PARLIAMENTARY TRAVELSAFE COMMITTEE

REPORT NO. 48 JUNE 2007

INVESTIGATION INTO THE ROAD SAFETY IMPLICATIONS OF MANDATORY 12 HOUR SHIFTS FOR JILALAN TRAINCREW

THE TRAVELSAFE COMMITTEE

The Travelsafe Committee is a select committee of the 52nd Parliament required to monitor, investigate and report on all aspects of road safety and public transport in Queensland, particularly:

- Issues affecting road safety including the causes of crashes and measures aimed at reducing death, injuries and economic costs to the community;
- The safety of passenger transport services, and measures aimed at reducing the incidence of related deaths and injuries; and
- Measures for the enhancement of public transport in Queensland and reducing dependence on private motor vehicles as the predominant mode of transport.

BACKGROUND TO THE INVESTIGATION

The Rail Tram and Bus Union (RTBU) wrote to the committee on 12 February 2007 about what was then a proposal by Queensland Rail (QR) to implement mandatory 12 hour shifts for train drivers at the Jilalan depot near Sarina. According to the union, this proposal would increase the risk that drivers would drive home after their shifts impaired by fatigue, and that this would create an unacceptable safety risk on the roads. The union requested the committee to investigate the shift proposal in the interest of public safety. According to the union, the changes proposed by QR National included:

- Extending the shift length for train drivers from 11 hours to 12 hours;
- An offer to provide fatigued train crew with transport home at the end of their shifts, though they would need to find their own transport back the next day to the depot/departure point to retrieve their vehicles; and
- Provision of a recovery room for fatigued drivers to rest after their shifts before driving home.

The union further submitted that QR National, a subsidiary of QR, had a duty of care to its employees and the general public, and that the move to 12 hour shifts would create an unacceptable safety risk on the roads. The union raised a number of specific issues about the move to 12 hour shifts including:

- Safety concerns about train crew driving home in a fatigued state after working six consecutive 12 hour shifts, as set out in the draft QR National roster;
- Fatigue levels were already critical for drivers working 11 hour shifts;
- Claims that QR failed to follow its own fatigue management policy guidelines (QR National Fatigue Management document ref. 4071);
- Claims that the fatigue management process (FAID) utilised by QR to assess the proposed roster was not accurate as the score rating had been derived from projected average shift lengths and not the worst case scenario as in QR National fatigue management guidelines; and
- Allegations that a combined union document and 49 individual letters of concern about the safety aspects of 12 hour shifts had been ignored by QR National management.

According to the RTBU, the roster change by QR was motivated by a shortage of train drivers.

QR implemented the new roster on 5 February 2007.

TERMS OF REFERENCE FOR THE INVESTIGATION

On 21 February 2007, the committee resolved to investigate the road safety implications of extended shifts implemented by QR National for train drivers based at the Jilalan depot.

The committee agreed to examine:

- QR National fatigue management policies and practices;
- Laws and agreements governing shifts for train crew;
- The research evidence on the fatigue implications of extended shifts and shift work;
- The involvement of driver fatigue in road crashes across Queensland, particularly in the areas surrounding Jilalan, Sarina and Mackay; and
- The application of fatigue management policies and practices and rostering within QR National.

The committee has undertaken this investigation as a case study given:

- The importance of driver fatigue as a contributor to road crashes and road trauma in Queensland;
- The growing number of workers in Queensland working extended shift work and commuting by road; and
- The importance of good fatigue management practices to ensure safety in the workplace and on the roads.

INVESTIGATION PROCESSES

For their investigation, the committee:

- Wrote to key stakeholders informing them of the investigation and inviting them to lodge written submissions on any points that fell within the terms of reference;
- Invited further submissions from leading fatigue researchers with experience and expertise in shift work and railways;
- Examined the submissions and other evidence at an *in-camera* hearing convened at the Parliamentary Annexe in Brisbane on 3 April 2007; and
- Formulated its report to Parliament.

RESPONSIBILITY OF MINISTERS

Section 107 (Ministerial response to committee report) of the *Parliament of Queensland Act 2001* requires the responsible minister or ministers to respond to recommendations contained in committee reports within three to six months of the report being tabled.

QR NATIONAL

QR National is a business unit of QR. It is Australia's leading hauler of coal for the coal industry.[1] In 2005-06, QR National hauled 153.8 million tonnes of coal.[2] QR National operates approximately 485 weekly services to more than 32 mines using QR's interconnected coal network of over 2,000 kilometres of track. In Queensland, QR's only competitor is a private company, Pacific National Queensland. QR National also hauls coal in the Hunter Valley in NSW for Hunter Valley Energy Coal, Resource Pacific, Centennial Coal and Gloucester Coal. This represents about 13 per cent of the NSW market.[3]

THE JILALAN DEPOT

QR's Jilalan depot is located three kilometres south east of Sarina and 35 kilometres south of Mackay. It is the staging point for coal trains serving the Goonyella System, a purpose-built railway used primarily to service coal mines in the northern and central areas of the Bowen Basin. Coal is transported around the clock seven days a week from mines at Blair Athol, German Creek, Riverside, Oaky Creek, North Goonyella, Moranbah North, Burton, Hail Creek, Coppabella and Moorvale Foxleigh to unloading facilities at the terminals of Dalrymple Bay and Hay Point.

