



Fatigue improvement efforts in the rail industry

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Session content:

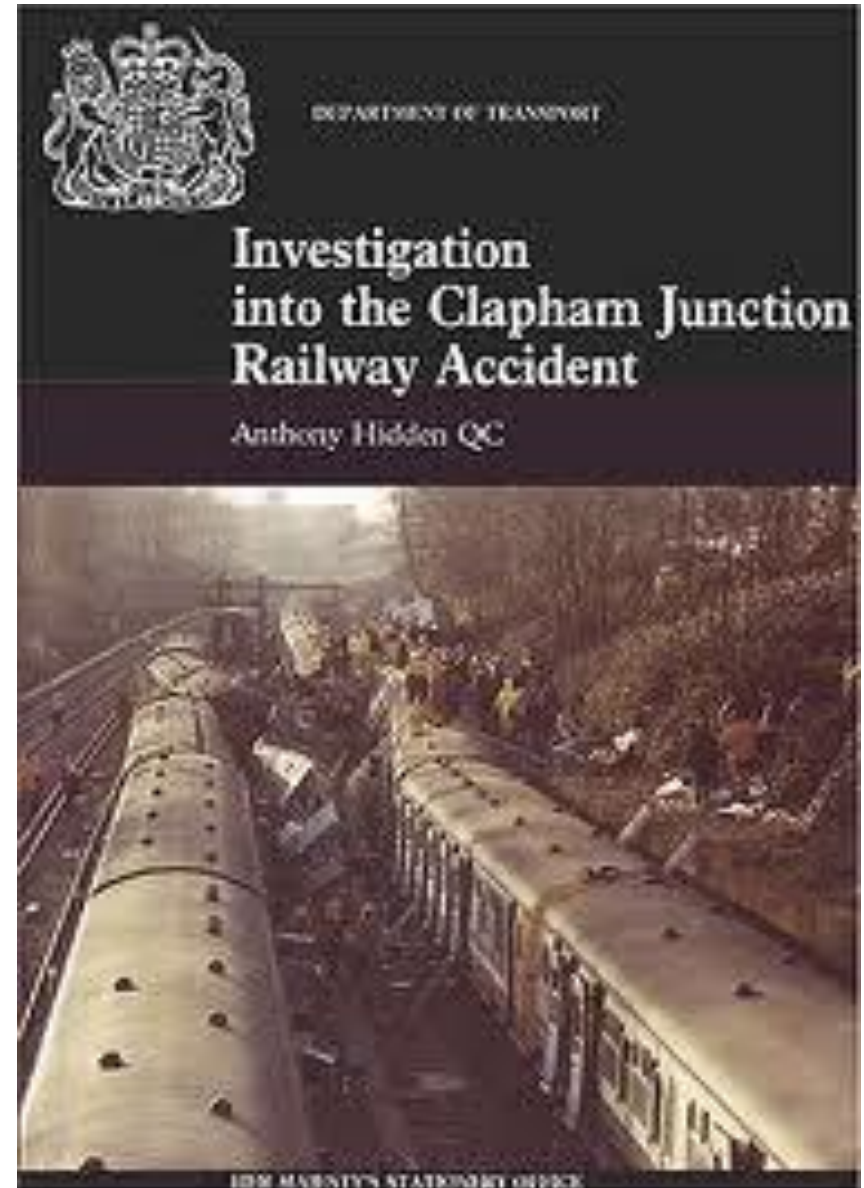
- Slides on some efforts underway
- Brief discussion
- We don't have all the answers!

Fatigue – what and why?

- Impairment... from prolonged working, heavy workload, insufficient rest or inadequate sleep
- Effects:
 - Less alert
 - Slower reactions
 - More errors
 - Less patient
 - “Lose the picture...”
- A factor in 21% of high risk **railway** incidents
- 20% **motorway** accidents : drivers falling asleep
- People underestimate risk from fatigue - no “blood test”
- Long term effects on health
- More errors? → **Serious consequences...**

Consequences of fatigue?

