

**IMPROVING THE BASIC FATIGUE
MANAGEMENT OPTION
DISCUSSION PAPER**

August 2010



National Transport Commission

Prepared by

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Improving the Basic Fatigue Management Option

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REPORT OUTLINE

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Abstract:	This report considers potential improvements to the Basic Fatigue Management option under the national model laws for fatigue management. It seeks comment on some potential minor changes to extend the number of days that can be worked consecutively while further restricting the number of hours that can be worked each day and the time of day when work can be undertaken.
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FOREWORD

In 2007 the National Transport Commission gained national endorsement to develop a new fatigue management regime for the heavy vehicle industry. The program is being progressively adopted nationally. The regime includes new record keeping requirements, assigns new responsibilities to all parties who can have an impact on driver fatigue, and sets out hours of work and rest for truck drivers. These hours of work and rest comprise three tiers that support the management of fatigue in proportional to the safety risk.

The regime has now been in place for over 18 months and a number of issues with the practical application of the regime have been raised. The NTC has responded to these issues by promoting better awareness and education throughout the heavy vehicle industry and the enforcement community. Many of the issues simply reflect the 'teething problems' that are commonly experienced with major new reforms, as well as the change in culture from one that holds drivers solely accountable for fatigue management to one that holds everyone in the supply chain accountable.

This report considers some minor changes to the hours of work and rest specified within the Basic Fatigue Management (BFM) option. By adjusting these hours of work and rest it may be possible to safely address some of the practical issues faced by industry. This potentially has benefits for both industry and the community, if more businesses decide to undertake BFM. Entry to BFM is contingent on accreditation, which requires training and improved management practices for participating businesses. The NTC has demonstrated in the past that accredited companies tend to be safer companies.

Some stakeholders have also raised issues with the NTC specifically around the new fatigue laws. These stakeholders have been particularly helpful in identifying areas that require improvement, generating case studies to help illustrate issues and sourcing expert advice to help identify alternative solutions. In addition, the fatigue experts who provided advice have shown the enthusiasm and goodwill needed to make a good reform better, and to help provide safe solutions for industries coping with significant change.

I would like to thank the stakeholders who have assisted to date, along with the team of NTC staff who have contributed to this proposal. The next few weeks provide an opportunity for a broader range of stakeholders to provide their views. I encourage written submissions before the closing date of 8 October 2010.



Nick Dimopoulos
Chief Executive Officer

SUMMARY

The Heavy Vehicle Driver Fatigue reform, which introduced a new three-tier approach to managing heavy vehicle driver fatigue, was agreed by Ministers of the Australian Transport Council (ATC) in February 2007. It was implemented in four states (Queensland, New South Wales, Victoria and South Australia) on the 29 September 2008.

The key characteristics of the reform are:

1. The introduction of a 'general duty' on all parties in the transport supply chain. All parties must take 'reasonable steps' to ensure that their actions do not cause a driver to drive while fatigued.
2. 'Chain of responsibility' requirements which ensure that parties do not contract out of their obligations and leave it up to the driver to balance their fatigue risks with productivity demands.
3. Enhanced record keeping requirements.
4. A work and rest hours regime based on a scientific analysis of fatigue, which introduces the notion of risk management by allowing three options for work and rest hours.

This paper focuses on the fourth characteristic of the Heavy Vehicle Driver Fatigue reform – the hours of work and rest.

Of the issues put forward by stakeholders over the last twelve months, the key issues that may warrant legislative change relate to the Basic Fatigue Management (BFM) option. This option allows hours of work and rest that potentially present an increased level of safety risk compared to standard hours. In order to manage this risk, those choosing the BFM option must become accredited, which requires that they are trained and have systems in place to manage that risk.

The NTC formed a small working group to determine whether there was merit in developing a national proposal to address the issues. In consultation with the working group, the NTC has identified three key issues relating to the BFM option. On these three issues the NTC discussed the alternatives, sought fatigue expert advice, and worked with industry and experts to put forward a proposal.

The issues considered are split rests, the 14-day cycle and early starts.

- Split rests – under the laws, a long break of seven hours is required in any 24-hour period. This is one hour longer than the previous limit. For practical reasons some proponents argue that they should be able to split that seven hour break into two blocks, even if it means the two blocks of rest sum to a period exceeding seven hours.
- 14-day cycle – under the laws, the BFM option requires a 24-hour rest in a seven-day period and after no more than 84 hours work time. This means that a driver cannot work more than seven days in a row, even if the days are shorter than the maximum allowed under standard hours and do not involve high risk activity such as night work. It is argued that this is unnecessarily restrictive and that a practical

solution can be found which allows 14-day, rather than seven-day cycles and adequately manages risk.

- Early starts – it is argued that the limitations on the night rest period (10 pm to 8 am) restrict the capacity of drivers to go to bed early and start work early on a consistent basis. Minor adjustments to that window may enable greater flexibility while maintaining safety.