During 2005-06, QR hauled 82.4 million tonnes of coal through the Goonyella corridor. This was 55 per cent of all coal hauled by QR that year. Haulage through the Goonyella corridor will increase with the planned expansion of infrastructure at Hay Point and Dalrymple Bay.

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1 Queensland Rail, 2007.
2 Queensland Rail, 2006, p. 92.
3 Queensland Rail, 2007.

DEPLOYMENT OF TRAIN DRIVERS

Train drivers work shifts either on their own or as part of a two-driver operation (TDO). TDO is a crew configuration in which two drivers share the operational task of driving a train. The two drivers decide who drives and for what proportion of each journey. The driver who is not driving (i.e. not at the controls of the train) is deemed equally responsible for the safety of the train in relation to signal sighting and the vigilance of the driver operating the train.[4]

The Traincrew Industrial Agreement sets out the hours of duty that traincrew work. This agreement, together with the State Award identifies the limitations of hours for TDO.[5]

The committee was told 219 drivers are based at Jilalan. They include five train management improvement officers who are not on the track every day.[6]

FATIGUE

The term 'fatigue' is used to describe a range of concepts such as sleepiness, tiredness, exhaustion or even inattention.[7] In road safety, fatigue is a key cause of driver impairment, the effects of which start long before the driver actually falls asleep. The lower arousal which accompanies fatigue makes it harder to maintain attention, particularly while performing monotonous tasks such as driving.

For most people, fatigue affects performance depending on hours of wakefulness. That is, the longer they stay awake, the more their performance will be impaired. Working longer hours, during normal sleep hours, at night or in the early morning causes sleep loss which increases fatigue risks.

SHIFT WORK, EXTENDED HOURS AND FATIGUE

Longer working hours affect a growing number of Australians.[8][9] Working shift work, extended working hours and irregular and unpredictable working hours can cause sleep loss and fatigue.[10] Most shift workers get less sleep over 24 hours than day workers. Between 60 and 70 per cent of shift workers have difficulty sleeping or problem sleepiness that may result in an increased risk of motor crashes, especially on the commute home after a night shift.[11] A quarter of all shift workers probably have shift work maladaption syndrome.[12] Characteristics of the syndrome include sleep disturbances, chronic fatigue, gastrointestinal problems (heartburn, constipation or diarrhoea), alcohol or drug abuse, mood disturbances, depression and interpersonal relationship difficulties.[13]

Around a third of QR's workforce work regular or irregular shift work.[14]

LEGISLATIVE AND OTHER CONTROLS TO LIMIT TRAIN DRIVERS' WORKING HOURS

Queensland Transport (QT), the department responsible for rail safety in Queensland, informed the committee that there are no legislative or otherwise enforceable limits on train driver working hours in Queensland, and that the department requires QR to work to its safety management system:

> Within that [safety management system] they have processes for fatigue, for risk assessments and for ensuring that they work within an accredited safety management system. So we expect them to work to that. There is no legislation as such.[15]

In further evidence, QT advised there are no specific offences for driving trains while fatigued and impaired, as there are for driving trucks.[16] However, drivers can be issued with a notice precluding them from operating until they have correct processes in place. Their accreditation to operate on the railway can also be suspended.[17]

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4 Queensland Rail, *Submission*, p. 5.
5 Queensland Rail, *Submission*, p. 10.
6 Keating, *Hearing Transcript*, 3 April 2007, p. 9.
7 Roads and Traffic Authority, 2001, p. 2.
8 Australian Centre for Industrial Relations Research and Training, 1999.
9 Pocock, 2001, p.4.
10 Department of Industrial Relations, 2005, p. 6.
11 National Heart, Lung and Blood Institute, 1997, p. 3.
12 Travelsafe Committee, 2005, p. 32.
13 Grossman, 1997, p. 604.
14 Queensland Rail, *Submission*, p. 3.
15 Couch, *Hearing Transcript*, 3 April 2007, p. 26.
16 Couch, *Hearing Transcript*, 3 April 2007, p. 27.
17 Fill, *Hearing Transcript*, 3 April 2007, p. 27.

QT clarified for the committee QR's obligation to undertake a safety case for moving to longer shifts:

> QR basically would have to go through their safety management system. If it is completely different from what they have done before – if it is a material change – it requires them to undertake a risk assessment process, a safety case, and it would come to the regulator and advise us of what they are doing and how they can show us, with the controls they have put in place, that they can do it safely. I suppose we would expect them to go through that process.[18]

FATIGUE AND DRIVING

Driving motor vehicles whilst tired accelerates crash risks on the road. The Centre for Accident Research and Road Safety – Queensland estimates that fatigue is the primary contributing factor in six per cent of all road crashes, 15 per cent of all fatal crashes and 30 per cent of fatal crashes on rural roads nationally.[19]

There were 5,640 fatigue crashes in Queensland during the five years 2002-2006. Of these crashes 1,858 (33 per cent) were serious, including 202 (3.6 per cent) that were fatal.[20] Because of the inherent difficulties of identifying and proving fatigue's contribution to crashes, these statistics are likely to underestimate the full extent of the fatigue crash problem.

