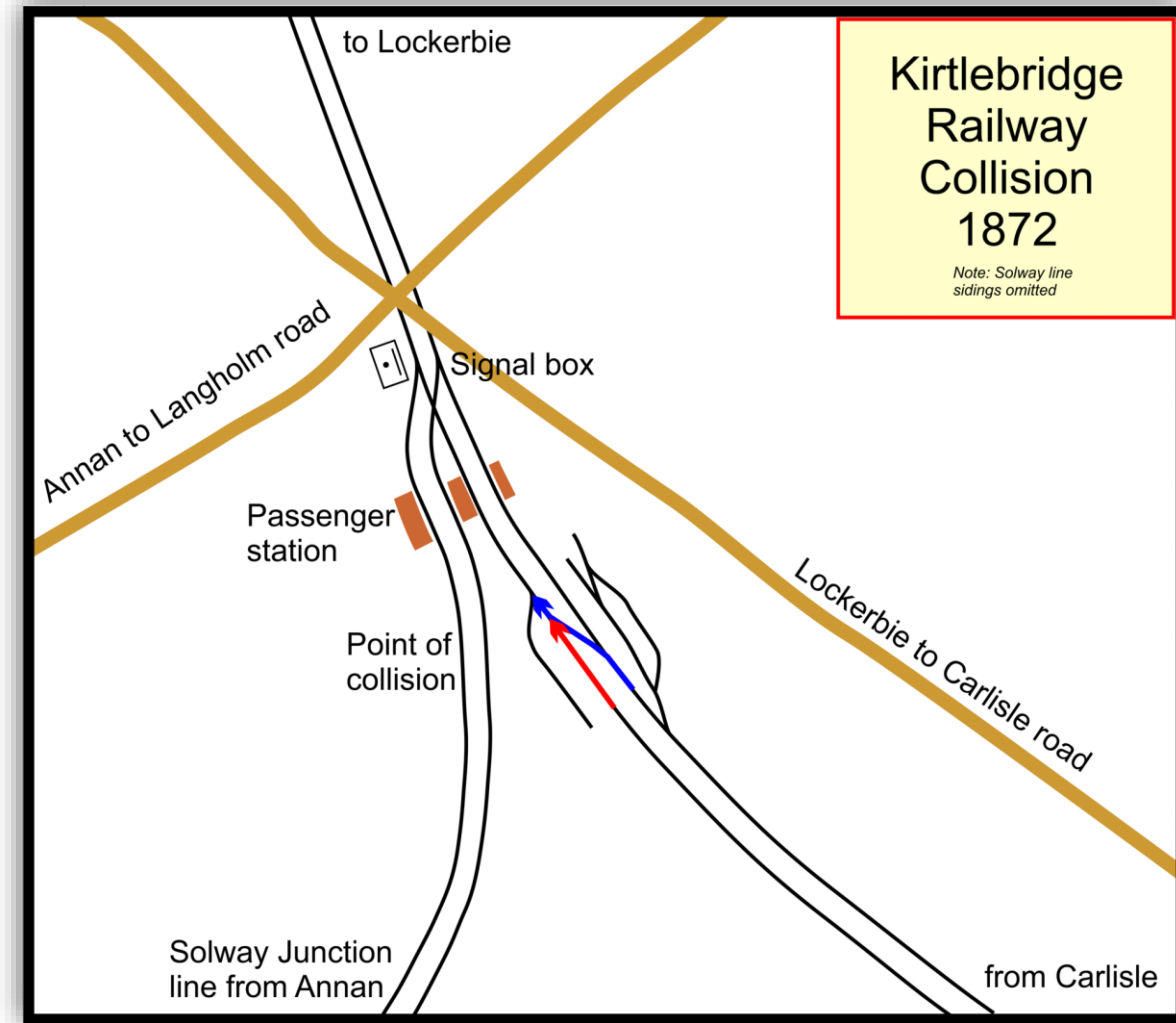
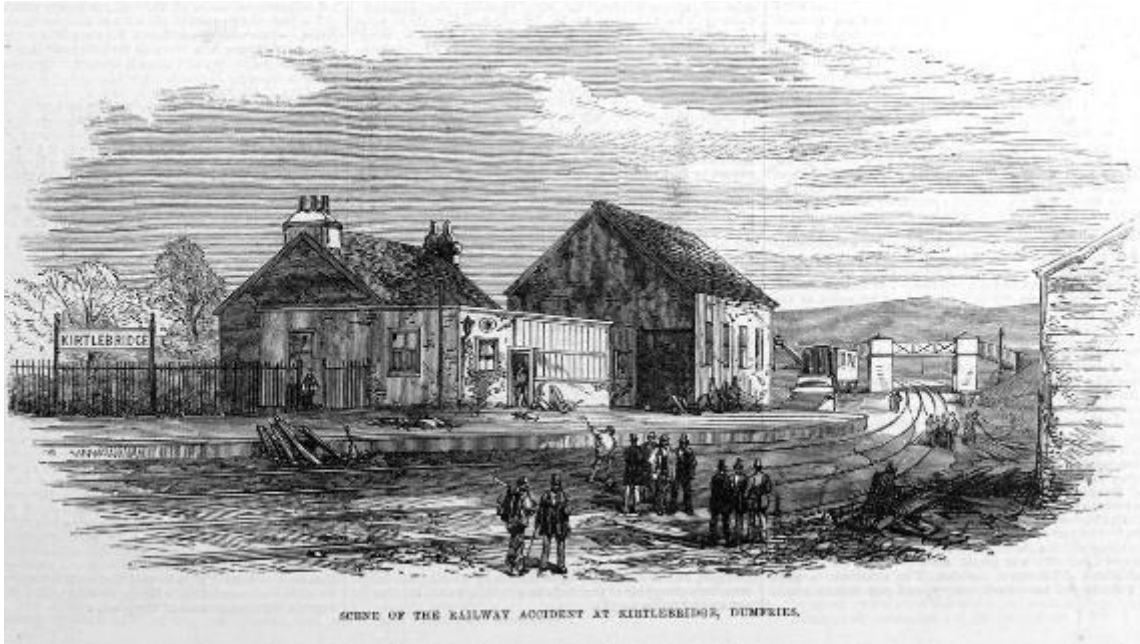
Clayton Tunnel, 1861 - BLOCK