- E.g. Clapham Junction collision 1988
 - Inadequate controls for working hours
 - Signal maintainer fatigued : wiring error, 35 killed
 - Q: Scale & effects of fatigue-related errors in your industry?



ORR guidance... ...a fatigue risk management system

- Checklist helps you do a POPMAR gap analysis on your fatigue controls



12. Appendix F. An FRMS Checklist

12.1 Some features of a Fatigue Risk Management System (FRMS) are summarised in the table below which may be useful as a checklist when organisations are considering the adequacy of their fatigue management arrangements. The FRMS should be proportionate to the size and complexity of the operation and the likely risks from fatigue – it is recognised that not all items in the checklist will be appropriate for all organisations.

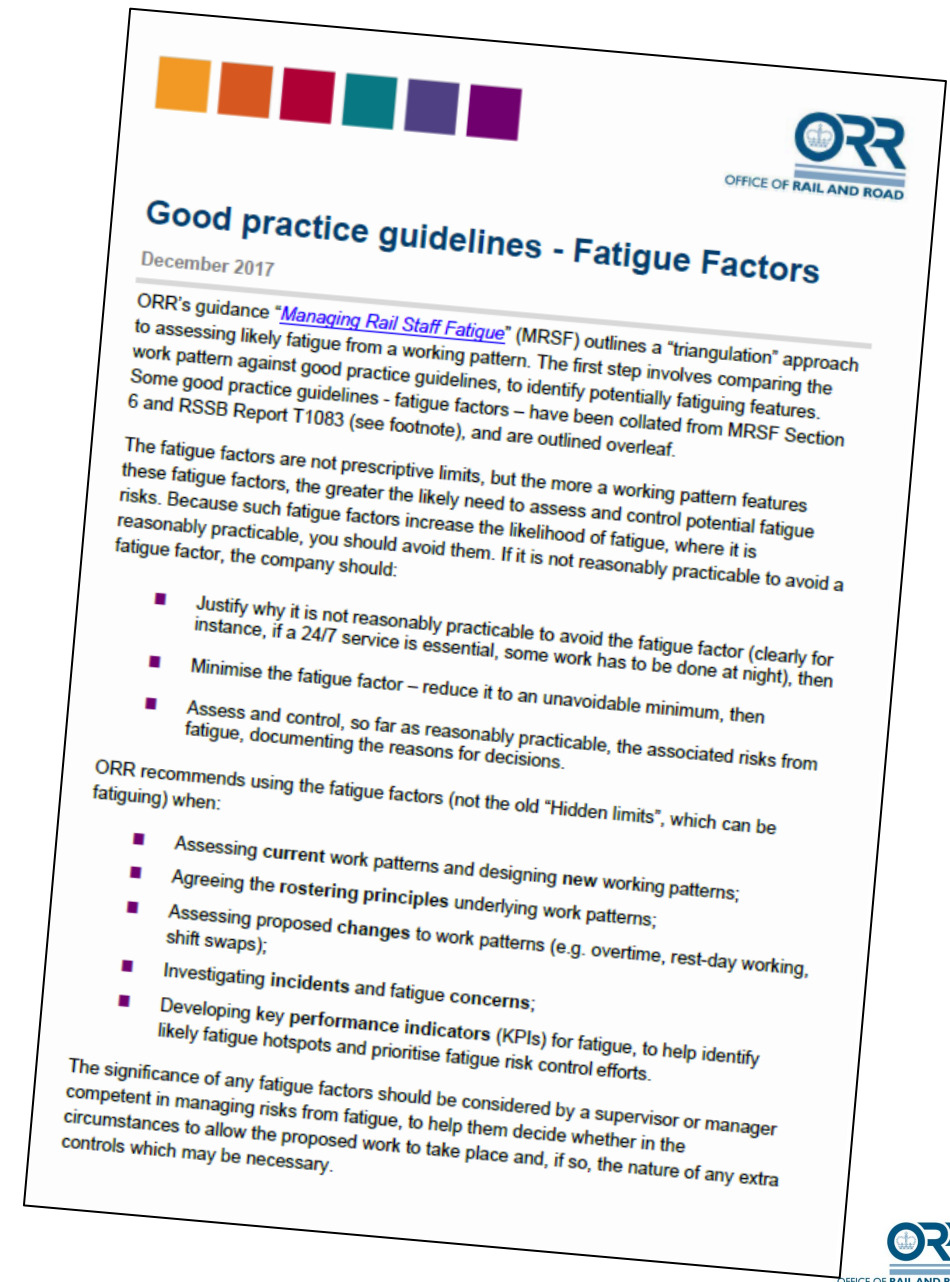
No.	Para in this guidance	Issue	Company FRMS / SMS ref?	Comments?
General				
1	5.7	Is the FRMS integrated with wider Safety Management Systems?		
2	5.8	Does the FRMS identify & draw together the preventive & protective measures which help control fatigue? Does a document provide "signposting" to these various fatigue controls?		
3	5.9	Is the FRMS proportionate to the organisation's nature, size, and complexity, and likely fatigue risk?		
Policy				
4	5.16			