Australian research has quantified the impairing effects of driver fatigue. The level of impairment experienced by a driver who has been awake for 17 hours without sleep (ie 4.00am – 9.00pm) is equivalent to driving with a blood alcohol level of 0.05 per cent, the legal limit.[21]

QT advised that crashes involving fatigued drivers and riders account for 9.5 per cent of all serious crashes around Sarina and Mackay. This is higher than the state average of 7.8 per cent. During the period 2001 to 2005, there were 176 road crashes in the Mackay-Sarina area involving fatigued drivers or riders. Of these crashes, four were fatal crashes, 53 were hospitalisation crashes, 41 were medical treatment crashes, 20 were minor injury crashes and 58 were property damage only crashes.[22]

When asked if railways should consider the drive home by railway workers after they finish their shifts, QT acknowledged the importance of the drive to and from work and rest breaks to the fatigue level of workers:

> Based on what the research would show, we consider it a fair point that the travel time after work and before work should be included in consideration of what is reasonable. Clearly, that would be the case. Some of the discussion here today would indicate that there are risks around the current set-up, particularly in relation to the break periods.
>
> It does raise the issue, however, that if people cannot get an adequate and quality break during a 12 hour shift because of the continued operation of the train, it sounds like the most likely time for a break would be at the end of the shift, which in itself raises issues. The staff are often keen to get home at the end of a shift, and understandably so. So I think there are a lot of complexities to this.[23]

COAL TRAIN PLAN 30

Coal Train Plan 30, implemented by QR on 5 February 2007, is the revised master roster for train drivers at Jilalan. The roster includes 12 hour shifts for two driver operation at the Jilalan depot for the first time.[24]

The committee heard that a number of QR depots are now working 12 hour shifts, though Jilalan appears to be the only depot that works continuous 12 hour shifts in a staggered shift scenario.[25] QR told the committee that drivers at Jilalan and Callamondah depots are affected by the new rostering arrangements.[26]

Representatives of the Rail Tram and Bus Union (Queensland Branch) and the Australian Federated Union of Locomotive Employees Queensland explained that drivers can work up to 11 consecutive days per fortnight, and any one of those shifts could be a 12 hour shift.[27] QR explained that two-driver shifts start every 40 minutes, around the clock.[28]

The age of the drivers has a bearing on their ability to cope with 12 hour shifts. With increasing age, the number of drivers with medical conditions affecting their fatigue also increases.[29] The age range of the drivers working 12 hour shifts at Jilalan is 45-50 years[30], and most of them have families.[31]

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18 Couch, *Hearing Transcript*, 3 April 2007, p. 30.
19 Travelsafe Committee, 2005, p. 25.
20 Queensland Police Service, 2007.
21 Australian Transport Safety Bureau, 2004, p.133.
22 Stapleton, *Hearing Transcript*, 3 April 2007, p. 27.
23 Stapleton, *Hearing Transcript*, 3 April 2007, p. 30.
24 Queensland Rail, *Submission*, p. 5.
25 Ward, *Hearing Transcript*, 3 April 2007, p. 4.
26 Featherstone, *Hearing Transcript*, 3 April 2007, p. 11.
27 Kummerfield, *Hearing Transcript*, 3 April 2007, p. 2.
28 Featherstone, *Hearing Transcript*, 3 April 2007, p. 20.
29 Keating, *Hearing Transcript*, 3 April 2007, p. 6.
30 Kummerfield, *Hearing Transcript*, 3 April 2007, p. 2.
31 Kummerfield, *Hearing Transcript*, 3 April 2007, p. 2.

DEVELOPMENT OF THE REVISED ROSTER DIAGRAM

QR explained to the committee that the introduction of the new master roster was preceded by 12 months of consultation with workplace representatives of the Jilalan depot.,[32] However, this consultation does not appear to have been successful or effective. Drivers, through their unions, rejected invitations to meet with QR to discuss the risk assessment of the shift diagram because they saw no point in risk-assessing a diagram they fundamentally disagreed with.[33] The driver representatives told the committee that drivers had no final say in the design of the shift diagram.[34]

QR National did not complete and verify a safety case prior to implementing 12 hour shifts for Jilalan train drivers. In evidence, QR argued that the change to work patterns was considered 'routine' because 12-hour shifts had already been implemented for drivers at the Callamondah depot, and that a safety case was not warranted.[35]

The key difference between a risk assessment and a safety case is that safety cases require validation by the Chief Risk Officer and either the Level 2 or Senior Executive Manager responsible for that particular area in the organisation.[36] The committee further heard that the decision as to whether a change is routine, and a safety case is unwarranted, rests with the manager responsible for the change taking place.[37]

COMPARISONS WITH OTHER ROSTERING SYSTEMS

QT advised the committee that 12 hour, two driver shifts are normal in other jurisdictions:

> In almost all other states it is allowed and often does happen with a number of the major players. I suppose the fatigue management guideline is very similar to processes in other countries, particularly in European countries.[38]

QT told the committee that, to date, 12 hours has been the ceiling for the rail industry in Queensland and other states, and that the department would need to see significant management processes in place to undertake any raising of that level.[39]

Driver representatives, in their evidence, contrasted aspects of the shift work structure at the Jilalan depot to the rostering practices in the mining industry for workers living on site. They stressed the comparative difficulties faced by train drivers at Jilalan because of long and irregular hours as well as the monotony and repetitive nature of their work.