Time-interval “control” system,
combined with unreliable traction
and unreliable communications.
23 dead after collision in tunnel.

Led to the fundamental Block
concept of only having one train in
each section, and positively proving
this, rather than basing safety on
time intervals



Kirtlebridge, 1872 - LOCK



Disorganised system of work.

No interlocking, failure of communication between the person in charge of shunting and the signaller allowed an express train to collide with a goods train shunting in the station.
11 people died.

Armagh incline, 1889 - BRAKE



Inadequate (non-existent) brake systems, combined with various operational errors.
80 dead, 260 injured, 1/3 of which were children

Regulation of Railways Act 1889

- Enacted following the Armagh disaster
- Requires any railway company to:
 - Adopt the **block** system of signaling on passenger railways
 - Provide inter**lock**ing of points and signals
 - Provide continuous **brake**s on passenger trains, that fail safe if split
- Also some early focus on the number of hours worked by safety critical staff
- Still in the statute book today, albeit heavily superceded

Quintinshill, 1915

- Around 226 dead following a double collision.
- Signallers lost situational awareness and overlooked a train standing adjacent to their signal box.
- Wooden framed coaches with gas lamps, so the collision resulted in a large fire
- Various rule breaches occurred, but there was a reliance on signaller vigilance and few engineered safeguards
- The investigations into this accident almost entirely blamed the actions of the signallers.



Harrow & Wealdstone, 1952



- Double collision, caused by a train passing a signal at danger (SPAD). 112 fatalities.
- Almost half the fatalities were railway staff travelling to work.

Harrow & Wealdstone - 2

- Lock, Block & Brake – note that two of three protect against Signallers making errors.
- Brake - last-ditch defence in many situations.
- Drivers ALWAYS correctly obeying signals taken as a “given”. Some efforts made (eg GWR ATC) to support the driver, but not much.
- Arguably from around 1900, the greatest precursor of railway risk swung from being in the signalbox to the driver in the cab.
- The idea of “why people make errors” was very alien until more recent times.
- Harrow led to the adoption of AWS – a simple electro-magnetic aid for the driver, across the network.



Clapham, 1988

- Signal failure due to a wiring fault.
- 35 dead.
- New wiring installed, but the old wiring was still in place and not secured. False feed led to an incorrect aspect showing.
- Major issues with safety culture and working hours.
- Hidden Inquiry followed, which included 93 recommendations including:
 - Many of the principles of SMTH as we know it
 - Control of fatigue
 - Cab to signalbox radios
 - Address systems in trains



A difficult time for the railway industry...

- High profile accidents including:

- Southall
- Ladbroke Grove
- Potters Bar
- Ufton Nervet
- Hatfield
- Grayrigg
- Sandilands
- Carmont
- Etc...



Rail Safety Regulations 1999

- Included:
 - Prohibition of Mark 1 rolling stock (life expired and issues with overriding)
 - Prohibition of hinged doors without central locking
 - Use of a train protection system
 - Should apply the brakes if a train
 - Passes a stop signal without authority
 - Travels at excessive speed
 - Also includes approaches to buffer stops
 - Ultimately led to the introduction of TPWS, which doesn't fully comply but was a quick and simple solution to meet these regulations

Ladbroke Grove, Oct 1999 – Cause: SPAD
Outcome: head on collision (130 mph)
31 fatalities, > 500 injuries



Lord Cullen's Report 2003 Railways and Transport Safety Act (The 2003 Act)

Radical change in rail industry's
safety management.

