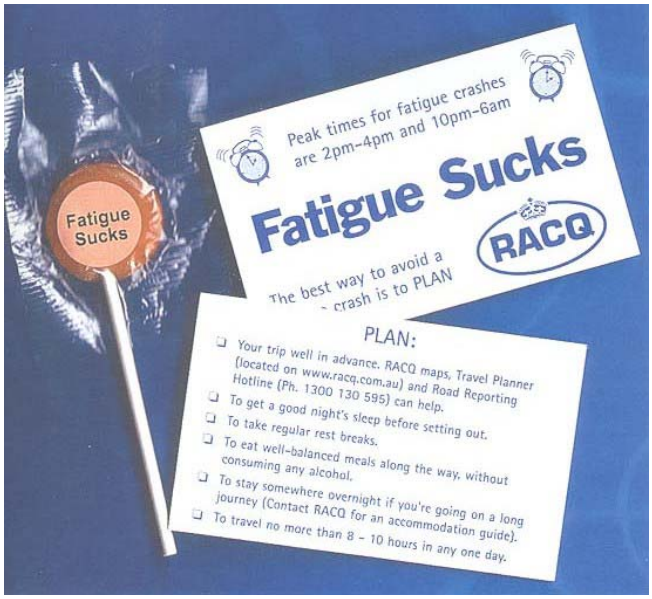
SUBMISSION

TO

PARLIAMENTARY TRAVELSAFE COMMITTEE:

INQUIRY INTO CRASHES INVOLVING
DRIVER AND RIDER FATIGUE
IN QUEENSLAND



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SUMMARY

Fatigue is often referred to as the hidden killer because many drivers are unaware they are experiencing its effects until it is too late. Fatigue is a major cause of road crashes.

High-risk times for fatigue-related crashes appear to be mid-afternoon and between midnight and dawn. Therefore young drivers, shift workers, heavy vehicle drivers and drivers who suffer from sleep disorders are especially at risk for fatigue-related crashes.

While fatigue management programs, driving hour restrictions and chain of responsibility legislation have been introduced to address fatigue problems in the heavy vehicle industry, fatigue is particularly difficult to detect and enforce for the private driver.

Current research and development, through advances in technology, are exploring ways in which a driver can be monitored and warned of the onset of fatigue. But until there is widespread availability of reliable technology that enables a driver impaired by fatigue to be alerted and/or detected, public education and advertising campaigns will continue to be necessary to make all drivers aware of the dangers and early warning signs of fatigue and what they can do to minimise the risks of driving while tired.

Other current and past measures used in Queensland to combat fatigue-related crashes include education and advertising campaigns, engineering approaches (such as rest areas, rumble strips, road duplication, audio-tactile line-marking and wider sealed road shoulders), driver reviver program and fatigue management programs for heavy vehicle drivers.

It is important to keep in mind that many of these measures only help reduce the risk of having a fatigue-related crash. They don't address the core problem in that quality sleep remains the only real cure or preventative measure for fatigue.

RACQ regularly reminds motorists about the dangers of driving tired and how to manage fatigue through various means, including:

- media releases, particularly prior to holiday periods and long weekends;
- maps and leaflets identifying the location of rest areas and driver reviver sites;
- accommodation bookings for motorists planning to travel;
- a web-based *Travel Planner* (www.racq.com.au) identifying travel routes and times including when to take a rest break;
- *Road Conditions Report* service and *Road Reporting Hotline* advising motorists of any travel delays; and
- safety advice and information on driver fatigue on RACQ website; and
- the RACQ's club magazine, *The Road Ahead*, also runs articles on fatigue-related topics.

RACQ has also been involved in specific campaigns that provide fatigue-related information and advice in a format which motorists can take with them when they are driving. Recent initiatives involving RACQ include the *Fatigue Sucks* campaign (2003 Easter holiday period) and the "*Fatigue Busters*" travel diary initiative (2003 Christmas holiday period).

In its *Road Safety Priorities* launched earlier this year RACQ discussed how a 'whole of government" approach is required to ensure that all government departments and agencies, industry and community stakeholders are provided with the appropriate guidance, support and awareness in relation to:

- major road safety issues;
- their roles and responsibilities in delivering road safety outcomes; and
- being aware of what others are doing.

Fatigue is a major road safety issue and all efforts directed towards reducing its impact on the road toll will benefit from improving the working relationships between relevant authorities, organisations and the community.

While fatigue is recognised as a major crash factor that needs to be addressed, we must not lose sight of the other factors that contribute to driver and rider crashes on Queensland roads. Therefore it is important that a strategic approach is used to address all those factors and to prioritise and allocate funding to programs and initiatives that are most effective in reducing road trauma.

For instance the *National Road Safety Strategy* has estimated that a 19% reduction in Australia's road fatality rate per 100,000 population by 2010 could be achieved by improving the safety of roads.

Road-based countermeasures installed to address fatigue related problems have the advantage in offering benefits to many other contributing factors to crashes, particularly those which cause vehicles to leave the road and collide with fixed roadside objects.

Unfortunately existing road funding programs do not go far enough to cover the ever-increasing backlog of sites requiring attention on all categories of roads at the national, state and local levels. More funds need to be allocated to federal programs such as *Black Spot Program* and *Safety and Urgent Minor Works Program*. It is also important to keep funding for safety works separate from maintenance so expenditure spent on fatigue countermeasures is accountable and projects can be monitored and evaluated.

List of Recommendations

- RACQ believes that the community, particularly identified target groups be encouraged to change their beliefs and behaviours:
  - about the dangers of driving when fatigued (e.g., motorists driving in rural and remote areas);
  - not to depend on unreliable or short-term remedies to offset the symptoms of fatigue; and
  - how to manage the fatigue problem, e.g., treatments for sleep disorders, preparing and planning trips, taking regular breaks en-route, getting adequate sleep including power naps (minimum 15 minutes), campaigns for overseas visitors and commercial drivers.
- Further research the factors leading to fatigue-related crashes, including categories of road users most at risk.

- Consider methods and/or powers for police to stop a driver from continuing to drive if they are deemed to be a high risk endangering their own or other people's lives. Issues to address include:
  - lack of means to identify how long drivers have been driving for without any sleep as they are not required to maintain a log of driving hours;
  - many drivers are and would be unaware of their level of impairment and their ability to drive. While there has been research and studies equating lack of sleep to equivalent BAC levels for alcohol impairment, there are no accurate guides to impairment levels for fatigue, as there are with alcohol and standard drinks; and
  - present lack of an accurate means for police to assess or determine a fatigued driver's or rider's level of impairment.
- Further encourage the implementation of best-practice fatigue management programs that ensure safe working conditions in the workplace.
- RACQ supports the continuation of the *Driver Reviver Programme* and consideration of:
  - increasing the operating hours of relevant sites to cover the high-risk fatigue period during 10pm to 6am;
  - assisting local communities to deliver fatigue-awareness and prevention activities during non-holiday periods which may prove useful in increasing awareness amongst the local community, visiting drivers and motorists that fatigue is not just a problem during holiday periods or when driving long-distances.
- Investigate and test various types of audio-tactile devices and methods of installation for the range of road conditions in Queensland, e.g., practical application on new or existing pavements, and the stone and adhesion characteristics in western areas which experience extreme temperature variations.
- Identify and adequately prepare road locations for the appropriate treatments, e.g., widen and seal shoulders to accommodate the edge line or rumble strip.
- Allocate additional funding within existing road works programs to install audio-tactile devices more extensively.
- Adopt a research strategy of before and after studies of driver performance and crashes to develop a better understanding about the most appropriate road based engineering treatments according to location.
- Provide, enhance and promote road-based fatigue countermeasures, e.g., rumble strips, audible edge lines and a network of quality roadside rest areas at strategic locations along key travel routes adequately signed and marked on maps.
- Develop measures and devices that can monitor and detect driver fatigue from both inside the vehicle and the external environment.
- Investigate and implement measures to detect and enforce against fatigue impaired drivers, e.g., on-road automated camera surveillance systems (Safe-T-Cam) for heavy vehicles and buses.

- Expand the application of measures to further assist emergency services in promptly locating crash sites in rural areas, e.g., install roadside identifiers, expand mobile phone coverage

- Continue to investigate the application of in-vehicle global positioning systems (GPS) devices that notify authorities in the event of a crash or other emergency.

RACQ will reserve its comment on specific questions identified by the QPTC issues paper until the second round of submissions. These include the following:

- how fatigue should be defined;
- on whether Queensland should adhere to the ATSB's operational definition of fatigue;
- if there are better methods of identification; and
- on the success of various countermeasures in reducing fatigue crashes.

1.0 INTRODUCTION

While it has been known for some time that crashes can result from the driver falling asleep at the wheel, this issue has traditionally not received as much attention in road safety programs compared to alcohol or speed until recent years (Pack, Pack, Rodgman, Cucchiara, Dinges, Schwab: 1995).