The committee heard that:

> With our working, we can start the week at midnight for a sign-on and progress to 20:00 hours (8.00pm) at the end of the week. In QR's own business instruction it states that this is not best rostering practice.[40]
>
> How on earth can you compare someone who does eight to four and then four to midnight with someone who is in the rail industry who can sign on between 12 or 1am and 11.59pm at any given minute of those hours in that 24-hour period? Also, train men get deferred and cancelled.
>
> There is no comparison whatsoever to a guy who works at a mine site that has a morning break, a lunchbreak, an afternoon break and then finishes work and goes straight to his accommodation on site. The train man when he finishes his shift, has to get in a motor car and drive to wherever his location is.[41]
>
> A train driver sits at the controls of the train for up to 11 hours 40 on a shift. It is monotonous. It is repetitive tasks. You are doing the same things at the same spot: here is where I put the brake on, here's where I put it in two notches.[42]
>
> I do not think the lessons learned from outside industries like locked-in, set shifts have been brought to QR. If 36 trains leave a day, there will be 236 sign-on times, and for that driver it will change the next day and the next day. That is the part that significantly needs to be addressed to incorporate a successful 12-hour shift.[43]

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32 Queensland Rail, *Submission*, p. 5.
33 Ward, *Hearing Transcript*, 3 April 2007, p. 4.
34 Ward, *Hearing Transcript*, 3 April 2007, p. 4.
35 Featherstone, *Hearing Transcript*, 3 April 2007, p. 12.
36 Stroud, *Hearing Transcript*, 3 April 2007, p. 12.
37 Stroud, *Hearing Transcript*, 3 April 2007, p. 12.
38 Fill, *Hearing Transcript*, 3 April 2007, p. 28.
39 Fill, *Hearing Transcript*, 3 April 2007, p. 30.
40 Ward, *Hearing Transcript*, 3 April 2007, p. 5.
41 Ward, *Hearing Transcript*, 3 April 2007, p. 7.
42 Keating, *Hearing Transcript*, 3 April 2007, p. 8.
43 Stewart, *Hearing Transcript*, 3 April 2007, p. 10.

The committee was told that QR's rostering practices contrast with practices at Pacific National Queensland, the other rail operator in Queensland, and Pacific National Australia:

> They (Pacific National) use the FAID system to assess fatigue and they will not let their drivers on a track with a FAID score of above 80. That is a very strict rule.[44]

> Pacific National Australia wide has the same policy in place. …It is standard that they do not force anybody to work 12 hours.[45]

FATIGUE RISKS WITH 12 HOUR SHIFTS

Leading fatigue researcher, Professor Drew Dawson gave the committee a useful insight into the risks associated with working longer shifts and longer working weeks:

> …the more hours you work per week, the less hours you have available to sleep and, therefore, the higher risk of sleep loss and fatigue and, subsequently, of potential accidents and injuries.[46]

> If you look at some of the shifts that are now being worked in the mining sector, for example, up in Queensland where people may be working 13, 12 hour shifts in a row and those individuals are sometimes doing a swap over, that is, seven days or six days and one over in seven nights or something along that level, anecdotally the data would suggest that there is a significant increase in the number of incidents. On the other hand, what is being proposed in this roster is not in the same order of workloads—that is, there are some increases in the shift system but they are not into the same zone that we would see many of the rosters in the mining, resource and other parts of the rail industry going into.[47]

On the move from 11 to 12 hour shifts, Professor Dawson advised:

> I think you can clearly say that there is a potential elevation in the average likelihood across that whole driving population, but that it is not in extreme levels and there are many rosters worked equivalently in Australia and overseas that do not have prima facie evidence that they are necessarily risky. Although in our position we would always argue a cautionary principle and say, if you are elevating risk, show us what you are doing to bring the risk back down through other hazard control mechanisms.[48]

Professor Dawson stated that 12 hour shifts may result in a slight elevation in risk, if any, when they form part of a compressed working week comprising two days, two nights, four off, and travelling to work less often.[49] He also advised that these risks can be managed, based on the number of sites in Australia using compressed work schedules and the absence of clear evidence showing a significant increase in accidents and injuries. He went on to qualify his advice:

> The quality of the research in Australia looking at this issue is not good. In many cases, the 12 hour shifts are only part of a number of things that have changed in the workplace at the same time. In many cases, the research is what I called vested interest research—that is, where an organisation is trying to prove a point and they recruit somebody to do science that supports a preconceived notion.