Accident Investigation
Safety Recommendations

Replaces "Rail Regulator"
Safety Regulator
HASAW
Economic Regulator

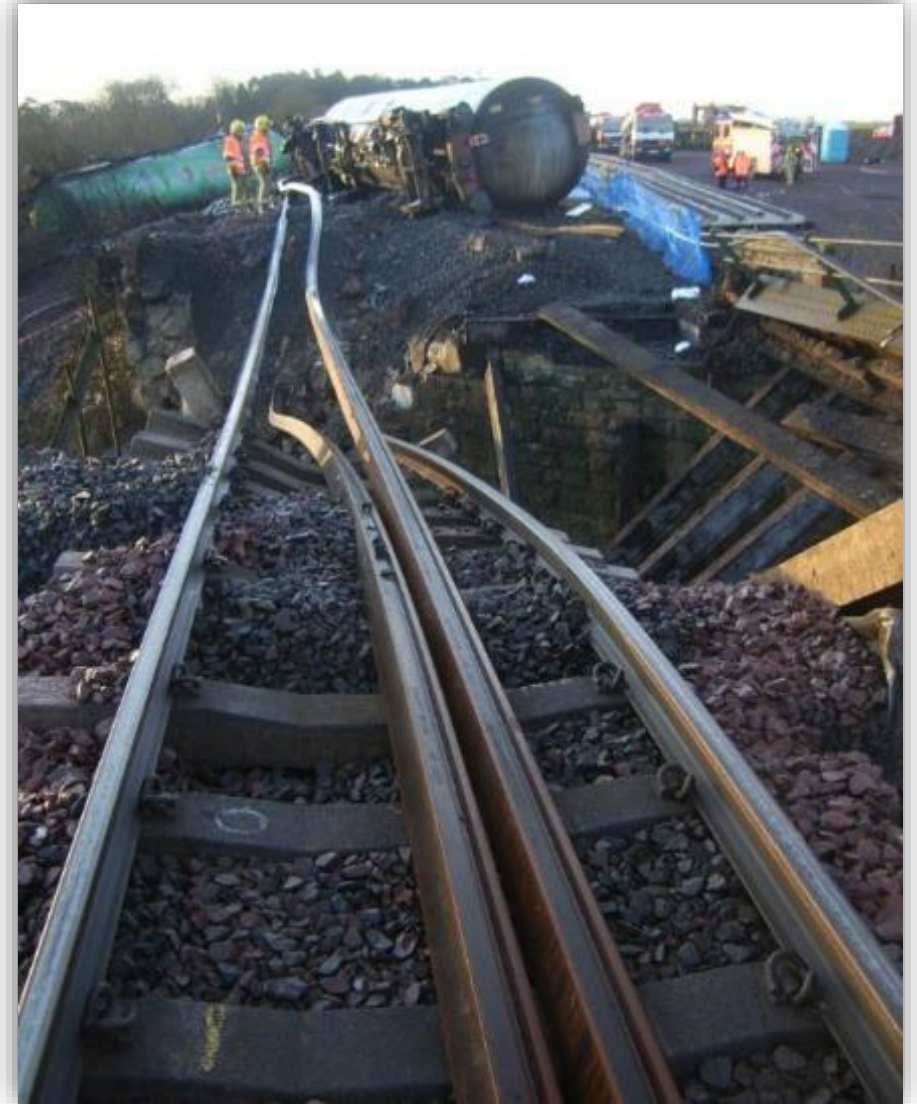
Standard Setting
Data Analysis
R&D

2005 Railways (Accident Investigation and Reporting) Regulations (The 2005 Regs)

- While the high-level 2003 Act created RAIB, the 2005 Regs actually includes more detail on how this works in practice
- Covers such things as:
 - Requirement of duty holders to notify RAIB of accidents/incidents
 - The conduct of RAIB investigations
 - Allowing RAIB to use others to assist in investigations
 - Preservation, use and disclosure of evidence
 - How RAIB reports should work, including timescales, consultation and recommendations
 - Requirement to produce an annual report

RAIB's Purpose

- Investigation of accidents and incidents to **improve railway safety** and **inform the public**.
- Independent of all other parties.
- Does not establish blame or liability.



RAIB's Scope: All mainline, underground, metros, tramways, channel tunnel and heritage



2003 Act – Section 8 - RAIB Inspector's Powers

- Enter railway property
- Enter land adjoining the railway
- Enter any other land (if appropriate)
- Seize evidence
- Make records, take photos/videos
- Interview witnesses and compel them to answer (cannot 'no comment')
- Seize documents/records



What type of accidents are investigated?