**Are our work
patterns “safe”...?**

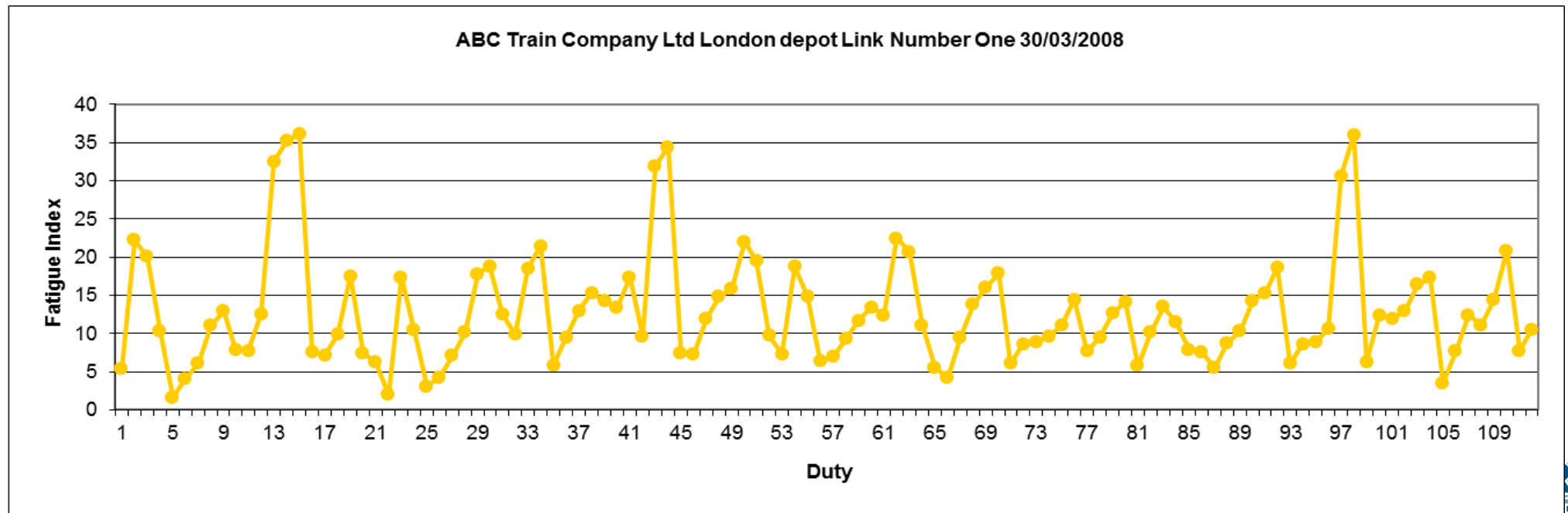
Work pattern guidelines

- Minimise factors which cause fatigue
 - (shift lengths, consecutive shifts etc)
- Consider when:
 - Planning work, considering changes, overtime
 - investigating incidents
- Work in progress - being updated this year
 - e.g. reduce consecutive day shifts from 12 to 6