> If you look internationally, there is a general consensus that there probably is an increase in risk associated with extending shifts from eight to 12 hours. In many of the cases where this risk is increased, you are able to put in place risk controls or hazard controls to manage that. I also think there is a general consensus that 12 hours is probably the outer limit of where it can be done.[50]

FAID SCORES

Fatigue Audit InterDyne (FAID) is a fatigue management tool designed to estimate average fatigue levels of workers based on their opportunities to sleep and rest. The specific formulae for the program were developed and validated by the Centre for Sleep Research at the University of South Australia. FAID is intended to be used as a tool to support decisions about rosters and hours of work. FAID accounts for the length of shifts and breaks, time of day, prior seven-day work history and biological limitations on sleep. FAID scores do not account for individual differences.[51]

FAID scores range from zero to 140 points. FAID scores of less than 80 points are generally consistent with a safe system of work. Scores between 80 and 100 cannot be broadly considered safe or unsafe unless the context is

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44 Keating, *Hearing Transcript*, 3 April 2007, p. 7.
45 Kummerfield, *Hearing Transcript*, 3 April 2007, p. 7.
46 Dawson, *Hearing Transcript*, 3 April 2007, p. 32.
47 Dawson, *Hearing Transcript*, 3 April 2007, p. 33.
48 Dawson, *Hearing Transcript*, 3 April 2007, p. 33.
49 Dawson, *Hearing Transcript*, 3 April 2007, p. 32.
50 Dawson, *Hearing Transcript*, 3 April 2007, p. 32.
51 Fletcher, 2005, p. 4.

known. Scores of 100 points and more are generally consistent with an unsafe system of work.[52]

As a relative reference, a score of 80 equates to approximately twice the maximum fatigue score for a 9.00am to 5.00pm Monday to Friday work week.[53]

The nature of the task is also important to fatigue risks. For example, while a score of 80 might be appropriate for someone doing photocopying, a lower maximum threshold of 65 points would be appropriate for a person required to fly a plane at low altitudes.[54]

In a validations study of FAID scores for a consortium of rail operators, the heavy haul environment showed more sensitivity to fatigue as defined by FAID. That is, significant increases in dangerous behaviours were observed in the heavy haul environment. The increases in urban rail environments were more subtle and required additional study to make definitive conclusions.[55]

USE OF FAID SCORES BY QR

Professor Dawson explained that the rail industry has an informal industry standard for FAID scores for train crew:

> We came to a general sense—and this has emerged in crude terms as an informal industry standard—that, for the type of work that we are talking about in this train crew, fatigue scores under 80 are probably pretty reasonable and would require minimal additional controls.
>
> Scores over 100 are sufficiently concerning that you would want to see significant additional controls put in place, and in the range of 80 to 100, depending on the exact nature, whether it is single driver, double driver, the specifics of the task, then there is a kind of a yellow zone. We have set up a model for the industry which says that there is a green zone, a yellow zone and a red zone.
>
> You should not plan to be going into the red zone. If you go into the yellow zone you should be showing higher levels of additional risk management. If you are in the green zone that is below 80, you probably do not have a major issue.[56]

QR uses the FAID software to gauge the level of worker fatigue related to rostering. The committee's concerns have focused on the inability of the FAID score to assess individual's levels of fatigue. QR interprets FAID scores according to the FAID Tolerability Framework below.[57]

FAID Tolerability Framework

Fatigue Score	Tolerability Framework
120 and above	Intolerable
100-120	Risk Managed (Reduce to less than 100 if practicable)
80-100	Moderate Risk (Risk Assessment provided on request)
0-80	Lower Risk (Subject to work cycle hours being achieved and acceptable social outcomes)

(Source: Queensland Rail Submission - Business Instruction 4071)

Professor Dawson told the committee that he considered QR's interpretation and use of FAID scores in their risk assessment to be non-standard with respect to best practice recommendations.[58] He described common problems with the usage of FAID:

> The difficulty has been that a number of people who have adopted these models have become bewitched by the software and think that as soon as they have a number they do not need to do anything else. This is not a criticism levelled specifically at QR but at many organisations who adopt the software. It is normally part of a developmental phase that they go through.
>
> The software itself actually measures the degree of sleep opportunity that the organisation provides an individual with and is specifically directed towards answering the question, 'Has the organisation met its occupational health and safety obligations to provide a safe system of work by providing an adequate sleep opportunity?' That is a really important theoretical point, because many of the organisations understandably but erroneously think, 'If we have provided you with an adequate sleep opportunity then you must not be fatigued.[59]

Driver representatives also noted the limitations of the FAID system:

> There is no way that that FAID tool can assess the fact that a monotonous and repetitive job will fatigue you far more in a mental sense than an active job. That is the FAID limitation. At this point, QR does not have a mechanism for assessing those other things

52 Fletcher, 2005, pp. 3-4.
53 Fletcher, 2005, p. 4.
54 Fletcher, 2005, p. 5.
55 Fletcher, 2005, p. 7.
56 Dawson, *Hearing Transcript*, 3 April 2007, p. 34.
57 Queensland Rail, *Submission*, p. 9.
58 Dawson, *Hearing Transcript*, 3 April 2007, p. 34.
59 Dawson, *Hearing Transcript*, 3 April 2007, p. 34.