The RAIB:

- Shall investigate any serious railway accident
- May investigate a non-serious railway accident or incident

“Serious accident” means an accident involving a derailment or collision of rolling stock which has an obvious impact on railway safety regulation or management of safety and includes such an accident that results in:

The death of at least one person

Serious injury to five or more people

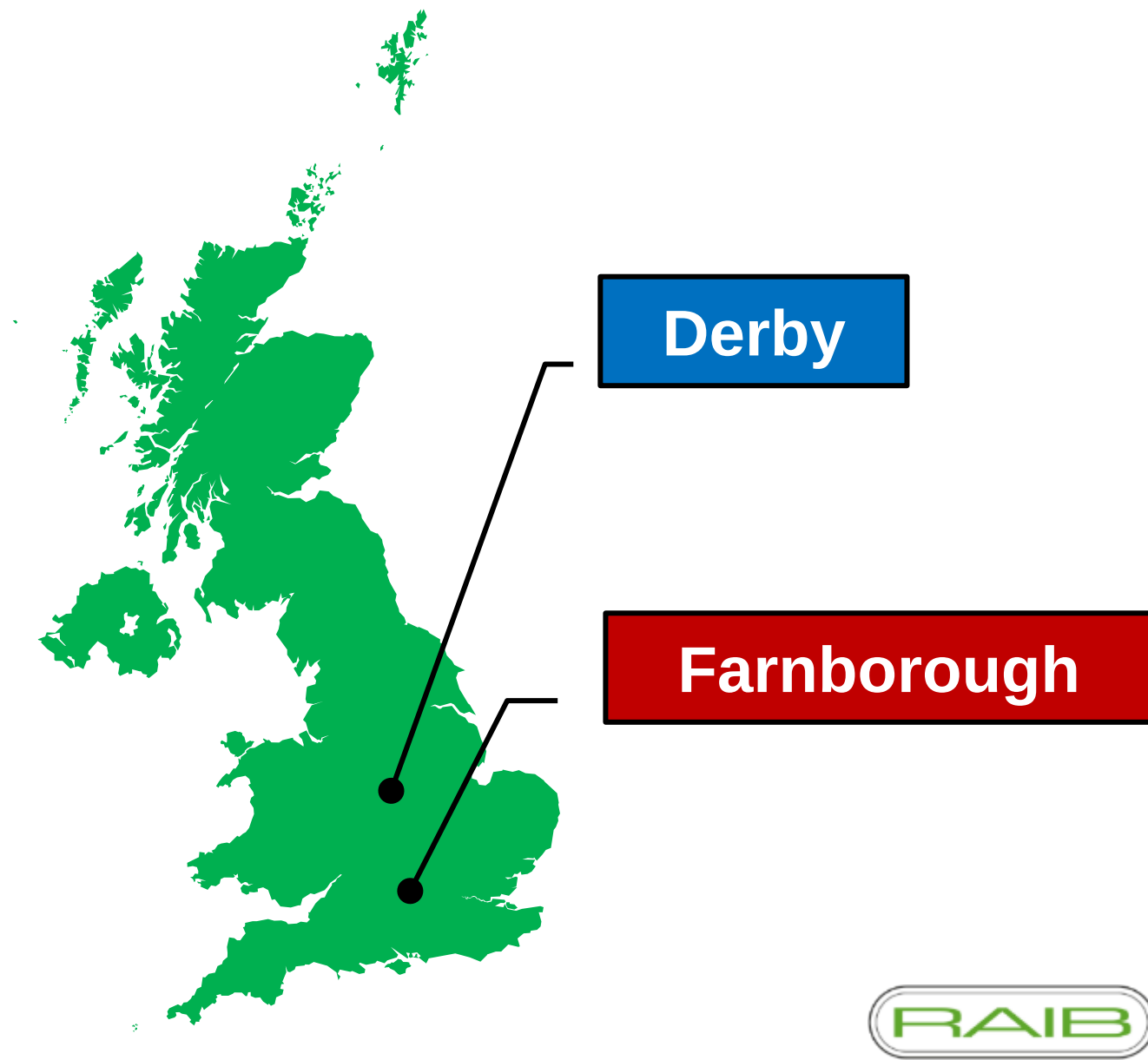
Extensive damage to rolling stock, infrastructure or the environment

The RAIB will investigate other incidents at its discretion, based on:

- How serious the incident is; and
- The likely safety lessons to be learned

RAIB's Setup

- RAIB staffing:
 - Chief Inspector
 - Deputy Chief Inspector
 - 5 Principal Inspectors
 - 18 Inspectors
 - 20 Support staff
- At least five staff on-call
 - 1 Duty Coordinator
 - 2+ Derby Inspectors
 - 2+ Farnborough Inspectors
- On-call 24/7, 365 days/year
- Travel by whatever means is appropriate.