In considering these issues, the working group noted that there is nothing in the Advanced Fatigue Management (AFM) option that prevents any of these proposals. However, there may be significant time and expense incurred by any individual operator developing such a proposal. It was therefore agreed that the group should explore the possibility of allowing these measures within BFM provided adequate safety could be demonstrated.

This paper considers the following amendments to the BFM option.

1. Continue to allow the possibility of split rests under the AFM option. This represents the status quo on this matter, though analysis undertaken as part of this exercise has contributed to the body of knowledge on split rests and may contribute to the development of future AFM proposals.
2. Amend BFM option to allow an alternative 14-day cycle. It would contain the same requirements as the current option with the following exceptions.
 - The requirement for a 24-hour rest after no more than 84 hours work time is removed.
 - The requirement that drivers must have at least one 48-hour break in any 14-day period is added.
 - The requirement that at least six of the minimum seven continuous hours of night rest must be taken between the hours of 9 pm and 9 am on each work day is added.
3. Amend the definition of ‘night rest’ such that the night rest period can start at 9 pm to enable more early starts.

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1. INTRODUCTION

1.1 Fatigue reform

The Heavy Vehicle Driver Fatigue reform, which introduces a new three-tier approach to managing heavy vehicle driver fatigue, was agreed by Ministers of the Australian Transport Council (ATC) in February 2007. It was implemented in four states (Queensland, New South Wales, Victoria and South Australia) on the 29 September 2008.

The reform has four key characteristics.

1. The introduction of a ‘general duty’ on all parties in the transport supply chain. All parties must take ‘reasonable steps’ to ensure that their actions do not cause a driver to drive while fatigued.
2. ‘Chain of Responsibility’ requirements which ensure that parties do not simply contract out of their obligations and leave it up to the driver to balance his or her fatigue risks with productivity demands.
3. Enhanced record keeping requirements.
4. A work-and-rest-hours regime based on a scientific analysis of fatigue, which introduces the notion of risk management by allowing three options for work and rest hours.

This paper focuses solely on the fourth characteristic – the hours of work and rest.

2. BACKGROUND

2.1 Current work and rest options

There are three different work and rest options.

1. Standard Hours is the default option, which sets out prescriptive work and rest hours with a focus on regular night time rests to manage fatigue.
2. The Basic Fatigue Management (BFM) option allows some additional flexibility (compared with Standard Hours), and in return an operator must put in place a risk management system (as part of accreditation requirements¹).
3. For operators with unique operating conditions, the Advanced Fatigue Management (AFM) option allows them to propose their own work and rest times within prescribed outer limits to suit the individual requirements of their operation. These operators must put in place a risk management system (as part of accreditation requirements) and have their proposal supported by the advice of a fatigue expert. This helps to ensure that their system and processes identify and manage risks associated with driver fatigue.

¹ Regular audits, medical assessments of drivers and training for key staff are mandatory requirements of accreditation.

2.2 Implementation of the reform

The fatigue reform was introduced in South Australia, Victoria, New South Wales and Queensland in October 2008.

At 1 May 2009 there were approximately 500 operators in BFM and over 5,000 drivers². Just over half of these are in Victoria. It is likely that this difference in uptake is due to the six-month transition period in Victoria, which provided greater incentive for operators to be accredited early. The transition period finished in April 2009. Overall, it is too early to compare whether the uptake of BFM is as it was originally anticipated. Currently there are nine nationally approved AFM applications.

2.3 Implementation issues

A former NSW Minister raised some concerns about the current laws with the NTC in 2009. The NTC sought advice on these and other key implementation issues from its fatigue working group. The group comprises representatives from the road transport industry, unions and the NSW regulator. A comprehensive list of issues was created and several of these were ultimately referred to the NTC as requiring a national approach.

The NTC formed a small BFM review working group to consider these issues and to determine whether there was merit in developing a national proposal to address them. In consultation with the working group, the NTC:

- identified three key issues relating to the basic fatigue management regime
- discussed alternatives around the three issues
- sought fatigue expert advice
- worked with industry and experts to put forward the proposals contained in this paper.

² Based on information provided by road transport regulators.

3. KEY NATIONAL ISSUES

The three key issues investigated by NTC each relate to the hours of work and rest available under the BFM option. The issues are:

1. split rests
2. 14-day cycle
3. early starts.

3.1 Split rests

Under BFM, drivers are required to take a seven-hour continuous rest break within a 24-hour period. Earlier advice from fatigue experts indicated that the previous fatigue laws did not allow sufficient sleep opportunity in a 24-hour period, so the rest break was extended from six hours in the old regime to seven hours in the current model law.

However, in developing the current model law, it was recognised that there may be legitimate circumstances where drivers were simply unable to effectively convert this sleep opportunity into sleep (due to heat, noise, disturbances, etc.) and that there would be merit in allowing a driver to occasionally ‘split’ the continuous rest into two blocks. From a fatigue management point of view, any splitting of the seven-hour rest would need to compensate for the broken nature of the rest and ensure that it could not be exploited by unscrupulous operators purely for a profit motive.