While a lot has been done to address fatigue problems in the commercial and heavy vehicle industry, fatigue is particularly difficult to detect and enforce for the private driver and rider. Fatigue is often referred to as the hidden killer, because many drivers are unaware they are experiencing its effects until it is too late, and remains as a major cause of road crashes on Queensland roads.

On the 18th June 2004, the Queensland Parliamentary Travelsafe Committee (QPTC) invited submissions from the public as part of its media release announcing its inquiry into crashes involving driver and rider fatigue in Queensland. Under the inquiry's terms of reference, the QPTC (2004, p.2) will examine and report on the following:

- the involvement of driver and rider fatigue as a factor in road crashes in Queensland;
- the causes and symptoms of this fatigue; and
- legislative, enforcement, educational and other measures to reduce the incidence of fatigue-related crashes.

This submission provides RACQ's response to the questions raised by the QPTC's (2004) *Issues Paper: inquiry into crashes involving driver and rider fatigue in Queensland*.

2.0 RACQ COMMENTS

2.1 How should fatigue be defined?

Driver fatigue is usually referred to as driving tired or the driver experiencing a level of sleepiness when alertness and cognitive performance are diminished (slower reactions and impaired visual scanning) and the ability for them to drive safely is impaired significantly even before the individual falls asleep (Smith and Trinder: 2000, pp.3, 4).

Queensland Transport (as stated by QPTC: 2004, p.2) uses an operational definition of fatigue that includes, "crashes assessed by officers of the Queensland Police Service to be fatigue-related as well as single vehicle crashes on open roads during high-risk times (2.00pm to 4.00pm and 10.00pm to 6.00am)."

While Queensland Transport's operational definition of fatigue may be likely to understate the contribution of fatigue to crashes (QPTC: 2004, p.2), there is no guarantee that any of the approaches used by the Australian Transport Safety Bureau (ATSB) or other Australian states do not also possess similar limitations. In the future with the widespread introduction and acceptance of technology-based fatigue monitoring and detection devices built in to vehicles and roads, there may be opportunities for improving the quality of crash data collected for fatigue-related crashes.

From initial, informal discussions with representatives from Queensland Transport and the Queensland Police Service, RACQ is aware that both of these organisations have provided detailed discussion in their submissions to the QPTC (2004, p.3) on aspects of defining fatigue.

RACQ will reserve its decision on how fatigue should be defined until after considering the first round submissions of relevant stakeholders, e.g., Queensland Transport and the Queensland Police Service. This will be in the second round of submissions stage of the QPTC inquiry program.

2.2 Should Queensland adhere to the ATSB's definition of fatigue?

RACQ has a concern with the ATSB's operational definition's non-inclusion of certain crashes, even though police have reported fatigue to be a factor, based on exclusionary criteria (Dobie: 2002, p.22-24). ATSB (Dobie: 2002, p.25) recognises that their operational definition possesses some limitations and may exclude some fatigue-related crashes while including some crashes caused by other factors.

RACQ would also be concerned, with the effectiveness of the current method of identifying and recording fatigue-related crashes, if fatigue-related crashes were being under-reported to the extent it receives less attention than it deserves from the government and/or general public compared to other major contributing factors. In practice, RACQ is aware that fatigue has received increasing attention in recent years in terms of crash reporting and recognition since 1997 as one of the 'Fatal 4' driving behaviours on Queensland roads.

A consistent and rational approach of defining fatigue related crashes either using ATSB's and/or combination of other jurisdictions' definitions needs to address the under-reporting issue. This will not only quantify how fatigue is viewed in relation to other factors contributing to the road toll but also assist in evaluating the effectiveness of anti-fatigue interventions.

RACQ is open to a review of the current method and the possibility of changing the way fatigue is defined to improve the identification and reporting of fatigue-related crashes in Queensland. However, RACQ would prefer the opportunity to consider Queensland Transport's and the Queensland Police Service's responses to these questions before committing itself to opposing or supporting any change/s, including whether Queensland adheres to the ATSB's operational definition of fatigue. Therefore, RACQ will provide comment at a later stage, in its response to the QPTC's release of the second issues paper.

2.3 Is there a more effective method of identifying fatigue-related crashes in Queensland?

Evaluating whether or not fatigue is determined to be a contributing factor in a crash can rely to a certain degree on qualitative rather than quantitative analysis and the experience and sensitivity of the accident investigator. Haworth (as referred to in Edmonston et al: 2002, p.12) suggests it is difficult to isolate fatigue as a factor in crashes, particularly in more severe crashes as there is no commonly accepted definition or measure of driver fatigue.

Crash-reporting authorities at state and national levels - as reported by the House of Representatives Standing Committee on Communications, Transport and the Arts (HORSCCTA: 2000, pp.14-17) - use different approaches in identifying whether fatigue was a contributing factor in a crash. In Queensland, as previously highlighted, fatigue-related crashes are normally identified as single vehicle-type crashes (such as roll over or hit object) in 100km/h or over speed zones during typical fatigue times (2-4pm, 10pm-6am) or where police considered fatigue to be a contributing factor.

There is also recognition amongst road safety authorities and researchers that the current approaches (including that used in Queensland) used to identify fatigue in crashes is resulting in under-reporting of fatigue (HORSCCTA: 2004, p.14). However, as is the case with Queensland's and the ATSB's operational definition of fatigue, the other approaches may also possess some limitations and may exclude some fatigue-related crashes while including some crashes caused by other factors.

A certain proportion of crashes related to inattention and distraction could also involve a degree of fatigue, e.g., including crashes in which loss of concentration may have contributed to the crash increased the prevalence of fatigue in NSW crashes to 17% (Roads and Traffic Authority, NSW: 1993/1994; as cited in Haworth: 1998).

RACQ would be supportive of efforts by road safety authorities to more accurately identify crashes involving drivers affected by fatigue based on current methods available.

As well as exploring opportunities to improve the quality of crash data collected, there is also a need to improve communication and understanding between the road safety practitioners and data analysts to ensure that the raw data is not being misinterpreted and that the practitioners are being made aware of and provided with the most relevant and appropriate data. RACQ supports recent efforts by Queensland Transport to improve the way in which data for fatigue-related crashes is being analysed and publicly reported to road authorities and relevant stakeholders, e.g., availability and sharing of data using Webcrash2.

RACQ is aware of recent efforts by Queensland Transport to provide further analysis of fatigue-related crashes in terms of origin/destination of journey and where the driver and vehicle occupants lived. This, for example, may prove useful in better targeting fatigue countermeasures at specific locations.

RACQ will reserve its comments about if there are better methods of identification until after consideration of submissions from relevant stakeholders. This will be in the second round of submissions stage of the QPTC inquiry program.

2.4 Fatigue warning signs

In Queensland as in other states, road safety authorities and an increasing number of private organisations offer information and advice about 'fatigue' and driving while tired. For example, RACQ provides information identifying the common symptoms and warning signs of fatigue while driving, which include:

- yawning, heavy eyes, sweaty hands;
- droning and humming in ears;
- vehicle wandering across the road;
- daydreaming;
- unintentional changes in vehicle speed;
- pressure in the head and temples;
- stiffness and cramps; and
- delayed reactions.

Road safety authorities also provide information in the form of questions and checklists to assist a driver in identifying whether they are at risk of suffering driver fatigue. For example, RACV promotes the use of a *Driver Fatigue Checklist* that asks drivers the following questions to make sure that they are not too tired to drive (RACV: 2002):

- *Have you been getting full nights of restful sleep over the past week?* When you don't get enough sleep you acquire sleep debt. The only way to repay the debt is by sleeping.
- *Are you setting off on a trip after a good night's sleep, rather than after a full day at work?* Being awake for 17 hours has the same effect on driving as having a BAC (Blood Alcohol Concentration) of 0.05, doubling your risk of crashing. After 24 hours the BAC equivalent is 0.1, equating to a 7 times greater risk of crashing than someone who is well rested.
- *Are you planning to start your trip after 6am, rather than starting out earlier when you would normally be asleep?* Your body naturally wants to sleep between about 1am and 6am greatly increasing your risk of crashing, at those times.
- *Have you allowed time in your trip to stop and rest if you feel tired?* Regular breaks every 2 hours will help maintain vigilance, however, the only way to combat fatigue is to sleep.
- *Do you stop and have a "powernap" if you feel tired while driving?* Stopping for a 15 to 30 minute sleep or "powernap" when you are tired is effective in alleviating the short-term effects of fatigue, but ensure you allow time to recover from your sleep before commencing to drive.
- *Are you sure that you do not suffer from a sleeping disorder, such as sleep apnoea?* 2 percent of people suffer from the most common sleep disorder, sleep apnoea. Men over 50, particularly those overweight, are most at risk.

While these efforts to highlight the warning signs of fatigue have had an impact in raising the profile of fatigue as a 'big killer' on Queensland roads (Queensland Transport: 2004, p.1), RACQ remains uncertain as to the driving public's recognition and understanding of these factors, as well as their acknowledgement that driver fatigue is "not simply a

function of time spent driving" but that it relates to many factors including "hours of wakefulness" and time of day or night (RTA: 2004).