Bio-mathematical fatigue models

- Input shift / sleep times → algorithm predicts likely fatigue
- OK, can help, but beware - an aid, not “gospel”!
- Scores aren’t “limits to work up to”: think what score means, understand assumptions & limitations
- Some allow comparison with alcohol impairment : helps justify any “thresholds”
- Charts can help ID likely peaks, trends, hotspots to target



Feedback from on-the-ground?

- **Talking** with staff
- **Fatigue survey?** A spectrum: complex or e.g.
 - “Which shift/s do you find most tiring? Why? How could we improve it?”
- **Fatigue rating scale** →
 - Takes 10s: e.g. before, ½ way thru & end of shift
 - To help ID more tiring shifts
 - To assess effect of changes to shift (before v after)?
 - Is it the shift or the person?
 - Aim to e.g. get rid of all sixes? Then reduce fives?

What was your level of fatigue at the **START** of the duty period?
(circle one number)

Mental fatigue rating**

1 2 3 4 5 6 7

What was your level of fatigue at the **VERY END** of the duty period?
(circle one number)

Mental fatigue rating**

1 2 3 4 5 6 7

** MENTAL FATIGUE RATING

- 1= fully alert, wide awake;
- 2= very lively, responsive, but not at peak;
- 3= okay, somewhat fresh;
- 4= a little tired, less than fresh;
- 5= moderately tired, let down;
- 6= extremely tired, very difficult to concentrate;
- 7= completely exhausted, unable to function effectively.

Feedback from emerging technology? But intrusion concerns...?