A ‘split rest defence’ was therefore created which allows the driver to avoid prosecution for not taking a seven-hour continuous break if they can demonstrate that:

- they are the sole driver of a regulated heavy vehicle under the BFM option
- they took a six-hour continuous rest and a two-hour continuous rest break within the same 24-hour period
- they did not take a split rest in the previous 24-hour period.

The limitations of this provision is that it is only a defence. The driver can only use it in court as a defence to avoid prosecution for not taking a seven-hour continuous rest break. In addition, the rest break can *only* be split into one six-hour and one (or more) two-hour components. The split cannot, for instance, be taken as two four-hour breaks (and so on).

The proposal put to NTC sought to reassess the capacity to safely split rests without having to rely on the existing legal defence.

Industry case study #1

While a seven-hour rest is desirable in most circumstances, some transport operators encounter circumstances where it simply may not be possible to convert much of the seven-hour period into sleep or useful rest. Many drivers operate for extended periods away from home and argue that even with the best scheduling arrangements, it may often be necessary to take the rest in the sleeper-cab of the truck at roadside. The physical size of the truck, legal restrictions on parking and access to quiet areas, or lack of rest areas, etc. may mean that there are very limited suitable locations for rest. In these circumstances the driver is vulnerable to disturbances that prevent lengthy blocks of sleep, including extreme weather conditions, noise from vehicles, livestock, refrigeration units or other disturbances which cannot be controlled. They argue that where disturbance cannot be controlled, they should have the option of moving the vehicle to a more suitable location and taking a second block of rest in circumstances where good rest can be achieved, while still getting 'credit' for the first block of rest.

3.2 Fortnightly cycle

The BFM option under the current model law has replaced the Transitional Fatigue Management Scheme (TFMS), which was available under the previous fatigue laws. The TFMS regime was criticised by fatigue experts for failing to adequately manage night work and continuous long working days. As a result, a key change introduced through BFM was to introduce limits to the number of days that could be worked consecutively. This is achieved through the '84 hour rule', which requires a 24-hour continuous rest after 84 hours of work.

Critics argue that the weaknesses of TFMS could have been addressed in a way which maintained the option of working 12 days straight, then having two full days off (a 14-day cycle). In particular it is argued that by restricting night work and the hours worked in any 24 hours, the ability to work 12 days straight at low fatigue risk could be preserved.

Industry representatives contend that a 14-day cycle with a significant rest period at the end of twelve days provides better quality of life (more family time, etc.) than does 24 hours off after 84 hours of work.

The proposal put to NTC sought to reassess the capacity to safely work a 14-day cycle by introducing restrictions on night work and hours worked in any one day.

Industry case study #2

During grain harvests many truck drivers need to work a considerable distance from home. Under existing BFM limits, they might typically work eight or nine hours a day, entirely during daylight hours. The '84 hour rule', which requires a 24-hour continuous rest after 84 hours of work, means that they might need to take a 24-hour break after nine or ten days. If the harvest is not completed, they might need to take the 24-hour break away from home and continue working the next day. Drivers argue that the 24-hour break is often taken in a remote area which they find leads to boredom and frustration rather than rest and recovery. They argue that given minimal risk of fatigue associated with eight or nine-hour days and good night rest opportunities, there would be benefit in pushing back the 24-hour rest requirement until the drivers had the opportunity to take a longer rest at home. Allowing a 14-day cycle where drivers could work up to 12 days in a row would help in this instance.

3.3 Early starts

As discussed above, the BFM option sought to address some of the fatigue risk issues associated with the earlier TFMS regime. In doing so, restrictions were placed to ensure adequate rest during the night period – a period where the human body is particularly at risk from fatigue. In developing the new laws, fatigue experts advised that the ‘night’ period when drivers would most benefit from restorative sleep was between the hours of 10 pm and 8 am. It was deemed that taking seven hours rest in this period is optimal from a fatigue point of view (there is a high likelihood of converting rest into sleep).

The regional transport industry is traditionally an ‘early start’ industry, particularly during the summer months and when dealing with stock. This means that there is a preference for drivers to start as early as 3 am or 4 am. The current hours for a ‘night’ rest (10 pm to 8 am) mean that drivers can only start at 5 am on these days (with a seven-hour continuous night rest starting at 10 pm) if they are to meet the four night rests requirement each fortnight. In addition, drivers are capped at 36 night/long hours, which means that they cannot exceed 36 hours a week driving between 12 am and 6 am or beyond 12 hours a day.

Critics argue that drivers (particularly in rural areas) have become accustomed to going to bed early and getting up early and that the 10 pm to 8 am window places unreasonable limits on their capacity to start early whenever they deem necessary. It is argued that simply shifting that window to start at say 9 pm would allow drivers to start work at 4 am and still achieve adequate restorative rest.

The proposal put to NTC sought to reassess the safety of shifting the night rest window so that it commences at 9 pm rather than 10 pm.