There is also evidence to suggest that motorists have difficulty in being able to comprehend the early warning signs of fatigue when actually driving, or in taking appropriate steps to reduce their risk of driving whilst fatigued (refer to next section for further discussion). Results of research involving drivers from New South Wales found that (Harrison: 2002, p.513) drivers associated "heavy eyes" and "falling asleep" as the first noticeable signs of fatigue and were less likely to recognise the cognitive signs of tiredness, i.e., reduced concentration etc.

2.4.1 How can drivers and riders be encouraged to use their knowledge about fatigue to change their behaviour?

Since the inclusion of driving tired as a major focus of road safety public education campaigns in Queensland, fatigue-related information and advice has been increasingly provided in various forms - such as pamphlets, brochures, television and radio public education campaigns. More recently with the introduction of the Internet, motorists have had even greater access to a broader range of resources from other states and around the world. RACQ provides fatigue-related information and advice in the following formats:

- location of rest stops on its travel and tourist information maps;
- travel advice and information in RACQ *Refresh* handbook;
- travel advice and information on RACQ website, including access to a Travel Planner;
- media interviews and press releases for holiday periods and long weekends; and
- specific driver fatigue campaigns, i.e., *Fatigue Sucks*.

Motorists have access to a wide range of information and advice on personal countermeasures to use against 'fatigue' and driving while tired, with an emphasis on holiday-related or long-distance driving. Current RACQ advice includes:

- getting plenty of sleep before taking long trips;
- taking regular breaks from driving – at least a 15 minute break every 2 hours of travel. Drivers should make use of rest areas, tourist spots and *Driver Reviver* stops;
- having only a light meal or snack prior to the journey, rather than a heavy meal;
- sharing the driving;
- not drinking alcohol, which will make you drowsy, before and during the trip;
- avoiding medicines that make you drowsy. Check with your pharmacist or doctor;
- not driving late at night or early in the morning; and
- breaking a long journey with an overnight stop.

RACQ also advises drivers who are suffering from extreme tiredness (and there is not another licensed driver in the vehicle) to pull over where safe to do so, lock the vehicle doors and sleep until refreshed.

Additionally, based on RACV information, the *RACQ Refresh* handbook warns drivers about the most common wrongly held myths about fatigue. These myths include (RACQ: 2004, p.13):

- *Coffee is the best way to combat fatigue.* Coffee only provides short-term benefits; once its effects wear off, you suffer from sleep rebound, which is a major cause of crashes.
- *Playing music will help keep me alert.* This is only a short-term benefit.
- *Young people need less sleep.* In fact, drivers under 25 years of age are over-represented in fatigue crashes.
- *I know I am tired, or when I am having "sleep attacks".* The danger is that you only find out how tired you are when it's too late.

Despite the availability of information and advice and improved public awareness, driver fatigue continues to be a major contributing factor to road crashes in Queensland. Many drivers continue to drive tired and are involved in fatigue-related crashes.

RACQ research results show that 52% of RACQ members surveyed admitted to driving tired at least once a year (MCR: 2003, p.86), with 30% stating that they drive tired a *few times per year or less often*. On average, RACQ members admitted to driving tired approximately 7 times a year, with males admitting to driving tired nearly twice as often as females. RACQ members over 40 years of age (56%) were more likely than their younger counterparts (38%) to state that they *never* drive tired.

The reasons why drivers continue to drive while tired are numerous and varied. Of greatest concern to RACQ is the general motorists' reluctance or inability to take appropriate steps to reduce their risk of driving whilst fatigued, i.e., pull over and get some rest or sleep. Research by Harrison (2002, p.513) found that participants viewed driving as an essential activity and concluded that any message that suggests restricting driving activity is likely to be disregarded by drivers.

Consequently, it is not surprising that drivers tend to have a preference towards using measures that they perceive will enable them to continue driving without a major impact on total journey time. Research commissioned by RACQ (MCR: 2003, p.89) shows that the most popular countermeasures employed by RACQ members when driving while tired were as follows:

- Wind down the window (61%);
- Pull over to eat or drink (60%);
- Pull over for some fresh air or exercise (56%)
- Get a good night's sleep the night before (55%);
- Talk to passengers (55%);
- Turn on the radio or music (54%);
- Change the driver (51%);
- Take a break every 2 hours (48%);
- Drink coffee (35%);
- Pull over to have a sleep (28%);

- Drink an energy drink, e.g., Red Bull (20%); and
- Turn on/up the air conditioning (2%).

While encouraged by the use of proven fatigue countermeasures (e.g., getting a good night's sleep) by motorists, RACQ has concerns over the high use of unreliable fatigue countermeasures (e.g., winding down the window) by many drivers, despite past and current public education campaigns that have repeatedly warned drivers of the dangers of relying on such measures to combat driver fatigue. Particularly since many of these unreliable countermeasures offer only short-term, if somewhat questionable benefits which at most may allow a driver to complete a shorter journey or drive to the nearest town on a longer journey. Even if these short-term measures keep a driver more awake for a little while, their reaction time may still be slower while driving and their susceptibility to suffer from micro-sleeps increased.

While appropriate fatigue management measures are being introduced and implemented in the heavy vehicle industry and increasingly by many employers striving to meet their responsibility of providing a safe workplace, there are still many drivers being left to their own devices in choosing and using ineffective countermeasures. In particular, the RACQ believes there needs to be a better awareness and understanding of accumulated sleep debt and sleep disorders.

RACQ also recognises that fatigue is not confined to drivers or the task of driving and that management of fatigue in many cases is reliant on a person changing their work, sleeping and eating patterns. Consequently, there needs to be more focus by authorities and organisations on providing and improving access to appropriate information and advice for those drivers suffering from sleeping problems. This information should inform drivers on how they can better manage and/or improve the quality of sleep they are getting. Researchers at the University of South Australia (2004) are studying the causes of sleep deprivation and ways to overcome these problems. This study also provides advice on how to better manage sleep and overcome difficulties for people having trouble obtaining sufficient sleep.

Recommendation

- RACQ believes that the community, particularly identified target groups be encouraged to change their beliefs and behaviours:
  - about the dangers of driving when fatigued (e.g., motorists driving in rural and remote areas);
  - not to depend on unreliable or short-term remedies to offset the symptoms of fatigue; and
  - how to manage the fatigue problem, e.g., treatments for sleep disorders, preparing and planning trips, taking regular breaks en-route, getting adequate sleep including power naps (minimum 15 minutes), campaigns for overseas visitors and commercial drivers.

2.5 What factors contribute most to fatigue-related crashes in Queensland?

Lack of sleep, time of day and time spent on task are seen as major contributing factors to fatigue-related crashes (QPTC: 2004, pp.4-5). These have been widely discussed and researched in the past decade.

There is increasing public awareness that many general day-to-day activities such as work, social activities and parenting responsibilities can contribute to tiredness while driving, not just holiday-related and long-distance work-related driving (Harrison: 2002, p.513). Other factors that can contribute to fatigue, drowsiness or inattention while driving include general health, age, alcohol, drugs, illness, medicines, stress, demanding physical or mental work, shift work, caring for children and the demands of daily living (ATSB: 2004, p.135).

Anecdotal evidence suggests that drivers continue to drive when they know they are tired as they see driving as an essential activity and are likely to ignore any restrictions on them continuing their journey (Harrison: 2002, p.513). Compounding this is the driver's inability to comprehend when they are "too tired" to drive, as well as their reliance on ineffective short-term countermeasures in order to continue driving.

Vehicle owners are also being presented with an increasing variety and number of devices that have the potential to increase the driver's workload while driving adding to driver fatigue, as well as being an additional source of distraction. Some of these devices include:

- driving aids such as satellite navigation systems;
- portable and mobile devices such as mobile phones, hand-held PDA's; and
- in-car entertainment devices, such as DVD players and in-vehicle games consoles.

There has been a lot of recent research undertaken to better understand the impact of in-vehicle distractions on a driver's workload, particularly with the use of hand-held and hands-free mobile phones.

While a lot of the fatigue-related information advises drivers to let fresh air into their vehicles, it is unknown as to whether many drivers are aware of the dangers of leaving their air-conditioning on recirculation. Research into vehicle gases and suicide has found that the poisonous build-up of gases in motor vehicle can have serious consequences for unwary drivers who leave their air-conditioning on recirculated air. RMIT researchers found the use of the recirculating function on ventilation systems can allow levels of oxygen to drop and carbon dioxide concentrations to increase, which can cause a range of symptoms from headaches to drowsiness, fatigue and poor coordination (Bishop: 2000, p.11). There is limited information provided to drivers on this problem in some vehicle owner manuals, e.g., drivers are advised not to use recirculated mode for long periods of time as it re-uses interior air (Holden: 1999, p.1-47).

Recommendation

- Further research the factors leading to fatigue-related crashes, including categories of road users most at risk.