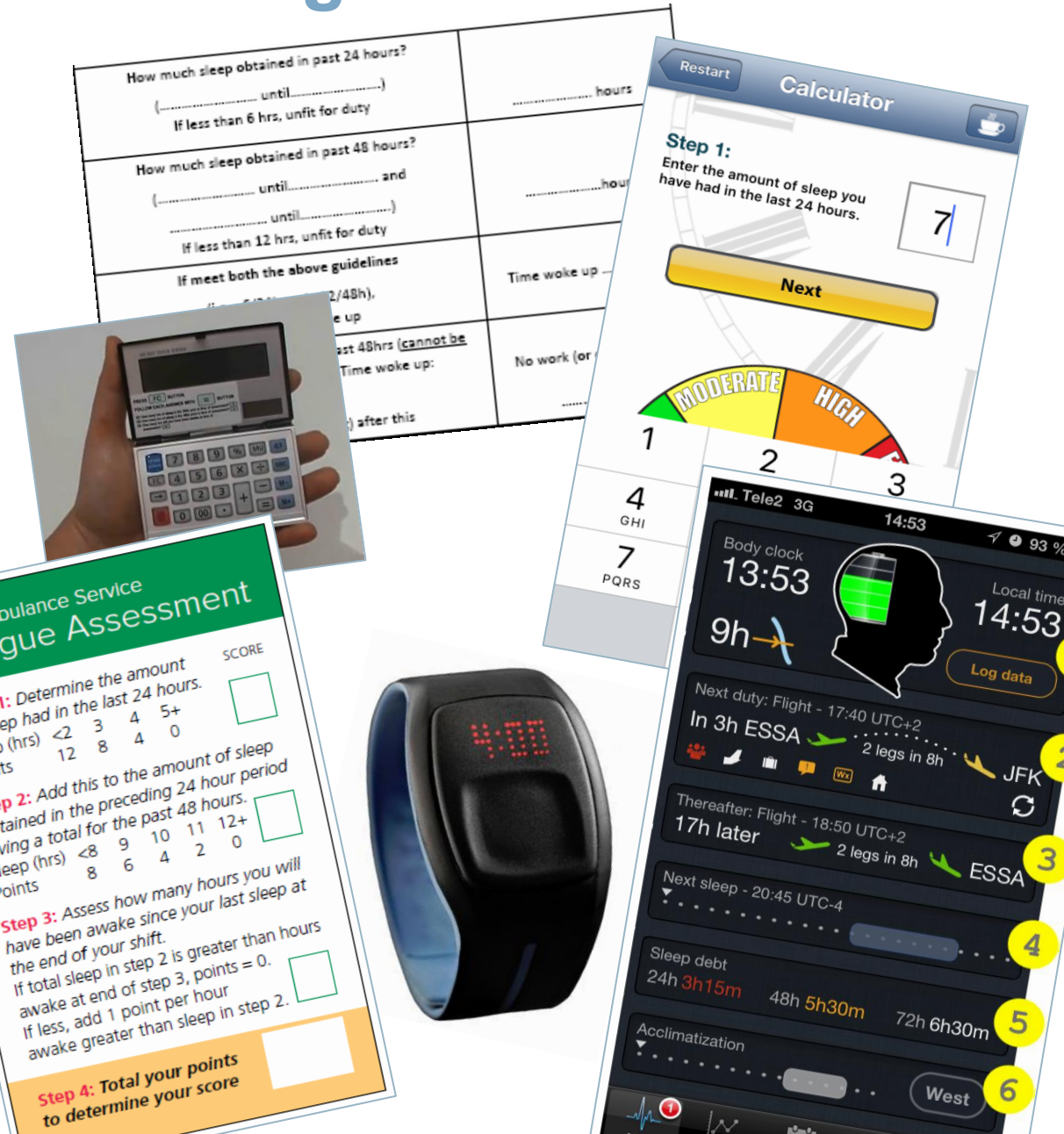
- e.g. sleep and activity trackers?
Sleep diaries?

- e.g. emerging alertness monitoring technologies e.g. PERCLOS (% eye closure)?
 - Australia, truck fleets, quarries...
 - Trams, buses...
 - Could help assess WHETHER there's a problem, & if so where...



Safe to work / drive? Recent sleep & time awake are key, but often neglected...!

- Not enough recent sleep and/or staying awake too long means fatigue, but people under-estimate these effects
- Q: Fitness for duty thru' whole shift? Then driving home? Hard to judge...
- RSSB Project T1082 → Decision-aids for fitness-for-duty (booking on etc)
- In progress, but any rough rules of thumb?



Rough “rules of thumb” on recent sleep...

■ “Have I had enough sleep?”

- We’re all different, but most adults need 7 to 9 hours sleep per night on a regular basis for optimal health & performance. Occasionally you may not manage to get this, and wonder “Have I had enough sleep?” You may feel OK when you book-on, but it’s hard to tell how tired you’re likely to become through the whole of your shift. Here are some rough guidelines. Everyone’s different, and many things affect fatigue - you may be too tired even within these guidelines. If in doubt, put safety first, tell your supervisor and don’t put yourself or others at risk.

■ Your performance is likely to be impaired:

- If you’ve had less than 6 hours’ sleep in the previous 24 hours
- If you’ve had less than 12 hours’ sleep in the previous 48 hours
- When you’ve been awake longer than your total sleep in the previous 48 hours (up to a maximum of 16 hours, whichever is the lower)

Fatigue from travel: work-related road driving?

- Often contractors' biggest fatigue problem - road driving to/at/from work :
- ORR fatigue guidance - Appendix B
- + raft of HSE, RSSB, RoSPA guidance →

8. Appendix B. Travel time

8.1 Time spent travelling to and from work does not provide rest in the same way as time spent at home. This is especially true of staff who drive themselves to, from or at work since, to state the obvious, driving provides no opportunity for sleep. Travelling as a passenger in a car, van, taxi or by public transport prevents a tired employee endangering other road users, but does not allow the same opportunities for sleep and rest as a bed at home or in lodgings, with consequences for subsequent fatigue.