4. STATEMENT OF ISSUES

The asserted issue is that there is a lack of flexibility within the BFM option caused by:

- limitations on split rests
- inability to work a 14-day cycle
- limitations on very early starts.

This lack of flexibility results in safety and productivity disadvantages. Some businesses will adjust rosters and try to work within the standard hours option. This may deny productivity and safety improvements that could be available with increased flexibility. Other businesses will seek to operate under the AFM option thereby imposing a cost.

4.1 Analysis of the issues

To meaningfully investigate the issues and options for addressing them, NTC sought expert advice.

The expert advice was garnered from industry, government and academia. An advisory group was formed comprising:

- The Australian Trucking Association
- NatRoad
- The Livestock and Bulk Carriers Association
- The NSW Roads and Traffic Authority
- The Transport Workers Union
- Dr Adam Fletcher (fatigue expert).

To ensure a practical perspective, the meetings were attended by several business owners who were members of the associations. While the group is small, it represents a microcosm of a much larger and very diverse industry. The size and composition of the group enabled it to provide a level of input and analysis that would ensure that any *national proposal* to change the model law was well thought through and grounded in the realities of business needs and fatigue science.

Given that the research on the effects of fatigue is not definitive, the fatigue risk issues were referred to a small panel of prominent fatigue experts rather than rely solely on one expert. The panel was asked to prepare a report on the relative fatigue risks associated with the possible changes discussed in Section 3 of this paper.

The advisory group identified key limitations and proposed more flexible options based on their business needs. For example, a clear message arising from discussions was that many businesses were trying to manage fatigue by reducing or eliminating night shifts. This enabled the group to develop a proposal that permitted up to 12 days of working, but involved little or no night work. Proposals such as this were given to the fatigue experts to jointly consider.

4.2 Assessing ‘worst case’ scenarios

The inherent difficulty in developing new combinations of work and rest is the need to identify ‘worst case’ scenarios and investigate what risks might arise if every limit was regularly reached, however unlikely this might be. The fatigue experts identified particular scenarios and discussed the fatigue risks associated with the worst case exploitation of the proposals. Importantly, under both the current Basic and Advanced Fatigue Management options, training and accreditation requirements are designed to educate businesses and drivers about fatigue risks and their safety risk management legal obligations. While the requirements for training and accreditation should reduce the risk of drivers and operators pushing the limits, our analysis necessarily takes account of the worst case use of the hours available. It should also be noted that there is a general duty imposed by the fatigue management legislation on drivers not to drive while fatigued and on parties in the chain of responsibility to take reasonable steps to ensure that a driver does not drive whilst fatigued. The fact that a driver is compliant with work and rest limits is unlikely on its own to be sufficient to discharge these duties.

5. ADVICE FROM FATIGUE EXPERTS

Based on consultation with the advisory group, the fatigue experts produced a draft report covering each of the issues raised. That report is available at www.ntc.gov.au. A summary of the proposed changes and the expert panel's views are presented below.

5.1 Expert views on split rests

Following advice from the advisory group, the proposal that the expert group considered for allowing split-rests was:

- split rests 'as of right' (not as a defence)
- split be taken as a 6-hour/2-hour split
- the longer part of the rest must be taken away from the truck or in an approved sleeper berth
- cannot schedule a split rest
- cannot split rest on consecutive days
- cannot split mandatory night rests.

A summary of the expert panel's analysis is as follows.

- While the split-rest option would increase rest from a minimum of seven hours to eight hours rest per 24 hours, breaking the rest into two periods will decrease the value of this additional rest.
- There is little chance of each block being effectively converted to sleep.
 - An earlier study showed that for drivers working any shift other than permanent day shift, nearly all drivers achieved between four and five hours sleep per 24 hours, a level not considered sufficient to sustain safety over consecutive days.
 - Another study showed that drivers who were required to have a minimum of eight hours off-duty time had an average of 5.18 hours in bed and obtained an average 4.78 hours sleep.
- A key concern is the time of day that each part of the split rest is taken. This is because research on the timing of naps shows that drivers who nap during the circadian trough period (4 am – 6 am) are more likely to experience sleep inertia that adversely affects performance. Naps of one to two hours duration are more likely to produce sleep inertia than shorter naps.
- There would need to be controls in place to ensure that split-rest risks are managed. These controls should include:
 - how often splitting rests should be allowed
 - the time of day that each part of the split can occur.
- Under AFM, with an appropriately argued case for reducing any increased fatigue risk, splitting of rests could be safely managed.