RAIB Inspectors

- Most are ex-rail industry, but also from police, ORR, MoD and HSE.
- Wide range of underlying experience
 - Track
 - Signalling
 - Traction and Rolling Stock
 - Civil Engineering
 - Heritage
 - Human Factors
 - Investigation and Incident Management
- Extensively trained in investigation techniques
- Trained in evidence collection and analysis
- Trained to interview witnesses
- Family liaison
- An underpinning knowledge across the railway disciplines
- Know the right questions to ask!

Notification

- Duty holders are required by the 2005 R (Railway) Regulations to notify certain incidents:
 - Schedule 1 – Serious incidents, notify immediately
 - Includes fatalities, serious injuries to 2+ people or serious near misses [Sch 1(9)]
 - Schedule 2 – Less serious, notify within 3 working days
 - Includes single serious injuries, obstructions or incursions, fires and train divisions
 - Schedule 3 – Monthly returns
 - Includes SPADs, wrong-side failures, structure failures as they are not notifiable under Schedule 1(9)
 - Schedule 4/5 – Specially for Channel Tunnel



A quick guide to notifying accidents and incidents on UK railways

Always check whether notification should be under Schedule 1 before considering Schedules 2 or 3.

Schedule 1 - Notify immediately by telephone and follow up on form RAIBN1	Schedule 2 - Notify in 3 working days in writing on Form RAIBN1 or equivalent	Schedule 3 - Notify in bulk monthly in writing on Form RAIBN2 or equivalent
1(1) Deaths to staff, passengers, or members of the public caused in accidents or incidents involving moving trains, or to staff closely associated with train operations. Except: deaths as a result of suicide, trespass, assault, natural causes. If in doubt notify.	2(1) Collisions with objects other than animals or items placed by vandals on railway or tram tracks, which would not otherwise have required reporting under any of the headings in Schedule 1.	3(1) Failures of equipment at level crossings which reduce the level of safety on the railway and that are not notifiable under Schedule 1(9).
1(2) Serious injury to 2 or more staff, passengers, or members of the public caused in accidents or incidents involving moving trains, or to staff closely associated with train operations. Except: serious injury caused by attempted suicide, trespass, assault. If in doubt notify.	2(2) Serious injury to one person on trains, trams, stations or other railway property if the event leading to the injury was connected with the operation of trains. Except: serious injury caused by attempted suicide, trespass, assault. If in doubt notify.	3(2) Broken rails or rails where pieces have broken off and buckled out where the route has to be closed or a speed restriction put in place.
1(2) Level Crossing accidents involving death or serious injury to a person except suicide and trespass as above. If in doubt notify.	2(3) Incidents where road vehicles foul running lines or damage track.	3(3) Failures of structures on the railway (such as tunnels, cuttings, bridges, embankments, culverts, and stations), which reduce the level of safety on the railway and that are not notifiable under Schedule 1(9).
1(3) Collisions between rolling stock, other than in a siding, which cause damage to the vehicles involved.	2(4) Unintended divisions of any trains or trams while in service or being prepared for service.	3(4) Signalling failures which reduce the level of railway safety by affecting the ability of the system to detect or protect trains that are not notifiable under Schedule 1(9).
1(4) Derailments on lines open to traffic, or which block running lines open to traffic.	2(5) Failures of axles, wheels or tyres.	3(5) Signals passed at danger unless the incident is notifiable under Schedule 1(9).
1(5) Collisions of rolling stock with buffer stops or other automatic stop devices, other than in a siding, which cause damage to the vehicles involved.	2(6) Train fires, severe electrical arcing or fusing.	3(6) Collisions between trains and road vehicles which are not notifiable under Schedule 1(9).
1(6) Release of, or fires involving, dangerous goods (including radioactive material) requiring an area to be evacuated.	2(6) Failures of ropes on cable hauled railways whose total length is greater than 1km.	
1(7) Accidents or incidents leading to the closure of a route for more than 6 hours. NB: incidents do not include weather related matters.		
1(8) Accidents causing in excess of 2m euros worth of damage to trains, infrastructure or environment. NB: this includes rolling stock which is written off, major track or structure damage or significant pollution incidents.		
1(9) Accidents or incidents which could have led to deaths or serious injuries or 2m euros worth of damage to trains, infrastructure or environment, had the circumstances been slightly different. If in doubt notify.		