8.2 An estimated 25 to 33% of fatal and serious UK road traffic accidents involve drivers who are on the road for work related reasons (Health & Safety Executive Work-related Road Safety Task Group, 2001). 17% of UK road traffic collisions causing injury or death on major roads are sleep related (Dept for Transport 2010a p19).

8.3 The courts have taken a serious view of employers not adequately controlling fatigue in staff driving home after work. For instance, in 2002 a worker for a potato firm driving home after a third consecutive home night shift crashed and died when his van drifted into the path of an oncoming lorry. The firm had failed to monitor and control the hours employees worked, and the deceased was thought to be suffering from chronic fatigue causing him to fall asleep at the wheel. The firm was prosecuted under the Health and Safety at Work etc Act 1974, and convicted of failing to ensure the health and safety of their employee and the public.

8.4 How long people have been awake is a key consideration - long journeys to work mean staff may well become unfit to work safely later in the shift, and unfit to drive home safely. Employers are recommended to consider the likely effects of travel times when recruiting staff, especially into safety critical roles. Shift workers are more likely to be tired on the drive to and from work than non-shift workers. In particular, sleepiness has been reported to be higher on the drive home after a night shift than from all other shifts. Factors found to contribute to the risk of falling asleep are previous sleep periods of less than six hours, and travel time over 35 minutes (RSSB T699 p36), though the significance of travel time will obviously vary depending on the shift length.

8.5 Travel time can be a significant issue when considered in conjunction with time spent at work "on site". A recent survey found that eight per cent of freight train drivers reported a journey to their booking on point of more than an hour, and that seven percent of contract trackworkers travelled more than two hours to work (RSSB T699 p13 & p24). The same study found that levels of fatigue reported at the start of a shift were correlated with the amount of time spent travelling to work, with increased fatigue from longer travel times.

8.6 Travel time can contribute significantly to fatigue, and can in turn affect

the safety of the rail transport system, if the person's work is "safety critical" under ROGS

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HSE
Health and Safety Executive
Driving at work
Managing work-related road safety

RoSPA
The Road Safety Association
Driving for work: Safer journey planner

RSSB
ROAD VEHICLE DRIVER FATIGUE KILLS
Every week around 200 road deaths and serious injuries involve someone using the road for work purposes. It is estimated that driver fatigue may be a factor in up to 20% of all road accidents and up to a quarter of fatal and serious accidents.

RSSB
Driving for Work: Managing Fatigue Risks
A Guide for Road Vehicle Drivers and their Managers

RSSB
FATIGUE KILLS
DO NOT PUT YOUR LIFE OR THE LIFE OF OTHERS AT RISK

ORR
OFFICE OF RAIL AND ROAD

Travel time...and “door-to-door” time?

- Contractors to assess site + travel time (door-to-door) BEFORE accepting work
- Clients to consider travel time when select contractors?
- Are travel distances & times realistic? Use e.g. Googlemaps?
- Sleep opportunity? Enough notice to plan & get sleep?
- NR’s “14h max door-to-door” (an occasional max, not to regularly “work up to”). NR moving towards 12h max door-to-door.
- **Sentinel smartcards** help monitor hours. Construction equivalent/s?
- Contractor & agency staff - sharing info on ALL site & travel time? IT systems to plan & track work pattern?



**...and an open, honest
culture around fatigue
(easy to say....!)**

More info? RSSB Fatigue & alertness webpages

Fatigue and Alertness

Secure | <https://www.rssb.co.uk/Pages/fatigue-and-alertness.aspx>

Apps | New Tab | Imported From IE

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Thank you – questions / discussion?