2.6 High risk groups for fatigue

Local and overseas research have identified that there are certain groups of drivers that are more likely to engage in activities placing them at higher risk of suffering from driver fatigue. These groups include (QPTC: 2004, p.5):

- drivers in the transport industry;
- drivers travelling long distances;
- drivers in rural areas;
- individuals with medical conditions that limit their ability to sleep, e.g., sleep apnoea and narcolepsy; and
- people with busy lifestyles.

American studies have found young males and shift-workers to also be at high risk for drowsy driving, due to chronic sleep deprivation (NHSTA and NCSDR: 1999). Young people (particularly males aged under 30 years) are high risk because they have insufficient sleep due to lifestyle, maturation and exposure to driving between midnight and 6am (Smith and Trinder: 2000, pii). Some overseas jurisdictions have night-time driving curfews imposed at the provisional licence stage to minimise young driver's risk at these times. The issue of night-time driving restrictions is under consideration by the New South Wales RTA. Shift workers are also at high-risk as they attempt to fit sleep around work, family and social commitments. They work, drive home when tired and their sleep is usually limited and disrupted (Bishop: 2004, p.14).

Past and current countermeasures, with the exception of those aimed at the heavy transport industry and long-distance driving, have tended not to directly target the other high-risk groups of drivers.

The *Road Accident Action Group* (RAAG) based in Mackay, of which RACQ is a member, has developed a strategy with objectives targeting the reduction of driver fatigue-related accidents in five identified high-risk groups (Pioneer News: 2002), including:

- young drivers;
- shift workers;
- occupational drivers;
- commercial and long haul drivers, and
- holiday drivers.

RAAG organised visits to a number of schools, mining industry groups and Mackay Sugar to educate people on driver fatigue.

While it is important to develop specific strategies to better target the high-risk groups that have received little or no attention in the past, there still needs to be a continuation of general public education campaigns and activities aimed at all drivers as many drivers outside these groups may still remain at risk.

2.7 Managing fatigue

A broad range of countermeasures involving the driver, vehicle and road environment have been used or are being developed with the intention of reducing death and injury from fatigue-related crashes. According to Haworth (1998: p.4) these fatigue countermeasures can have three aims, including:

- To prevent fatigue by maintaining driver alertness;
- To prevent fatigued driver crashing by providing a warning; and
- To reduce the severity of fatigue-related crashes.

2.7.1 What measures are used or have been used previously to manage fatigue?

All Australian State and Territory governments promote the fatigue message widely through the use of public education campaigns and activities on television, radio, billboards, printed material, and more recently, the Internet. Education campaigns and activities are tailored by each State and Territory according to local circumstances and driving conditions (UK Department for Transport: 2004).

Driver Reviver sites are also operated across most Australian States and Territories during holiday periods. Sites are usually manned by volunteers who provide coffee and tea to drivers, as well as advice and information. Government road transport authorities provide regional coordination, management and maintenance of the sites (UK Department for Transport: 2004).

Other approaches that are or have been used to manage fatigue in the Australian transport industry include (HORSCCTA: 2000):

- Regulatory measures such as driving hours restrictions;
- Non-regulatory regimes based on occupational health and safety legislation and associated codes of practice;
- Providing a safe and well designed road environment;
- Enforcement of regulatory measures by police and transport authorities; and
- Fatigue management practices adopted by employers.

New technologies are also been developed and used to detect or monitor fatigue, predict the potential fatigue level of workers working certain shift patterns and assist in the enforcement of regulations.

It is important to keep in mind that while many of the measures listed may assist in reducing the risk of having a fatigue-related crash, they do not address the core problem of preventing drivers from continuing to drive while fatigued – when only quality sleep remains the only real cure or preventative measure for fatigue.

2.7.2 Do these measures successfully reduce fatigue-related crashes?

A great deal of research and evaluation has been completed both overseas and locally on the various countermeasures used to reduce the severity and number of fatigue-related crashes.

RACQ understands that various countermeasures used in Queensland have been evaluated but the Club is not fully aware of the results in relation to their effectiveness in reducing the severity and occurrence of crashes.

RACQ will reserve its comment on the success of various countermeasures in reducing fatigue crashes until after considering the first round submissions of relevant stakeholders, e.g., Queensland Transport, Department of Main Roads and Queensland Police Service. This will be in the second round of submissions stage of the QPTC's inquiry program.

2.7.3 Are they suitable for use in Queensland?

With the exception of *Safe-T-CAM* and various other technology-based measures, a majority of the other measures to reduce fatigue-related crashes have been widely implemented and utilised in Queensland in some form or another. These measures include:

- introduction of fatigue management programs, driving hour restrictions and chain of responsibility legislation to address fatigue problems in the heavy vehicle industry;
- inclusion of fatigue-related information and advice as part of an overall fleet risk management package adopted by an increasing number of workplaces for their drivers.
- public education and advertising campaigns;
- community-based activities such as *Driver Reviver*; and
- engineering approaches such as rest areas, rumble strips, road duplication, audio-tactile line-marking and wider, sealed road shoulders;

Despite these measures, fatigue remains a difficult problem to detect and enforce for the private driver. Current research and development, through advances in technology, are exploring ways in which a driver can be monitored and warned of the onset of fatigue.

Until there is widespread availability of reliable technology that enables a driver impaired by fatigue to be alerted and/or detected, public education and advertising campaigns will continue to be necessary to make drivers of all vehicles aware of the dangers and early warning signs of fatigue and what they can do to minimise their risks of driving while tired. RACQ also believes that the adoption of proven fatigue management practices by employers in the workplace may offer major gains in reducing work-related driver fatigue.

These measures are discussed individually in more detail in the following sections.

2.8 Legislation

2.8.1 Does the current legislation in Queensland adequately regulate fatigue?

Considering the current limitations and difficulties associated with police officers in identifying and enforcing against driver fatigue, RACQ is satisfied that current legislation provides a means by which a fatigued driver or rider can be charged and penalised if found guilty (QPTC: 2004, p.6):

- *Transport Operations (Road Use Management – Fatigue Management) Regulation 1998*;
- section dealing with careless driving of motor vehicles under the *Transport Operations (Road Use Management) Act 1995*;
- section dealing with dangerous operation of a motor vehicle under the *Criminal Code Act 1899*; in addition to
- Common Law precedents.

However, RACQ recognises there are some legislative limitations. In Queensland and Australia, the heavy vehicle and road freight industry has been a regular target of researchers, legislators and enforcement officers in the implementation of fatigue management practices and legislation with severe penalties for those who contribute to a driver driving while fatigued. Other industry sectors and the motoring public are not subject to the same laws, regulations and levels of enforcement and are generally left to self-manage and self-regulate against driver fatigue.

Specifically, only those drivers and operators subject to the *Transport Operations (Road Use Management – Fatigue Management) Regulation 1998* are regulated by when and how long they can drive for in a given time period. The *Transport Operations (Road Use Management – Fatigue Management) Regulation 1998,* by the implementation of the *National Driving Hours Policy*, regulates the following (Queensland Transport: 2000):

- amount of time that all drivers of commercial buses (with a seating capacity of more than 12 adults, including the driver) and heavy vehicles (with a mass of more than 12 tonne) may drive and/or work over a given period;
- National Log Book – a driver who is driving a commercial bus or heavy vehicle outside of their "Local Area" is required to record driving, working and rest times (unless they are driving and working entirely within their "Local Area" – however, records of the driving, working and rest times are required to be maintained by the driver's employer); and
- Chain of Responsibility – tough penalties apply to consignors, employers and responsible employees that ask, direct or require a driver to undertake a task that would result in the driver committing a driving hours, driving record or speeding offence if he or she complied.

Alternatively, the *Transitional Fatigue Management Scheme* (TFMS) is an optional scheme available to employers and heavy vehicle drivers that allows for an increase in flexibility of trip scheduling and driver rostering in return for implementing additional fatigue management measures (Queensland Transport: 2000).

Another limitation is, as highlighted by QPTC (2004, p.6), that police do not have specific powers to direct drivers to stop driving if they are not subject to the *Transport Operations (Road Use Management – Fatigue Management) Regulation 1998*. This means that

drivers who are observed to be driving erratically or dangerously by a police officer and are found not to be impaired by drugs or alcohol are able to continue driving. RACQ sees this as an issue that requires discussion and resolution by relevant stakeholders to reduce unacceptable risks associated with drivers being allowed to continue to drive if they are deemed to be endangering their own or other people's lives.

Recommendation

- Consider methods and/or powers for police to stop a driver from continuing to drive if they are deemed to be a high risk endangering their own or other people's lives. Issues to address include:
  - lack of means to identify how long drivers have been driving for without any sleep as they are not required to maintain a log of driving hours;
  - many drivers are and would be unaware of their level of impairment and their ability to drive. While there has been research and studies equating lack of sleep to equivalent BAC levels for alcohol impairment, there are no accurate guides to impairment levels for fatigue, as there are with alcohol and standard drinks; and
  - present lack of an accurate means for police to assess or determine a fatigued driver's or rider's level of impairment.