RAIB Contact Details:

Address: Rail Accident Investigation Branch,
The Wharf, Stores Road, Derby
DE21 4BA
Telephone: 01332 253333
Fax: 01332 253338
E-mail: notify@raib.gov.uk

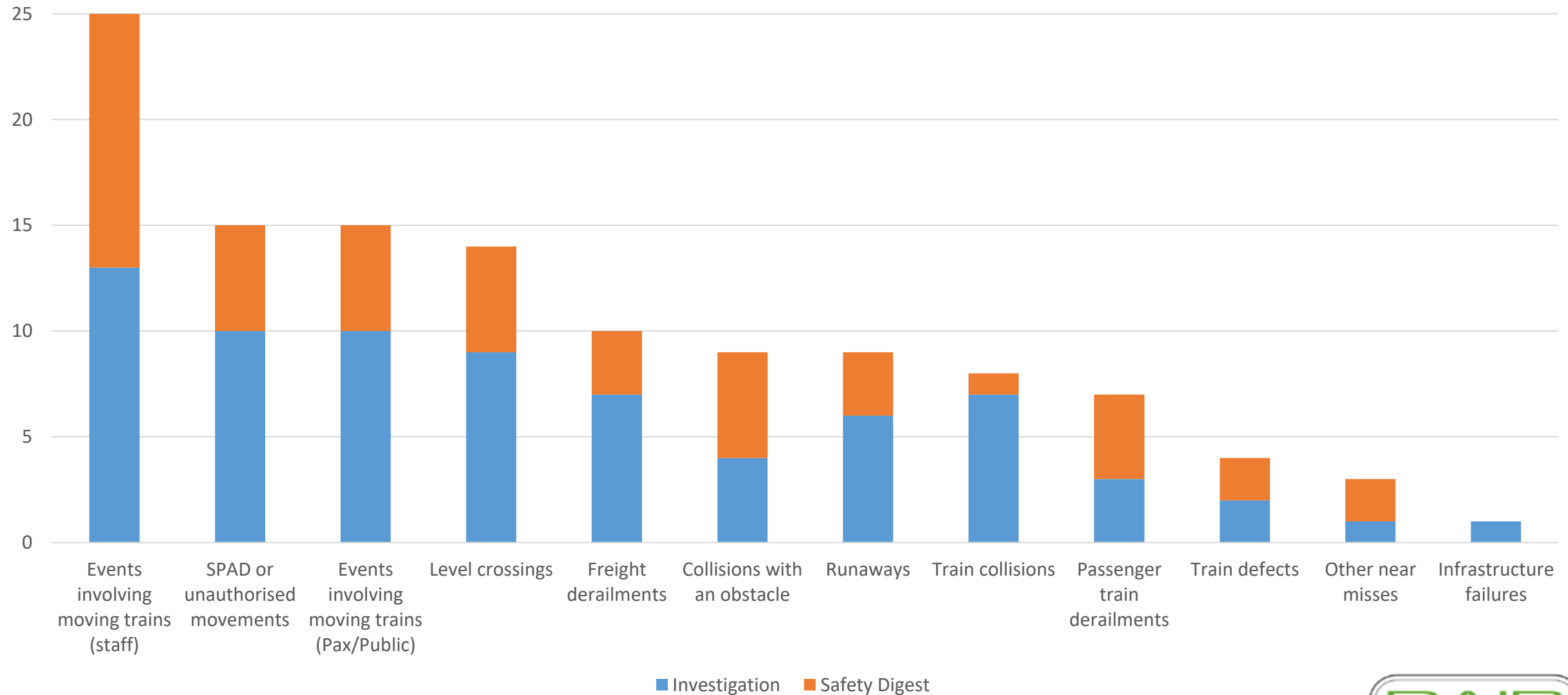
Further information, and examples of what is and what is not notifiable, can be found in the Schedules to the Regulations section of RAIB's Guidance on the Railways (Accident Investigation and Reporting) Regulations 2005. This can be found in the library section of RAIB's web site www.raib.gov.uk

Output - Recommendations

- Produce recommendations to the industry
 - Responsibility for follow-up generally lies with the ORR.
 - The party who the recommendation is addressed to has a duty to implement, or provide justification if not.
 - We can raise concerns if we don't feel that something has been closed out as intended.



Recent Themes (Reports launched 2018-2022)