> that factor into fatigue. That is our problem with FAID.[60]

In many cases the use of a model like FAID will not tell how tired somebody is because there are individual differences including boredom.[61]

The committee also took advice from Associate Professor Lee Di Milia of Central Queensland University who has researched fatigue management practices within the coal industry. Associate Professor Di Milia confirmed that FAID does not consider the unique domestic circumstance of each worker.[62]

The committee was also concerned that FAID scores failed to account for workers' lost sleep opportunities due to the time spent driving to and from work, family commitments and individual health issues that affect sleep quality. QT acknowledged that FAID only takes in the working requirements during the rail safety time.[63]

Professor Dawson advised the committee:

> Our advice to all of the rail industry, of which QR was part of the consortium that engaged in this, said that the use of FAID can only ever be considered, in the jargon we gave to them, as a first order control. That is, it will tell you what happens on average, but a safety case for the proposed changes would require additional hazard control processes in place in order to ensure that a given individual on a given day also was not tired. [64]

Associate Professor Di Milia told the committee that good occupational health and safety practice takes into consideration the ability of workers to get home and arrive at work safely.[65] The committee was told that most drivers based at Jilalan live considerable distances from the depot, and as far away as Blacks Beach, near Mackay.[66] The driving distance from Jilalan to Blacks Beach is approximately 50 kilometres.

The committee questioned QR about the validity of its FAID scores. QR advised that, for a FAID score of 100, it does a risk assessment and considers implementing control measures. QR also stated that it views scores over 120 to be 'intolerable'.[67] QR acknowledged the potential for drivers to work a large number of consecutive 12 hour shifts if they work overtime.[68]

As a control measure, QR monitors the fatigue scores for drivers who work the most overtime hours:

> We get a top 10 list every eight weeks and we monitor to see whether they are over the 100 limit. That is riding at zero per cent.[69]

FATIGUE DRIVING INCIDENTS INVOLVING FATIGUED JILALAN QR STAFF

The risk of crashing after a shift is a real concern for drivers at Jilalan given their distances from their homes to the depot.

QR submitted that a search of their accident/incident data base (ISIS) identified two incidents over the last five years where fatigue or drowsiness was a contributing factor. Both incidents occurred in 2005. No injuries were sustained. In one incident, a roster clerk based at Jilalan drove into a ditch whilst travelling to Mackay. The other incident involved a Jilalan train driver who experienced a micro sleep at work.[70] The committee also heard that driver fatigue was a factor in two major rail accidents at Black Mountain and Moranbah.[71]

QT advised that they could not isolate train crew crashes in their road crash data.[72]The driver representatives told the committee that there had been no recent incidents at work or on the way home involving train drivers who were fatigued, though some drivers were getting lifts home with others rather than driving.[73]

The revised roster might reduce the exposure of train crew to crash risks. QR examined the frequency that train crews were required to travel on roads around the Jilalan depot under the 11 hour and 12 hour shift rosters. They concluded that the 12 hour roster would result in fewer car journeys by Jilalan drivers to and from work and an overall reduction in the number of crew changes necessitating car travel during shifts of duty. QR calculated there would be 91 attendances by drivers per day under the new roster compared to 100 attendances per day previously.[74]

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60 Keating, *Hearing Transcript*, 3 April 2007, p. 8.
61 Dawson, *Hearing Transcript*, 3 April 2007, p. 34.
62 Di Milia, 2007.
63 Couch, *Hearing Transcript*, 3 April 2007, p. 30.
64 Dawson, *Hearing Transcript*, 3 April 2007, p. 33.
65 Di Milia, 2007.
66 Featherstone, *Hearing Transcript*, 3 April 2007, p. 23.
67 Featherstone, *Hearing Transcript*, 3 April 2007, p. 17.
68 Featherstone, *Hearing Transcript*, 3 April 2007, p. 18.
69 Featherstone, *Hearing Transcript*, 3 April 2007, p. 23.
70 Queensland Rail, *Submission*, p. 32.
71 Ward, *Hearing Transcript*, 3 April 2007, pp. 3-4.
72 Stapleton, *Hearing Transcript*, 3 April 2007, p. 27.
73 Ward, *Hearing Transcript*, 3 April 2007, p. 3.
74 Queensland Rail, *Submission*, p. 6.

THE QR RISK ASSESSMENT

QR noted, when developing the master roster for Jilalan, that whilst the roster did not contain any shifts that were intolerable (that is with a FAID score over 120), there were a number of shifts over 100, with the highest calculated fatigue score being 107.66. In accordance with Business Instruction 4071, a risk assessment was undertaken by QR to manage the risk.[75]

QR's risk assessment referred to a paper titled *Investigation of the relationship between FAID Scores and SPADs* written by QR's Human Factors Unit in 2004. SPADS is the acronym for signals passed at danger. These are incidents in which train drivers fail to respond to track stop signals. SPADs are potential precursors to collision events. The paper concluded that there was no correlation between high FAID scores and the prevalence of SPAD events, and that FAID scores were a poor predictor of SPAD occurrences. The committee ascertained that the paper had not been the subject of a peer review. QR further advised that an external consultant reviewed its processes and undertook a 'taproot'[76] analysis.[77]