5.2 Expert views on 14-day cycle

- There was little agreement between the experts on the proposal for 14-day work/rest cycles.
- An AFM option for a 14-day cycle would need to include a greater number of offsets that will ensure rest is increased during the cycle or other risk offsets.
- Controls or offsets must be included to balance the increased fatigue risk that will occur for drivers who are not able to have a full 24-hour off-duty period every seven days. Extra controls could include shorter shifts, timing of shifts and longer rest periods between shifts.
 - Shorter shifts – the increased fatigue risk due to consecutive days work could be managed through shorter work shifts. For example, 10 or 11 hour work periods would allow more time off for rest in each 24 hours so reducing the need for a full 24-hour period off duty.
 - Timing of shifts including limiting night driving or only working during the day would also manage increased fatigue risk as it would allow opportunity for night rest, which is more restorative.
 - Longer rest periods between shifts – this control would have the same benefit as shorter working shifts and would allow more time for restorative rest.

As a result of the expert views, the advisory group provided an amended proposal that focused on some of the controlling offsets. That proposal mirrored the existing BFM options with three key differences:

- the requirement for a 24-hour rest after no more than 84 hours work time (allowing up to 12 days straight work) would be removed
- drivers must have at least one 48-hour break in any 14-day period
- at least six hours of continuous night rest must be scheduled (or taken) between the hours of 9 pm and 9 am on each work day (this may be part of the minimum seven consecutive rest hours which would continue to be required).

In essence, the proposal sought to allow a long period of consecutive working days (12) while ensuring good night rest opportunities throughout the working period.

The proposal was referred back to the expert group. The group's response was generally supportive, except for some disagreement on the proportion of the rest between shifts (a minimum of seven hours) that should be taken at night (proposed minimum six hours of seven hours continuous rest) and whether the night window (proposed 9 am to 9 pm) needed to be altered to something more restrictive.

5.3 Expert views on early starts

The expert report stated:

This option gained the most agreement in the review group. The group agreed that changing the definition of night rest would address the need for some operators to work outside the designated night hours (22:00 – 08:00 hours). It was proposed, therefore, that this item be included in the NTC's general list of

maintenance items for reconsideration as part of the whole fatigue legislation package.

DISCUSSION POINT

While the advice of experts is helpful, it is not definitive and can only offer advice on risk levels rather than a robust conclusion about safety (and indeed, practicality).

Stakeholders are invited to contribute comments on risk analysis to complement the advice from the experts. Are there any alternative approaches to risk analysis that may be more compelling than what has been generated to date?

6. PROPOSED APPROACH

While there was not strong consensus on all issues, there is sufficient alignment to put a proposal for national consideration. Consistent with Council of Australian Government (COAG) requirements, it will be necessary to consider the impacts of any proposal. The discussion point below is intended to prompt further discussion on impact analysis.

Based on the discussion above, and the more detailed discussion in the expert group's draft report the preferred approach is as follows.

1. Continue to allow the possibility of split rests under the AFM option. This represents the status quo on this matter, though analysis undertaken as part of this exercise has contributed to the body of knowledge on split rests and may contribute to the development of future AFM proposals.
2. Amend the BFM option to allow an alternative 14-day cycle. It would contain the same requirements as the current option except:
 - the requirement for a 24-hour rest after no more than 84 hours work time is removed
 - the requirement that drivers must have at least one 48-hour break in any 14-day period is added
 - the requirement that at least six of the minimum seven continuous hours of rest must be taken between the hours of 9 pm and 9 am on each work day is added.
3. Amend the definition of 'night rest' such that the night rest period can start at 9 pm to enable more early starts.

DISCUSSION POINT

These proposals have been developed based on the limited consultation inputs of the working group to date. There may be alternative ways to meet the desired outcome – for example, the 14-day cycle could remain as a possibility under the AFM option. Are there other options that would meet the needs of industry and yet retain consistency with the expert advice received so far?

7. INDICATIVE COSTS AND BENEFITS

Even relatively minor changes such as those discussed above have impacts. The key proposal emerging from the discussion above is to alter the BFM option to allow for the 14-day cycle.

The BFM option requires participants to be accredited. Accreditation requirements include important safety measures such as medical assessment of drivers, training, auditing, etc. Therefore, companies operating under BFM are likely to be capable of better identifying and managing risk and be safer companies.

The emphasis in investigating the feasibility of the proposed change through expert advice was to ensure that there is no net negative safety impact (or safety cost). Based on the advice to date, it can be asserted that the safety cost is zero, or that there is a small safety benefit.

The other possible benefit relates to business efficiency and productivity. It is argued that the 14-day cycle will lead to higher levels of driver satisfaction and therefore better driver retention. It also offers more flexibility to businesses whose drivers are constrained by the current requirement to take 24 hours off after no more than 84 hours of work time. If more operators are attracted to accreditation under BFM because of identified productivity or efficiency gains, this will lead to both safety benefits and productivity/efficiency benefits being enjoyed by a greater proportion of the industry.

The NTC and stakeholders consulted to date have not yet been able to identify significant costs arising from the proposal. There may be some small cost in educating the truck community about the new option.

An alternative approach that leaves the 14-day cycle as a possibility under the AFM option would introduce marginally different costs and benefits.

DISCUSSION POINT

The proposed approach makes a marginal change to one aspect of a significant safety reform. Whatever the exact quantum of costs and benefits, they are likely to be small. Is there value in seeking to further quantify these costs and benefits? What methodology might be used? Are there alternative approaches which can be justified by pointing to costs and benefits?