2.8.2 If not, what should be included to manage this crash factor?

While not opposed to consideration being given to expanding the application of *Transport Operations (Road Use Management – Fatigue Management) Regulation 1998* and the TFMS to other industry sectors, RACQ believes this would only be warranted for work-related driving purposes. RACQ believes there would need to be further discussion with the driver and industry group/s affected to identify key issues and address major concerns. RACQ would see the expansion of this legislation for individual drivers and non-work related driving as both difficult to administer and enforce due to a lack of means to prove a driver had been driving while fatigued or for longer than a specified period.

A far less legislative and confrontational method would be for employers, especially those not covered by the *Transport Operations (Road Use Management – Fatigue Management) Regulation 1998,* to adopt fatigue management measures as part of an overall fleet risk management package. RACQ believes the existing *Workplace Health and Safety Act 1995* provides the means to encourage employers to do so. Under this legislation, employers are obligated to provide a safe workplace (i.e., any place where work is, is to be, or is likely to be performed by a worker, self-employed person or employer).

On a positive note, there are an increasing number of Queensland-based employers who are adopting measures to manage driver fatigue in their work environment, as part of their obligations under the *Workplace Health and Safety Act 1995*. Recent fatigue management measures adopted by the RACQ for its Road Patrols and Contracted Service Providers (CSP) include:

- a series of training workshops, with a section on driver fatigue, including a video specifically related to fatigue and preventing fatigue; and
- a section covering driver fatigue in the RACQ CSP's Workplace Health and Safety Manual. This manual also forms the basis of the training workshops.

The training workshops also cover scheduling and direct CSP proprietors to ensure that they or their drivers are fit to drive. In a remote regional area, depending on the circumstances, if a call is made toward the end of the day the CSP proprietor is encouraged to rest and then leave the next day. However, RACQ will not leave a member out in a remote area if they do not have adequate supplies or if there are children or a lack of adequate accommodation. Recently completed regional training also highlighted some poor fatigue management practices, which required further clarification of responsibilities on behalf of the CSP proprietors.

Additionally, RACQ is currently in the process of developing its own fleet risk management program for its employees, which will include a safe driving policy and e-learning component on driver fatigue.

Employers have the greatest influence and control over their employees' work practices and behaviour. Because of this, RACQ believes the adoption of safe driving polices and fleet safety risk management practices by employers have the greatest potential to be an effective means to distribute fatigue-related information and advice, as well as manage work-related driver fatigue. RACQ also believes that these measures could have a positive influence on employees' non-work-related driving with flow-on effects to other drivers they associate with. An evaluation of drivers participating in the TFMS found that they were more likely to report the following (Burgess-Limerick and Bowen-Rotsaert: 2002, p.3):

- greater involvement in determining schedules and rosters;
- that sufficient time was allowed in their schedule for breaks and non-driving work;
- a reduced frequency of fatigue indicators overall, particularly of performance-related fatigue indicators;
- greater knowledge of fatigue management;
- that management played their role in managing fatigue; and
- that their company's fatigue management policy was effective.

Drivers participating in the TFMS were also less likely to report (Burgess-Limerick and Bowen-Rotsaert: 2002, p.3):

- speeding to meet a deadline;
- feeling tired; and
- difficulty concentrating.

However, these benefits may not be forthcoming depending on the lengths an employer will go to ensure that staff is provided with the best fatigue management practices. At a joint Queensland Transport and Centre for Accident Research and Road Safety – Queensland (CARRS-Q) workshop on workplace fleet safety, management time and people resources were highlighted as the main barriers to employers adopting more effective and comprehensive fleet safety programs (Murray, W., Clements, K. & Anderson, W.: 2001: p.2). Other barriers to the implementation of improved fleet safety practices identified included:

- financial constraints, including the lack of tax incentives to specify safer vehicles;
- low priority by management – below other health and safety issues;

- apathy and lack of management, staff and driver commitment; and
- uncertainty in who in the organisation should be responsible for implementing policies and practices.

Consequently, there currently exists a wide range of fatigue management measures used by employers - varying from providing basic information and advice, to active training of drivers and management of work hours and conditions, including monitoring of driving hours.

In order to overcome these barriers, employers and fleet operators need assistance and guidance on what fatigue management measures are effective and practical for their organisation's size and needs. CARRS-Q is currently in the process of evaluating fleet management practices used by a number of organisations (CARRS-Q: 2004). RACQ believes further evaluations of the various alternatives are essential in order for both employers and relevant service-providers (e.g., driver/workplace trainers) to be aware of which risk management techniques are both cost-effective and reflect best practice.

Regardless of whether existing legislation is amended or new legislation introduced, RACQ recognises that there may be a need to raise public awareness of existing legislation and penalties for careless driving and dangerous operation of a motor vehicle in relation to drivers who drive while impaired by fatigue. This includes increasing public awareness of other implications of driving while fatigued, e.g. insurance and criminal charges.

Until the development of suitable technology and an appropriate mass screening device that can identify a driver suffering from fatigue and their level of impairment, it is likely that any attempts to change legislation to improve the regulation of fatigue will have limited effect due to lack of practical options to detect and enforce against fatigued drivers on a mass scale. These are issues currently being faced by Queensland and other states in their efforts to introduce roadside drug testing. Care should be given to ensure that more attention on the enforcement aspect of driver fatigue does not increase the public's perception that the risks of being caught is low as there are no means to identify fatigue amongst the general driving public.

Recommendation

- Further encourage the implementation of best-practice fatigue management programs that ensure safe working conditions in the workplace.

2.9 Public education and related activity campaigns

The RACQ believes public education and related activity campaigns have an important role to play in both raising the awareness of driver fatigue as an issue and as a means for providing self-help information and advice to drivers about how to manage and reduce driver fatigue. Haworth (1998, p.5) identifies some of the specific goals of fatigue educational programs as:

- to educate the public of the dangers of fatigue (information);
- to convince people that fatigue is an important road safety issue (attitude change);
- to get people to plan trips better (behaviour change); and

- to get people to stop driving if feeling tired (behaviour change).

Public education campaigns (e.g., *Fatal 4*) and community-based initiatives (e.g., *Driver Reviver*) have raised public awareness of fatigue as a major contributing factor in road crashes in Queensland. RACQ member research has found that driver fatigue is perceived to be one of the main causes of deaths and injuries on our roads (Staddon Consulting: 2001, p.11), as shown in Table 1.

Table 1: Perceived Main Cause of Death and Injuries on our roads.

Any mention of:	Region* (%)			Total
	S.E.Q.	Regional	Rural	
Speed / speeding	68	54	54	65
Drink driving / alcohol	50	42	42	47
Bad / ignorant / incompetent drivers etc.	41	30	31	37
Driver fatigue / tiredness	31	41	41	34
Poor / bad road conditions	9	27	25	15
Impatient drivers / drivers in a hurry	4	14	9	7
Drugs / drivers on drugs	4	8	6	5
Vehicles in poor condition	5	9	3	5
Underage drivers	2	4	2	2
Elderly drivers	-	3	1	1
Poor weather conditions	1	1	1	1

Source: RACQ Motoring Issues Members' Opinion Research (Staddon Consulting: 2001).
* - based on Queensland fuel regions.

Table 1 also shows that significantly more people from regional and rural areas of Queensland, than respondents from South East Queensland, mentioned driver fatigue as a perceived cause of crashes. While this information does not cover where the member believes most fatigue crashes occur, it would be concerning if drivers from the more urban areas in South East Queensland did not see fatigue as an issue for them whilst driving in urban areas.

While *Driver Reviver* was first introduced in Queensland in 1990, only recently has there been a widespread promotion and availability of fatigue-related activities, information and resources. These include:

- maps and leaflets identifying rest areas;
- Public media campaigns by non-government organisations;
- guidelines for provision of rest areas and design of road-based fatigue countermeasures;
- information and advice available on many company, government and road safety websites;
- web-based travel planners; and
- inclusion of fatigue-related information and advice as part of safe driving policies and fleet risk management packages adopted by employers for their fleets and drivers.

2.9.1 Is public education effective in reducing fatigue-related crashes?

Public education campaigns have been an effective means in informing targeted audiences about the dangers of fatigue (Haworth: 1998). There has been relative success in getting travellers and long-distance drivers to take a break on longer journeys through mass-media campaigns and operation of driver reviver sites during holiday periods. However, RACQ believes that driver complacency is still a major problem in regards to drivers fully understanding the effects of fatigue and its warning signs, with many displaying an over-reliance on short-term fixes to combat the effects of fatigue.

A recent phenomenon has been the proliferation of numerous food and drink products on the market claiming to combat fatigue and give an energy boost. While many of these fixes may offer short-term benefits, there is a danger and reality that drivers continue to drive beyond the point when these short-term measures can no longer be used to reduce fatigue.

Due to restrictions on the amount of time or space available, fatigue-related advice and information provided to the public is often too simplistic and limited. This can lead to misinterpretation or misunderstanding by drivers and motorists. For example, some authorities providing fatigue-related advice promote the use of measures that will at best only minimise fatigue for the short-term but fail to mention this. RACQ is also concerned that much of this information and advice provided does not draw enough, if any, attention to the fact that sleep is the only cure for fatigue and that no short-term measures will help if a driver is too tired.