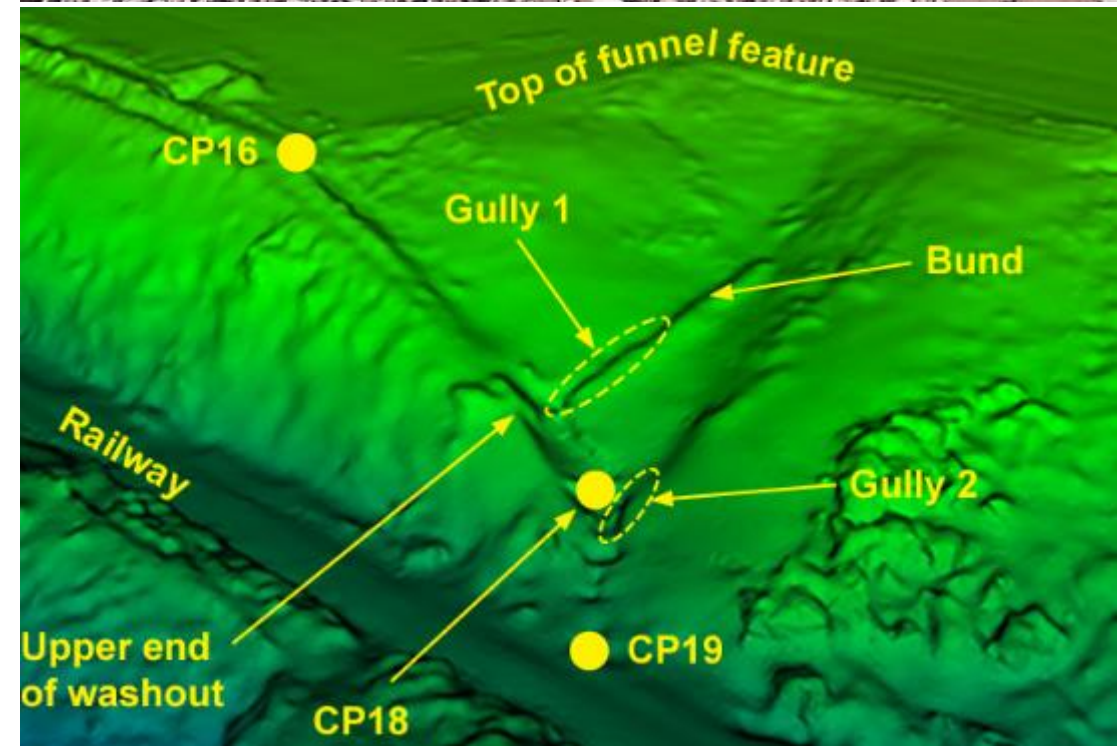


Carmont
12 August 2020



Carmont Accident

- 3 fatalities
- The 6 others on the train were injured
- The train struck debris that had been washed out from around a drainage trench in heavy rain
- The drain had not been constructed as per design and water flows were concentrated by an earth bund
- The train was not under a speed restriction
- More details including animations are available on RAIB's website



Carmont –Recommendation Areas

20 recommendations in areas such as:

- Management of civil engineering construction activities
- Inspection of cuttings
- Reaction to extreme weather
- Control room management
- Guidance of derailed trains
- Crashworthiness of older trains



Trackworker incidents and accidents

(Published since Jan 2017 and including ongoing investigations)

Chiltern Green

Paddington

Penkridge

Chalfont & Latimer (LU)

Llandegai Tunnel

Rowlands Castle

Surbiton

Roade

Kirtlebridge

Margam

Gatwick Airport

Stoats Nest (#2)

Ynys Hir

Sundon

Peterborough

South Hampstead

Dundee

Clapham Jn

Pelaw (T&W Metro)

Egmanton

Camden

Shawford

Dutton Viaduct

Clapham (Yorkshire)