Professor Dawson and Associate Professor Di Milia examined both documents for the committee. Professor Dawson advised:

> As an approach of going through and following the principles of risk management, I think they have done a pretty good job. On the other hand, some of the evidence that they have mustered in support of their safety case is less impressive from my perspective. That is, the intentions were correct but I am not sure that the data that they have presented convinces me of their case. I also qualify that by saying that I am not hugely concerned about the proposed roster, but the safety case is not fabulous.
>
> My guess is that there is plenty of data that they could have used and had access to that is part of their internal documentation because we developed it for them and it is not cited. You would expect that information to have been cited in their safety case. In particular, the investigation between FAID scores and SPADs in blunt terms is disingenuous. That is, it is a nonsense piece of research to bolster a point that is not relevant in my opinion. It is not good science, it is not the appropriate statistical analysis and it is even a flawed conceptual model. I will explain that in some detail.
>
> For example, what they have done is said that there is no correlation between the FAID scores and SPADs incidents. This assumes, therefore, that fatigue is not a cause of SPADs. That is predicated on the assumption that every SPAD is due to fatigue. We know that that is not the case. There are many reasons why a SPAD can occur and fatigue is likely to be a very small percentage of those. To say because there is not a relationship that FAID is not a good predictor is really silly.[78]

Further to addressing the risks associated with increased shift length from 11 to 12 hours, Professor Dawson stated:

> What they have done is said that the FAID analysis says that it is not over an absolute threshold; therefore, you should let us do it.
>
> What we would do from a safety case perspective is to say best practice would say we are elevating the risk, it does not on the surface look to be a huge increase in risk and it would not be unreasonable for us to accompany that increased level of risk with risk mitigation to bring it back down to an acceptable level. I think that is a subtle point but I think from a safety theory perspective it is quite an important one.[79]

Associate Professor Di Milia acknowledged QR's efforts to mitigate the impact of the roster change on the train drivers. However, he questioned the likelihood scale used to calculate risk in the assessment and whether the dimension was consistent with QR records. In the assessment, a score of '3' covers a likelihood spaning from once in ten years to once in a 100 years. Associate Professor Di Milia also questioned the methodology used in the QR paper on FAID scores and SPADs.[80]

The committee also asked QT to critique the paper. The department advised that it believe that the scientific methodology utilised by QR's Human Factors Unit in 2004 to reach the conclusions within the document was sound.[81]

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75 Queensland Rail, *Submission*, p. 10.

76 A 'taproot analysis is an investigative tool to objectively and systematically examine an incident/accident.

77 Featherstone, *Hearing Transcript*, 3 April 2007, p. 16.

78 Dawson, *Hearing Transcript*, 3 April 2007, p. 33.

79 Dawson, *Hearing Transcript*, 3 April 2007, p. 33.

80 Di Milia, 2007.

81 Queensland Transport, 2007.

CONTROL MEASURES IMPLEMENTED BY QR

QR, following its risk assessment, implemented a number of control measures to address risks to drivers associated with the move to 12 hour shifts. [82] These measures included the establishment of a designated recovery room for fatigued drivers to rest before driving home, signage warning drivers to rest rather than drive home and an offer of transport home for any drivers too fatigued to drive themselves. These measures were on top of the existing workplace health and safety policies and safety training provided to staff.

The committee heard of problems with the recovery room and the offer of safe transport home after shifts.

The Recovery Room

The committee heard that the recovery room is located next to, and overlooks, the main line used by coal trains with 120 cars leaving or coming through the station every half hour. The committee also heard that the room is not sound-proofed. On top of the extraneous noise, the room receives half-hourly announcements over the PA system. A photograph of the Jilalan depot building that houses the recovery room is at the end of this report.

QR told the committee that people had slept in the room for 30 years, that it had lockers, a TV and new recliner rockers. QR also stated that it was prepared to improve the recovery room if it would improve safety, and would consider moving the room to another site.[83]

QT said that QR had informed it of the recovery room, but was unaware of its deficiencies:

> During the meeting with Queensland Rail which we called when all of this occurred we were advised that they had a room available that was a dark room with recliner rockers et cetera, because we did ask the question of fatigue which is outside Rail Safety's area of expertise, or legislative ability I suppose. They said that was available to them – a dark room with recliners et cetera.[84]

When questioned, it became clear to the committee that QT was unaware that the recovery room was adjacent to the main rail line.[85]

Safe travel home after shifts

QR explained to the committee that it offered to drive home drivers who are fatigued after shifts:

> The offer that we have made to drive people home is fairly significant because we are talking about people who live from Blacks Beach through to Sarina. It is quite a wide area. We have made that commitment to take them home. Most drivers who live in Mackay work in a permanent, mate configuration – that is, they share drive. It is reasonable to expect that they could come back to work with another driver.[86]

QR further explained that the decision to meet drivers half way in driving them home if fatigued, but not back to work the next day, was based on problems encountered in the past when QR sought to assist drivers with travel to and from work for other reasons.[87]