There is a need to ensure the information and advice provided to drivers (particularly high-risk groups) is easily accessible, accurate, consistent and appropriate. Otherwise, there is a danger that educational and promotional material may be counter-productive, particularly when recommending the use of short-term countermeasures.

The provision of better information, advice and support may hopefully assist in changing a driver's behaviours to better cope with managing their fatigue, especially for work-related driving. But realistically, there is little at present to encourage drivers to change their behaviour by not driving when suffering from the symptoms of fatigue. RACQ believes this is more likely to happen when an accurate means of identifying and enforcing against fatigued drivers becomes available.

2.9.2 Are community activities such as the driver reviver program useful?

Highly visible and well-publicised community-based activities, such as *Driver Reviver*, can be an effective means to raise awareness of fatigue amongst the local community and passing motorists. *Driver Reviver* also provides the opportunity for drivers and passengers to stop and rest where community volunteers not only serve free coffee but also distribute information on fatigue, accommodation and places to eat. Brownlow (as referred to in ACRS: 2004) concluded that, "Queensland's experience in the *Driver Reviver Programme* has been that communities display high levels of energy, ownership, involvement, initiative and autonomy. These matched with effective state-wide coordination and governmental support, account for the programme's success in terms of both patronage and impact on road trauma."

In order to effectively manage the planning and implementation of community-driven road safety activities such as *Driver Reviver*, there is a need to provide participating communities with the necessary financial and technical support. RACQ believes that this

support is necessary in order to ensure that the enthusiasm displayed by the local communities is not lost and the effectiveness of these programs is maximised.

Recommendation

- RACQ supports the continuation of the *Driver Reviver Programme* and consideration of:
  - increasing the operating hours of relevant sites to cover the high-risk fatigue period during 10pm to 6am; and
  - assisting local communities to deliver fatigue-awareness and prevention activities during non-holiday periods which may prove useful in increasing awareness amongst the local community, visiting drivers and motorists that fatigue is not just a problem during holiday periods or when driving long-distances.

2.9.3 What other initiatives currently exist?

RACQ has increasingly become involved in public education initiatives targeting driver fatigue. In addition to media releases, RACQ has also been involved in specific campaigns that provide fatigue-related information and advice in a format which motorists can take with them when they are driving. Recent local initiatives involving RACQ include:

- For the 2003 Easter holiday period, RACQ promoted a *Fatigue Sucks* campaign where RACQ branches handed out lollipops and wallet-sized information cards to motorists.

The aim of this campaign was to raise even greater awareness among motorists of the dangers of fatigue to themselves and other road users and how to plan to avoid it. This was a state-wide campaign which followed on from a successful introduction in the Mackay region at Christmas 2002 by the local Road Accident Action Group (RAAG). Issues highlighted included:

- the increase in fatigue-related fatalities with more than half of fatigue-related crashes occurring on Fridays, Saturdays and Sundays; and
- fatigue is just as likely to pose a danger in the middle of the afternoon as it is when driving late at night.

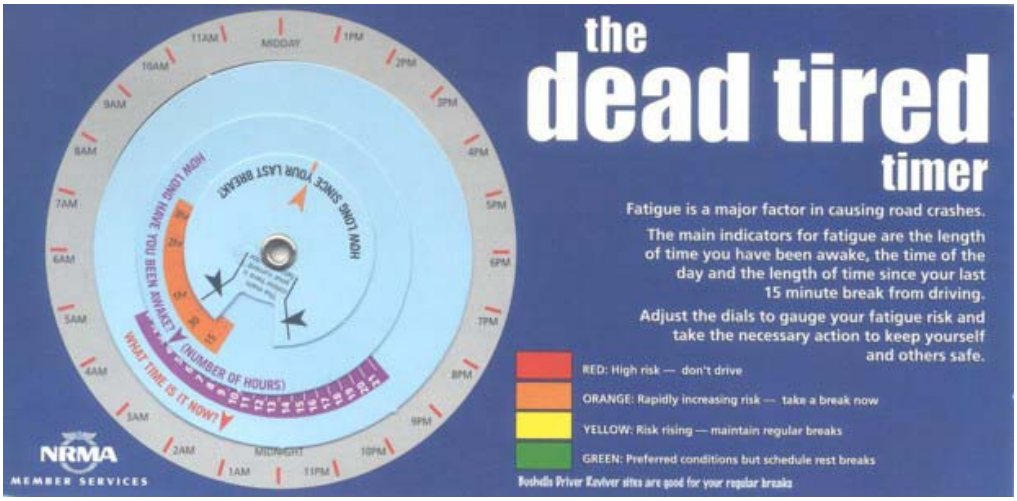
- For the 2003 Christmas holiday period, RACQ was a major sponsor of the "Fatigue Busters" travel diary initiative created by the Road Accident Action Group in Mackay. The initiative was designed to encourage drivers to regularly break their journey and reduce the risk of fatigue-related smashes along Queensland's Bruce Highway.

  For the "Fatigue Busters" initiative, 20,000 colour travel diaries were printed to be handed to motorists travelling along the Bruce Highway from mid-December 2003 to end of January 2004. The travel diary opened out to a map of Queensland with spaces for stickers and stamps, which motorists were encouraged to stop and collect at Driver Reviver and tourism information centres along the highway. The stickers and stamps were produced by 21 local government authorities from Brisbane to Cardwell.

RACQ's affiliate motoring organisations in the other states also take part in public education initiatives targeting fatigue. Some recent examples include:

- RACV in conjunction with the Metropolitan Ambulance Service and Rural Ambulance Victoria, have developed a checklist for drivers to make sure they're not too tired to drive. In the 2001 Christmas holiday period, with the assistance of the Australian Human Resources Institute, this checklist was distributed and promoted to many Victorian workplaces. Over the past few years, this checklist has also appeared in the RACV's *Royal Auto* magazine as part of articles raising awareness about driver fatigue during holiday periods.

- For the 2001 Easter holiday period, NRMA launched the *Dead Tired Timer*, which was distributed free to readers of the daily Telegraph newspaper and to motorists at *Driver Reviver* stops in New South Wales (Daily Telegraph: 2001, p.11).



By adjusting a series of dials on the *Dead Tired Timer*, motorists were able to determine their level of fatigue risk and whether they should continue driving or take an immediate break.

- For the 2000 Christmas period, RAA and Mobil Oil Australia launched a joint campaign aimed at reducing the incidence of driver fatigue crashes in South Australia. The campaign included a driver fatigue Kit that motorists could obtain from RAA branches and selected regional Mobil service stations on major tourist routes around South Australia. The kit contained information on fatigue and how to avoid it, an insulated coffee mug, games for children to play in the car and a range of free offers aimed at encouraging drivers to take regular breaks.

RACQ also provides a range of products and services to assist motorists and travellers in planning and completing their trips safely, including:

- maps and leaflets identifying the location of rest areas and driver reviver sites;
- accommodation bookings for motorists planning to travel;
- a web-based *Travel Planner* (www.racq.com.au) identifying travel routes and times including when to take a rest break;
- *Road Conditions Report* service and *Road Reporting Hotline* (on 1300 130 595) advising motorists of any travel delays; and
- safety advice and information on driver fatigue on RACQ website. RACQ is also in the process of updating the road safety information (including fatigue) on its website.

The RACQ's club magazine, The Road Ahead, also runs articles on fatigue-related topics. Past articles have included:

1. Snooze and you lose (June/July edition, 2002);
2. Amenities angst (April/May edition, 2002);
3. Sick of cars (February/March edition, 2002)
4. Gas busters (June edition, 2000).
5. Around the Traps (February/March edition, 1999).

Copies of the on-line version of these articles are provided in Appendix B. Fatigue is also mentioned in articles commenting on road crashes and road safety in general.

2.10 Engineering measures

2.10.1 Are Queensland's audible edge lines effective and should they be used more extensively?

Profile and audio-tactile line-marking (a continuous extrusion of thermoplastic material) has been used in Australia and overseas for many years to warn drivers of lane drift and alert them to take evasive action. Installing audible side and centre lines on roads have been shown to directly reduce trauma resulting from driver fatigue (Henderson as referred to by Edmonston et al: 1995, p.44). An evaluation of the audible edge line program in Queensland estimated that in the six years from 1993 over 170 casualty crashes had been avoided as a result of the program saving the community an estimated $8 million per year (HORSCCTA: 2000, p.72).

The Department of Main Roads (DMR: 2004, p.5) states that for audio-tactile edge lines to be effective, the shoulders on that section of road should have a minimum sealed width of 500mm (desirably one metre) to allow the driver to re-enter the running lane without losing control on the unsealed shoulder. Considering the road surface and formation width of Queensland highways, audio tactile edge lines or rumble shoulders may not be suitable at all fatigue zone locations. It is envisaged that roads with a chip seal surface, used extensively throughout Queensland, may reduce the performance of the edge lines over its life, if high surface temperatures melt the plastic and the raised transverse bars of the line are compacted into the rougher road surface profile under heavy wheel loads. RACQ also believes consideration should be given to a cost-effective process of re-installing audio-edge lines at the end of its life.