8. NEXT STEPS

NTC is inviting feedback to this report, and particularly on the discussion points raised. Feedback will be analysed and used to finalise this report for the Fatigue Maintenance Group. The Fatigue Maintenance Group will consider the changes in late October and recommend actions for each of the options presented. The timing of improvements to the Basic Fatigue Management option will depend on the activities for establishing the National Heavy Vehicle Regulator (NHVR), and will be determined in consultation with the NHVR project office and regulators from the states and territories.

ALTERNATIVE OPTIONS FOR BASIC FATIGUE MANAGEMENT

FATIGUE EXPERT GROUP COMMENTS

1. INTRODUCTION

The National Transport Commission (NTC) is undertaking a re-evaluation of the work and rest parameters for the Basic Fatigue Management (BFM) option of the Heavy Vehicle Driver Fatigue Reform. It has been claimed that some of the work/rest requirements discourage participation in BFM, resulting in large numbers of operators remaining in the Standard Hours regime.

2. BACKGROUND

The approach to date has been to form a small, but diverse, group of stakeholders to generate some options for improving the work/rest breakdown within BFM. The work of the group has been undertaken in collaboration with a registered fatigue expert (Dr Adam Fletcher of Integrated Safety Support). Several options have been proposed and discussed resulting in some reasonably refined options that have been summarised by the NTC. These formed the basis for the Review.

3. SCOPE OF THE FATIGUE EXPERT REVIEW

The NTC convened a group of fatigue experts on 21 September 2009. The Review group included: Prof Drew Dawson, Dr Adam Fletcher and Prof Ann Williamson. The Review involved two tasks: to provide advice on the range of solutions to issues raised with the current BFM parameters (raised in the 20 July 2009 document), and to provide advice on the potential fatigue risk, and the appropriateness of the proposed countermeasures to mitigate that risk. In addition, the group was asked to provide advice on the feasibility of developing a simple table to identify areas of flexibility and the offsets required to safely manage that flexibility.

Specifically, the proposed solutions offered for assessment were:

1. Split-rest option

The proposal for allowing split-rests is:

- Split rests 'as a right' (not as a defence).
- Split be taken as a 6/2.
- The longer part of the rest must be taken away from the truck or in an approved sleeper berth.
- Cannot schedule a split rest.
- Cannot split rest on consecutive days.
- Cannot split mandatory night rests

The specific questions relating to this issue that were asked are:

- is this acceptable within the current framework?
- if not, then what further controls would be needed to maintain safety at acceptable levels?
- what would be the implications of altering the split from 6/2 to 5/3?

2. 14-day cycle

The proposal for allowing a 14-day cycle is:

- 2x24 hour rests in a 14-day period.
- 2x consecutive night rests in each 7-day period.
- Maximum 84 hours work in each 7-day period.
- Maximum 144 hours work in 14 days.

The specific questions relating to this issue were :

- are additional controls needed to manage night/long hours?
- and if so, what controls can be used?

3. Extending hours for 'night time rest'

The proposal for extending the time within which a 'night time' rest can be taken is to change the window for a night time rest from 10pm-8am to 9pm-9am.

The specific questions relating to this issue that were asked are:

- what is the likelihood that the additional hour (9pm-10pm or 8am-9am) will be converted into a sleep opportunity and what are the consequences if this is not converted into sleep?
- what is the additional fatigue risk associated with only getting sleep/rest for 4 hours during the 12-6am period (instead of 5)?
- what is the additional fatigue risk associated with a driver starting work during a potentially higher risk time (early hours of the morning) on a regular basis?
- what are the combined effects of these issues?

4. RESULTS OF THE FATIGUE EXPERT DISCUSSION

General

The Review group took the view that the first two proposed changes to BFM should be addressed in AFM rather than amending BFM. In part, this was because the new system of regulation already allows for any operator to propose specific work/rest hours (including 14-day cycles and/or the use of split rests). This operator-tailored approach is implicit within the AFM option, and can be used for all of the items being discussed as part of the potential BFM review. Also, given that the context of an operator's system is critical, especially for AFM applications, it was not considered as valid to look at work/rest hours in isolation from the context(s) of use. Said another way, while still being a valuable set of controls the work/rest hours associated with any AFM application (and

to a lesser degree, any BFM application) is less of a contributor to the overall safety and efficiency of an operator's system than in Standard Hours.

AFM applications require a case to be made to explain how any likely increase in fatigue risk due to the specific change to work/rest could be reduced by specific compensatory changes to offset the increased risk. For example, the case would need to show how split rest would be taken to ensure that drivers can obtain sufficient sleep and rest.