Wimbledon

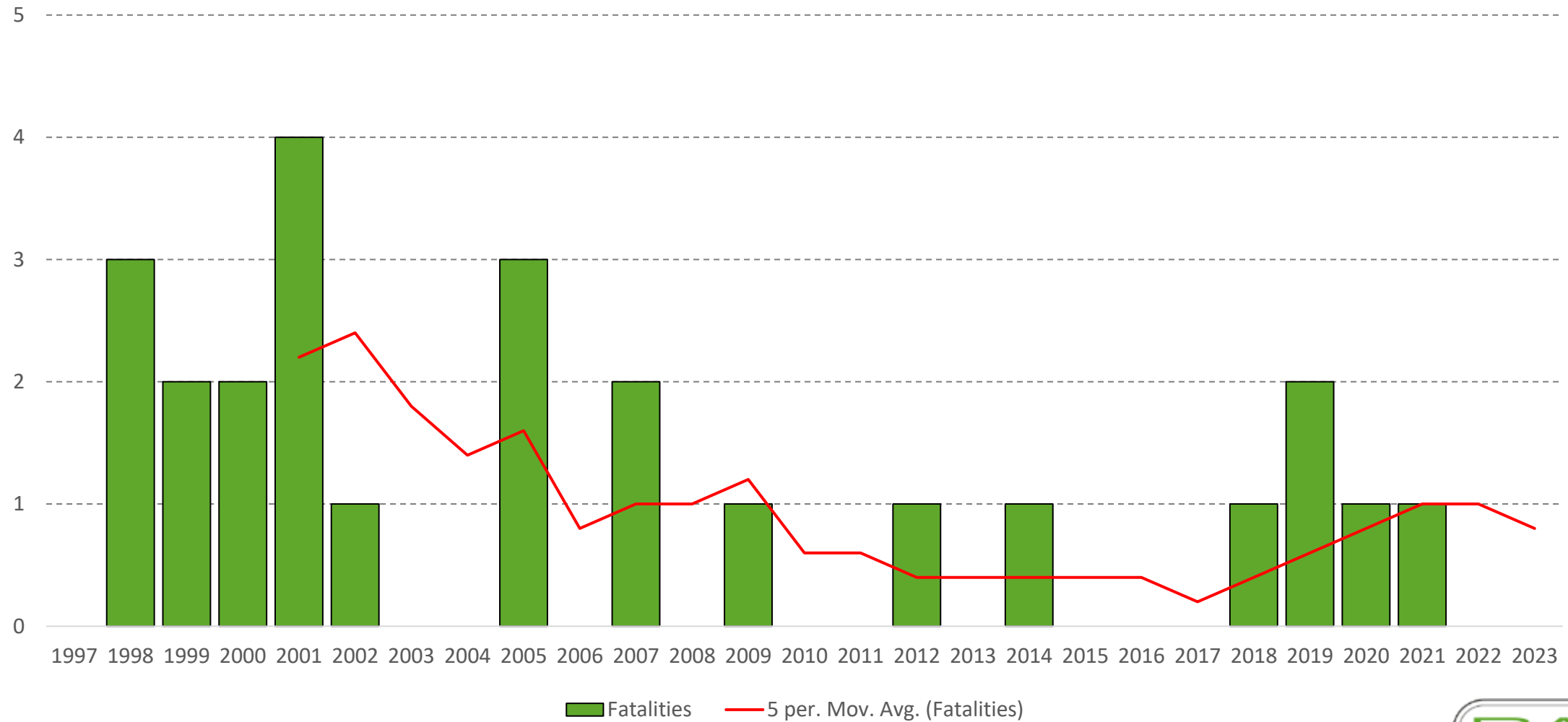
Great Chesterford

Ascot

Surbiton

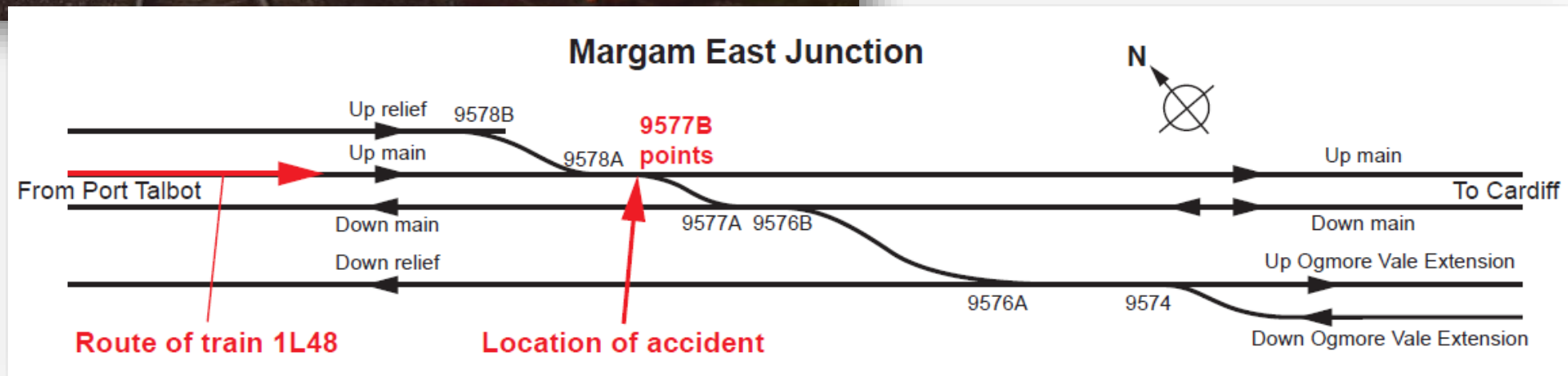
Recent Years

Trackworker Fatalities



Margam

[RAIB Report 11/2020](#)



Track worker safety post-Margam

- Since Margam, unassisted lookout working and LOWs working has been almost entirely removed from use
- The repercussions from this modal shift are still being evaluated
 - Near miss rate has dropped
 - But RAIB has still seen plenty
 - Exposing some issues with separated (site warden) working
 - Is it compromising track access and inspection quality?



Ongoing Investigations



Collision between passenger trains at Talerddig, Mid-Wales

- Mon 21 October
- One fatality, multiple other injuries
- Train 1J25 slid through Talerddig loop when trying to stop
- Low adhesion conditions
- Issue with sanding equipment on 1J25



Derailment at Audenshaw, Manchester

- Gauge spread as train crossed an underbridge
- Early evidence suggests an issue with coach screws on the longitudinal timber bridge
- No injuries, but significant damage and disruption

Summary

- Sadly, some large-scale industry changes have only happened because of tragedy
- But we can learn the lessons before these events if we take near-misses seriously
- Good investigations are critical
- Investigations demonstrate to those affected and wider society that action is being taken and lessons will be learnt.
- We are about to enter another time of reform in our industry, let's do all we can to make it a safe transition.





Rail Accident Investigation Branch

Any questions?

More information on all RAIB investigations is available at raib.gov.uk, where you can also sign up for email updates

jonathan.graham@raib.gov.uk