Other audio-tactile devices used to warn drivers are rumble shoulders, strips and sections. Rumble shoulders, used overseas, consist of grooves or rows of raised pavement markers placed just outside the edge line and at right angles to the direction of travel, to create noise and vibration when the vehicle passes over them. These have proven to be very effective for drift-off-road (DOR) crashes, e.g., segments of *Sonic Nap Alert Pattern* used on the Pennsylvania Turnpike reduced DOR crashes by up 70 percent (Hartley, Penna, Corry, Feyer: 1997, p lxxxv). A similar shoulder treatment installed on more than 100 miles of highway at three locations in New York in 1990 resulted in run off crashes at the three locations dropping from 20 in the 30 months prior to treatment to zero in 36 months after installation.

Rumble strips are transverse strips of rough textured pavement installed across the full width of the road at spacings to alert drivers to fatigue zones and signs, and/or when they are approaching intersections or narrow structures. Rumble strips are also used in advance of rest area signs to give sufficient time to decide on a course of action.

Rumble sections are extended rumble strips consisting of alternating surface textures, installed at up to one-kilometre spacings.

It is important that any treatment, which involves grooves, grinding or milling shoulders, takes into account any adverse noise effects on local residents, as well as safety impacts on other road users like cyclists.

Table 2: Road-based countermeasures

ROAD-BASED COUNTERMEASURES	Potential benefit to fatigue & inattention crashes	Benefit to Cost Ratio
Cheap Treatments		
Shoulder treatment & rumble strips	Recent research shows very great benefit to fatigue crashes	200:1
Intersection signage	Probably ineffective for fatigue and inattention	>200:1
Warning signs	Probably ineffective for fatigue and inattention	>125:1
100mm edge line	Willis (1984) suggests reduction of 35% in out of control crashes; of benefit to fatigue	10:1
150-200mm edge line	Moses (1986) & US study suggests 34% reduction for out of control crashes v. 100mm	10:1
Removal of trees	Good benefit for fatigue run off road crashes	10:1
Raised reflective pavement markers	Moses (1985) suggests ~20% crash reduction – good for fatigue because audible too	8:1
Reflective guide posts	Benefit at night could be ~30% - good for fatigue at night	8:1
Installing breakaway or slip poles	Extremely high benefit to fatigue related run off road crashes	7:1
Intersection sight distances	Some limited benefit for fatigue in rural crashes	5:1
Crash attenuators	Potentially useful for fatigue but limited applicability in rural environments	?
Moderate Cost		
Surfacing & sealing	Good for fatigue since recovery from out of control vehicle enhanced by sealing	9:1
Turning lanes	Probably limited benefit to fatigue crashes	5:1
Lane width	No evidence of benefit over 3.5m width	
Wide median strip	Very good benefit to fatigue run off road crashes up to 10m width of strip	3:1
Median with barrier	Questionable benefit for fatigue unless very narrow strip	0.8:1
Railroad crossing measures	Unknown, but possible benefit to inattention crashes	~0.5:1
Clear zone	Good benefits to fatigue crashes up to 9m clear	?
High Cost Treatments		
Two metre sealed shoulder	Good benefit for fatigue, especially rural crash	12:1
Overtaking lane	Of potential benefit since fatigue increases risky manoeuvres but unknown for fatigue	>3:1
Short 4 lane sections	Of potential benefit since fatigue increases risky manoeuvres but unknown for fatigue	>2:1
Stopping sight distance	Some potential benefit for fatigue when surveillance & reaction time is impaired	2:1
Reducing horizontal curvature	Unknown, but potentially great for fatigue by reducing run off curve crashes	2:1
T intersections	Unknown, but possible benefit to inattention crashes	>1:1
Superelevation and crossfall	Unknown, but potentially great for fatigue by reducing run off curve crashes	<1:1

Source: Table 5 from Hartley, Penna, Corry, Feyer (1997, p.lxxxiii).

Recommendations

- Investigate and test various types of audio-tactile devices and methods of installation for the range of road conditions in Queensland, e.g., practical application on new or existing pavements, and the stone and adhesion characteristics in western areas which experience extreme temperature variations.

- Identify and adequately prepare road locations for the appropriate treatments, e.g., widen and seal shoulders to accommodate the edge line or rumble strip.

- Allocate additional funding within existing road works programs to install audio-tactile devices more extensively.

2.10.2 What other engineering measures would reduce fatigue-related crashes?

Road-based measures (other than audio-tactile devices discussed earlier), which have the potential to alert and re-engage the driver, can be used to provide better delineation of curves and improve the driver's visual control. These include:

- pavement widening (especially at curves);
- raised pavement markers; and
- reflective guide posts.

Roadside billboards and "*driver fatigue crash zone next …km*" signs have also been used to warn drivers that they are entering a known fatigue zone.

In the event a driver and their vehicle does deviate from the road, then countermeasures can be used to reduce crash severity by providing a more forgiving road environment. These countermeasures include the following:

- shoulder widening and sealing;
- removal of trees and other objects to provide clear zones;
- breakaway poles;
- crash barriers for protection around bridges and culverts ; and
- wide median strips with barriers.

RACQ is aware that DMR in Queensland has developed rest area policies and guidelines for the location of rest areas and roadside stopping facilities that should be provided. RACQ believes that current restrictions applying to access of DMR's rest areas are an acceptable compromise to encourage short stays yet not affect the needs of commercial operators. DMR controls about 20 percent of Queensland's 470 rest areas with the remainder shared between forestry and water authorities, the state parks and wildlife service, local governments and services clubs.

In its submission to QPTC's *Inquiry into Rural Road Safety in Queensland*, RACQ (1999) actively advocated the provision of a comprehensive network of roadside stopping amenities appropriately spaced on all major highways. A mix of facilities should be available and rest stops spaced at approximately 30-minute intervals along major rural highways whether it be commercial service centres, towns or a remote location.

Rest areas should be considered as part of road network planning and be properly designed with access and exit roads from the highway and sited to alleviate the need to cross opposing lanes of traffic.

In order to encourage drivers to use them, RACQ members have stated that rest areas should be sufficiently attractive and suitably equipped with adequate space to separate parking for cars and trucks and offering facilities such as toilets, rubbish bins, drinking water, shade and shelter.

Roads that are upgraded to improve traffic carrying capacity, road safety, and provide flood immunity can often follow a different alignment to the old road. Sometimes these roads are duplicated and even bypass towns. The alignment of these roads can affect driver alertness. Curvilinear layout of the road rather than straight-line design can be more interesting to drive and therefore less fatigue inducing. So as well as minimising trip

distance between origins and destinations, it is important for designers to locate roads to obtain best value in terms of safety, capacity and driving experience. Road location and alignment should enhance scenic views of features to benefit driver interest and reduce monotony.

As opposed to education, legislation and enforcement, proven road-based engineering fatigue treatments represent a long-term investment that provides protection 24 hours a day, seven days a week.

Recommendation

- Adopt a research strategy of before and after studies of driver performance and crashes to develop a better understanding about the most appropriate road based engineering treatments according to location.

- Provide, enhance and promote road-based fatigue countermeasures, e.g., rumble strips, audible edge lines and a network of quality roadside rest areas at strategic locations along key travel routes adequately signed and marked on maps.

2.11 Technology

There has been much discussion on the benefits of using new technologies to detect or monitor fatigue, predict the potential fatigue level of workers working certain shift patterns and assist in the enforcement of regulations (HORSCCTA: 2000, p.76).

2.11.1 Technology to detect and alert drivers of fatigue whilst driving

The use of technology to reduce the role of human error in road crashes is increasing, particularly at the prestige end of the vehicle market. Over the past decade, there have been major advances in the use of sensors and microprocessors in vehicles to improve vehicles' efficiency, safety and handling. A range of intelligent vehicle applications are currently available, such as adaptive cruise control, lane departure and distance control systems, speed and collision warning systems, black box recorders, seatbelt warning and alcohol ignition interlock devices.

Vehicle manufacturers are currently developing and introducing technologies that monitor a driver's behaviour and/or warn them if they are suffering from fatigue. Some examples include (HORSCCTA: 2000, p.82 and 86):

- driver vigilance systems that can monitor a driver's reactions and alert them of the onset of fatigue or when impairment has reached a dangerous level; and

- black box information recording systems that monitors driver performance, such as speed, braking, over-revving and rest breaks.

These devices are also likely to be used in conjunction with other vehicle-based ITS technologies that control a vehicle's speed and steering to provide a pro-active collision avoidance system.

With regards to the poisonous build-up of gases in motor vehicle cabins, RACQ is aware of work being carried out by RMIT to develop a cost-effective device to monitor air quality

in the vehicle cabin and to alert drivers when gas levels exceed set limits (Bishop: 2000, p.11).