1. Split rest option

The Review group acknowledged that the split-rest option contains some offset of rest as it would increase rest from a minimum of 7 hours sleep per 24hrs to 8 hours, however breaking the sleep in to two periods is likely to decrease the value of this additional rest. This concern is based on previous research which demonstrated that truck drivers do not get sleep hours equivalent to the hours of rest available. A field study of drivers working within a context of 6 hours per 24 as a minimum opportunity for sleep (as per the previous work-rest regulations) provides some evidence of rest obtained by truck drivers under operational conditions. In summary, this study showed that for drivers working any shift other than permanent day shift, nearly all drivers achieved between 4 and 5 hours sleep per 24 hours, a level not considered sufficient to sustain safety over consecutive days. (See Appendix A below for additional detail, or the original research report:

Williamson, AM. Friswell, R. Feyer, A-M. Fatigue and performance in heavy truck drivers working day shift, night shift or rotating shifts, NTC Research report, December, 2004.)

In addition, a US field study of truck drivers (Mitler, et al, 1997) showed that drivers who were required to have a minimum of 8 hours off duty time had an average of 5.18 hours in bed and obtained 4.78 hours sleep on average (electrophysiologically verified) which the authors argued is less sleep than is required for alertness on the job. The study showed that sleep efficiency was high and many drivers supplemented the single period of sleep with a nap which added around 0.45 hr to their total sleep. Importantly, both studies showed that less sleep was obtained for night work when rest was obtained during the daytime.

These results suggest that even 8 hours rest time may be insufficient for rest and recovery in truck drivers. They also suggest that when allowed a shorter period for sleep, such as for Australian truck drivers, drivers will use more of it for sleep. This means that drivers who have split rest may not suffer significantly reduced sleep than obtained in the 7 hours required under Standard hours, and with an additional 2 hours allowed for rest in the second half of the split, they may obtain more sleep than Standard hours. One concern here is the time of day that each part of the split rest is taken (Milner and Cote, 2009). Research on the timing of naps showed that naps taken in the circadian trough period (04:00 – 06:00 period) are more likely to have a problem of sleep inertia and so adversely affect performance. Naps of one to two hours duration are more likely to produce sleep inertia than shorter naps.

Answers to questions:

- Is this acceptable within the current framework?
Yes, under AFM with an appropriately argued case for reducing any increased fatigue risk due to the splitting of rest.
- If not, then what further controls would be needed to maintain safety at acceptable levels?
The controls that would be needed to ensure that Split rest is allowed would include:
 - how often this would be allowed (probably rarely),
 - the time of day that each part of the split would occur. The best arrangement for Split rest would involve both sleep periods occurring during the time of day when sleep is most likely and beneficial, that is, the long period spanning as much of the midnight to dawn period as possible and the short period occurring during the afternoon circadian trough period. If this was not possible and the long period must occur at another time, the short split period should be taken early in the midnight to dawn circadian trough rather than late in this period. The delay between long and short splits should be shorter if the long sleep period occurs during the daytime as the quality of sleep obtained will not be as good as if the sleep was obtained during the night period.
- What would be the implications of altering the split from 6/2 to 5/3?
This would require a work-rest schedule that carefully outlines:
 - how often this would be allowed (probably very rarely),
 - the time of day that each part of the split would occur.

2. 14 day cycle

There was less agreement between the Review group on the proposal for 14 day work/rest cycles. Prof Williamson commented that the proposed option did not seem as safe as what exists within the Standard Hours, or what could be created within an AFM system. Prof Dawson indicated that this issue, like that of split rests, should be considered on a case-by-case basis related to AFM applications. He acknowledged that the proposal requirements were more difficult to comply with than the Standard Hours requirements, but that he was not convinced that they were necessarily any safer than them. Dr Fletcher indicated that, given the responsibilities and accountabilities that are required within BFM and AFM, he was comfortable with the proposed hours, given they could be further assessed to look at possible roster combinations that would comply or break the option (with the broader stakeholder group). He was also interested in and committed to finding a safe solution that may potentially allow for the removal of the 36- and 84-hour rules, which have reportedly been very complex for drivers, operators, enforcement agents and regulators to work with. Mostly the group agreed that 14-day cycles were appropriate for use within AFM systems, for operators considered to have the capacity to safely use a 14-day cycle, and so could obtain additional operational flexibility for themselves and the drivers. An AFM for a 14 day cycle would need to include a greater number of offsets that will ensure rest is increased during the cycle and/or other risk offsets.

Answers to Questions

- Are additional controls needed to manage night/long hours?
Yes, as part of AFM. Controls or offsets must be included to balance the increased fatigue risk that will occur for drivers who are not able to have a full 24 hour free of work every seven days.
- and if so, what controls can be used?
Extra controls could include:
 - Shorter shifts – the increased fatigue risk due could be managed through shorter work shifts. For example, 10 or 11 hour work periods would allow more time off for rest in each 24 hours so reducing the need for a full 24 hour period off.
 - Timing of shifts including limiting night driving – only working during the day would also manage increased fatigue risk as it would allow opportunity for night rest which is more restorative,
 - Longer rest periods between shifts – this control would have the same benefit as shorter working shifts and would allow more time for restorative rest unless data can be provided to demonstrate that sufficient sleep is being obtained.