Fatigued drivers who leave their vehicles at the Jilalan depot and accept QR's transport home after work would be without their vehicles. The driver representatives highlighted the difficulties this creates for drivers, their families and fellow drivers:

> I have a lot of members of my union and a lot of people at the depot who come to me and say, 'If I put my hand up [and admit to being fatigued], how do I get myself back the next day. I am a one-car family.' I have people who rely on me to get them home by car pooling.[88]

No pay penalty for sick leave due to fatigue

The committee noted advice from QR that drivers who call in sick with fatigue, are paid the full aggregate rate of pay.[89] This is to ensure there are no financial disincentives to drivers reporting that they are fatigued:

> No-one has ever been disciplined for putting up their hand for fatigue, ill-health, or drowsiness.[90]

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82 Queensland Rail, *Submission*, Appendix I, p. 10.
83 Featherstone, *Hearing Transcript*, 3 April 2007, pp. 22-23.
84 Couch, *Hearing Transcript*, 3 April 2007, p. 25.
85 Couch, *Hearing Transcript*, 3 April 2007, p. 26.
86 Featherstone, *Hearing Transcript*, 3 April 2007, p. 23.
87 Featherstone, *Hearing Transcript*, 3 April 2007, p. 23.
88 Ward, *Hearing Transcript*, 3 April 2007, p. 3.
89 Featherstone, *Hearing Transcript*, 3 April 2007, p. 16.
90 Featherstone, *Hearing Transcript*, 3 April 2007, p. 16.

CONCLUSIONS

Workers who drive home after work in a fatigued state are a key road safety challenge in Queensland. Factors that exacerbate the fatigue risks from work include the time of day, the existence of medical sleep disorders and the nature of the work.

Workplaces across Australia are moving to compressed work patterns utilising 12 hour shifts. As more workers move to shift work and extended working hours, it is likely that, without further controls, the number of fatigued drivers on the roads will also increase. The fatigue risks associated with longer working periods can be managed as part of a risk management process.

QR has a suite of safety policies and guidelines and a comprehensive safety management system to ensure the safety of their workers and the public. The effectiveness of the system is, however, only as good as its weakest link.

On 5 February 2007, QR implemented a revised roster for drivers of coal trains based at the Jilalan depot, a move opposed by drivers. The committee has examined the road safety implications of the new work patterns at the Jilalan depot due to increased driver fatigue. QR's safety management system allowed it to introduce the 12 hour shift roster without completing a safety case. Instead, QR management prepared a risk assessment.

The committee was puzzled by the logic of this, and why the final decision on a change with significant safety implications was not the responsibility of the Chief Risk Officer. It is unlikely that a line or executive manager would have high-level safety or risk assessment training. Even if they did, it would be prudent to maintain a clear separation between operational considerations and safety concerns, particularly when QR already has a safety system and trained personnel to deal with safety matters.

QR's risk assessment is not strong, though it has identified the need for control measures to reduce risks for train drivers. These include a driver recovery room and the offer by QR to provide one-way travel from the depot to home if drivers feel they are too tired to drive.

On paper, the control measures seemed plausible to QT, the department with oversight responsibility for rail safety, though the department was unaware that the recovery room was adjacent to the heavily trafficked main rail line. The standard of this facility has a direct bearing on its worth as a fatigue control measure and, consequently, the likelihood of drivers driving home fatigued.

QR uses state-of-the-art FAID software to estimate the average fatigue loading on drivers due to work rosters. FAID does not, however, account for the individual susceptibilities of drivers to fatigue, the lost opportunities for sleep while travelling home or the role of factors such as monotony and boredom. The yardsticks used by QR to determine when workers are being excessively impaired by fatigue appear weak.

The committee is not comfortable with QR requiring drivers of coal trains to work rosters in which FAID scores of 100 are routinely tolerated. Without adequate controls, this must lead to workers driving home after work while heavily impaired by fatigue. Had the move to 12 hour shifts not been assessed by management as 'routine', a proper safety case would have been required before the shift changes were implemented. In our view this process should have been followed, and should be followed now. The control measures implemented by QR at Jilalan should be reviewed as part of this process.

It is crucial that employers consider the safety of workers driving home from work when devising work patterns that are likely to produce high levels of fatigue. The fatigue crash risks need to be carefully managed. Fatigue management tools like FAID that identify average fatigue levels that work rosters are likely to produce are extremely useful. However, they do not account for individual circumstances, nor the susceptibility of individual workers to fatigue. What works for workers at one depot, may not be safe at another depot. Similarly what works for one worker, may not be safe for another.

Finally, when implementing control measures to address fatigue crash risks, it is imperative that these measures are properly validated to ensure that they actually work.

RECOMMENDATION 1

That the Minister requires Queensland Rail to complete a safety case for the revised roster diagram implemented at Jilalan, and prior to implementing 12 hour shift rosters for drivers at any depots.

Minister responsible:
Minister for Transport and Main Roads

Jim Pearce MP, Chair

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The Jilalan depot building housing the Driver Recovery Room.

Photograph courtesy of the Rail, Tram & Bus Union