3. Extending hours for night time rest

This option gained the most agreement in the Review group. The group agreed that changing the definition of night rest would address the need for some operators to work outside the designated night hours (22:00 – 08:00 hours). It was proposed, therefore, that this item be included in the NTC's general list of maintenance items for reconsideration as part of the whole fatigue legislation package.

5. ADVICE ON A POSSIBLE ALTERNATIVE APPROACHES

Where the Review group recommended that the proposed changes to BFM would be managed better under the AFM option, a case will need to be made by individual or groups of operators who wish to make these changes. Although the AFM option requires a case to be made for each request, the Review group recognised that there would be benefit for all parties in the industry if more guidance was provided on ways of implementing split rest and 14 day cycles which have an effective balance between work and rest.

The expert group discussed setting up some guidance and examples for the most frequent problems that are emerging from the industry. For example, some advice on the relationships between work and rest that would enable the use of split rests and 14 day cycles has already been progressed to some degree.

References

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Milner, CE. Cote, KA. Benefits of napping in healthy adults: impact of nap length, time of day, age, and experience with napping. *Journal of Sleep Research*, 2009, 18, 272-281.

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Appendix A: Review of evidence on Australian truck driver sleep during continuous rest breaks

Provided by Professor Ann Williamson

One of the factors that must be considered in developing effective schedules for rest for long distance truck drivers is the amount and timing of rest. The change from 6 hours continuous rest in 24 hours to 7 hours continuous rest in 24 hours was made on the basis that 6 hours is insufficient time for an effective sleep opportunity as well as time for other personal activities (eating, showering etc). The additional hour gained in moving to 7 hours has the benefits of ensuring that drivers at least have the opportunity to obtain at least 6 hours of continuous sleep.

The evidence on the amount of sleep long haul truck drivers obtain in long breaks suggests that given a 6 hour minimum continuous break, drivers do not obtain 6 hours sleep. Williamson, Friswell and Feyer (2004) measured the sleep of 22 long haul drivers doing permanent day shifts, 21 drivers doing permanent night shifts and 11 drivers doing weekly rotating day and night shifts. Sleep was measured using Actigraphs and work-rest diaries over two full weeks. The results showed that sleep for drivers doing each work pattern was less than 6 hours on average (see excerpt from report below). Drivers had between 30 and 100 mins less sleep than the allocated 6 hours continuous rest opportunity.

This evidence indicates that it cannot be assumed that the long continuous rest period provides an equivalent sleep opportunity for long haul drivers. Drivers with the opportunity for 6 hours rest will not get 6 hours sleep. In reality, this research suggests that they may get as little as 4.33 hours in this period. This amount of sleep is below the level of sleep required to maintain safe performance levels (Dinges, Park, et al, 1997).

Primary research report reference:

Williamson, AM. Friswell, R. Feyer, A-M. Fatigue and performance in heavy truck drivers working day shift, night shift or rotating shifts, NTC Research report, December, 2004

Excerpt from Williamson, Friswell and Feyer, (2004) (pg 41)

Amount of sleep obtained in breaks

Analysis of the amount of time scored as sleep in each first break using the Actiwatch Sleep Analysis software (actual sleep) is shown in Table 16. The results showed little change in the amount of actual sleep obtained across the week for permanent day drivers who averaged approximately 5.5 hours per break in their first sleep of each break. Permanent night shift drivers tended to get 0.5 to 1 hour less sleep than permanent day shift drivers ($F(1,23)=6.30$, $p=0.02$), with the biggest difference following the second shift (Break 2) of the week. The interaction between shift and group was not significant, however.

There was little evidence of systematic change in sleep across the week for permanent day or night shift drivers. Rotating drivers on day shift averaged the least sleep of all the conditions on their first sleeps of the breaks, significantly less than on their night week ($F(1,5)=18.46$, $p=0.008$), with sleep tending to increase slightly across the week. This pattern of increasing sleep over the week was also evident for rotating drivers on night shift, but for both weeks the increase in mean sleep was less than 1 hour over the week.

See the table below for additional detail.

Table: Mean (SD, n) hours sleep obtained in the first sleep in each break between shifts for drivers in each group over a five shift work week.

Break	Day shift	Night shift	Rotating – Day	Rotating – Night
1	5:49 (1:26, 21)	4:55 (1:02, 19)	4:19 (1:13, 9)	5:07 (1:30, 9)
2	5:36 (1:07, 20)	4:24 (1:27, 20)	4:56 (0:41, 9)	5:25 (1:31, 10)
3	5:37 (1:02, 16)	5:13 (1:24, 17)	5:11 (0:50, 9)	5:46 (1:31, 10)
4	5:35 (0:59, 15)	4:43 (1:03, 16)	4:56 (0:48, 8)	5:46 (1:31, 10)
5	5:49 (0:46, 3)	5:19 (-, 1)	6:22 (-, 1)	