There are also after-market fatigue warning devices being developed and made available to Australian consumers, particularly on the Internet. These are being dubbed by their distributors as driver safety aids. For example, Welkin's Nap Zapper (http://www.brightideas.com.au/2002/index.php?e=322&p=napzapper) is available for $9.95 and is promoted as 'the Guardian Angel for Drivers'. RACQ believes many of these devices have dubious claims as driver safety aids and are more likely to pose a danger as a driver distraction or false fatigue prevention measure.

With the increasing development and availability of personal and in-vehicle fatigue warning devices, there is a danger that drivers may become complacent about driving when affected by fatigue. In particular, RACQ shares Brown's (1997) view that caution should be given to drivers using such devices if it encourages drivers to rely on them to continue their journey, which should have been terminated because of human impairment.

RACQ, in its role as a motoring advocate, can only inform its members of the usefulness or uselessness of such devices, but ultimately we cannot stop these devices from being purchased and used in the mistaken belief that they will let the driver know that they are fatigued to the extent they should not be driving. Therefore, as with any so-called driving aids, there needs to be careful consideration of their impacts before their introduction and use becomes widespread.

Furthermore, at the same time as technologies that have the potential to reduce road trauma are being developed, so too are other technologies that provide in-vehicle entertainment and information for drivers. While a range of technological advancements will be available in the future, the impact that these may have on the driver in terms of distraction and additional cognitive stress is emerging as a growing area of concern. With all of the in-vehicle safety devices that require driver interaction, it is important that the driver is not distracted from their primary task of driving safely. RACQ believes that Australian legislation and standards will need to ensure that in-vehicle devices in new vehicle do not have a negative effect on road safety.

Recommendation

- Develop measures and devices that can monitor and detect driver fatigue from both inside the vehicle and the external environment.

2.11.2 Technology to detect fatigue drivers for fitness to work and enforcement purposes

Fatigue monitoring and detection systems are being tested in local and overseas workplaces to assess workers fitness to drive, as well as devise work rosters and shift times, e.g., Adelaide Centre for Sleep Research has developed a fatigue modelling software package as part of its National Shiftwork and Workload Study (HORSCCTA: 2000, p.83). RACQ is also aware of fatigue detection and monitoring devices currently being used in Australian and overseas jurisdictions. Some examples include "Safe-T-CAM" in New South Wales (HORSCCTA: 2000, p.77), as well as the trial of pupillometer devices in several jurisdictions in the United States (Illinois State Police: 2002). There is also potential for 'black box' information recording systems to also be used as an enforcement tool (HORSCCTA: 2000, p.82).

RACQ recognises that there are many issues that would need to be considered and resolved before a technology-based fatigue-detection device and/or system could be adopted for widespread use by enforcement agencies and workplaces in Queensland. This could be a long and arduous process, as recently experienced by legislators in Victoria with the introduction of legislation for roadside testing of drug drivers using new technology.

Recommendation

- Investigate and implement measures to detect and enforce against fatigue-impaired drivers, e.g., on-road automated camera surveillance systems (Safe-T-Cam) for heavy vehicles and buses.

2.11.3 Technology to assist Road Trauma Response

Due to greater impact speeds, sleep-related crashes generally cause greater driver mortality and morbidity than other types of crashes (Horne and Reyner: 1995). Therefore, the speed and effectiveness of crash victims receiving medical treatment is crucial. This is particularly important in rural and remote parts of Queensland given that crash severity is generally worse in rural areas than in urban areas. Research also indicates that rural people involved in crashes are 30% more likely to die while waiting for emergency treatment than urban people.

Current and new technologies are fast providing the means to quickly alert authorities and identify where and when a crash has occurred (e.g., satellite navigation and technological advances in communication networks, emergency alert and tracking devices can notify the relevant emergency services of a vehicle's location in the event of a crash). This is particularly important considering that many fatigue-crashes involves single-vehicles only and there may be a long period before the crash is bought to the attention of passing motorists.

Recommendation

- Expand the application of measures to further assist emergency services in promptly locating crash sites in rural areas, e.g., install roadside identifiers, expand mobile phone coverage.

- Continue to investigate the application of in-vehicle global positioning systems (GPS) devices that notify authorities in the event of a crash or other emergency.

2.12 Queensland Road Safety Strategy 2004-2011

RACQ acknowledges that the *Queensland Road Safety Strategy 2004-2011* and the accompanying two-year action plans are the most appropriate means to coordinate, plan and implement countermeasures to address fatigue-related crashes in Queensland. RACQ has also prepared its own road safety strategy document titled *Road Safety Priorities: A Map to Safer Road Use*, which was launched in April 2004 on World Health Day.

As with the *Queensland Road Safety Strategy 2004-2011*, RACQ's *Road Safety Priorities* document also identifies fatigue as a key issue to address to reach Queensland's targeted

reduction in the road toll. RACQ's *Road Safety Priorities* recognises fatigue is a complex issue that is not confined to the driving task, but can be influenced by many other factors including lifestyle and the physical environment.

2.13 Strategic Approach

In its *Road Safety Priorities* launched earlier this year RACQ discussed how a 'whole of government" approach is required to ensure that all government departments and agencies, industry and community stakeholders are provided with the appropriate guidance, support and awareness in relation to:

- major road safety issues;
- their roles and responsibilities in delivering road safety outcomes; and
- being aware of what others are doing.

Fatigue is a major road safety issue and all efforts directed towards reducing its impact on the road toll will benefit from improving the working relationships between relevant authorities, organisations and the community, e.g. sharing of information, technical data and funding between Queensland Transport, DMR and industry, research and development.

While fatigue is recognised as a major crash factor that needs to be addressed, we must not lose sight of the other factors that contribute to driver and rider crashes on Queensland roads. Therefore it is important that a strategic approach is used to address all those factors and to prioritise and allocate funding to programs and initiatives that are most effective in reducing road trauma.

For instance the *National Road Safety Strategy* has estimated that a 19% reduction in Australia's road fatality rate per 100,000 population by 2010 could be achieved by improving the safety of roads.

Road-based countermeasures installed to address fatigue related problems have the advantage in offering benefits to many other contributing factors to crashes, particularly those which cause vehicles to leave the road and collide with fixed roadside objects.

Unfortunately existing road funding programs do not go far enough to cover the ever-increasing backlog of sites requiring attention on all categories of roads at the national, state and local levels. More funds need to be allocated to federal programs such as *Black Spot Program* and *Safety and Urgent Minor Works Program*. It is also important to keep funding for safety works separate from maintenance so expenditure spent on fatigue countermeasures is accountable and projects can be monitored and evaluated.

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APPENDIX: Articles from The Road Ahead

6. Snooze and you lose (*The Road Ahead*, June/July edition, 2002).
7. Amenities angst (*The Road Ahead*, April/May edition, 2002).
8. Sick of cars (*The Road Ahead*, February/March edition, 2002).
9. Gas busters (*The Road Ahead*, June edition, 2000).
10. Around the Traps (*The Road Ahead*, February/March edition, 1999).

The Road Ahead

News & Features - June/July 2002

Snooze and you lose

Story by Chris Bishop

Can authorities measure, let alone fight, fatigue - the hidden killer on our roads?

Stop. Revive. Survive. For so long, these three words have underpinned Australian road safety messages.

Take a 15-minute break every two hours, so the mantra goes, and you'll be more alert to concentrate on safely driving that tonne or more of metal, glass and plastic.

But there is growing concern that the 50-year-old policy of driving breaks is not enough to combat a mounting transport fatigue problem.

The 2000 House of Representatives (HOR) Transport Committee report, Beyond the Midnight Oil, rated fatigue the biggest safety issue facing the transport industry.

It said fatigue was four times more likely to contribute to workplace impairment than drugs or alcohol.

The HOR report estimated between 20 and 30 percent of all road accidents involve driver fatigue. Experts say the actual figures are probably much higher.

Dr Tim Horberry, from the University of Queensland's human factors school, said there were three main contributors to fatigue.

"Time on task, time of day and lack of sleep for a few days prior are the main causes, although ergonomics and state of health also play a role," Dr Horberry said.

Sleep experts point to the fact that all animals are influenced by an unstoppable in-built biological clock, which regulates waking and sleep cycles.

This circadian rhythm causes drivers of all ages and abilities to get tired between 2am and 7am, and just after lunch from 2pm to 4pm.

The only effective way to reduce fatigue is to sleep for several hours without interruption.

Scientific evidence is mounting that society's growing obsession with 24/7 services and our increasingly frantic lifestyles are fuelling even more drowsy drivers.

The Adelaide-based Centre for Sleep Research has equated extended hours of work to reduced amounts of sleep.

Less sleep increases levels of fatigue and reduces alertness, which in turn reduces workplace performance and increases the risk of injury.

In simple terms, being awake for 17 hours has the same effect on driving as a Blood Alcohol Concentration of 0.05 percent, doubling the risk of crashing.

Stay awake for between 20 and 25 hours and then drive and the BAC equivalent is 0.1% - seven times the risk of crashing than if you're well rested.

Australian Bureau of Statistics figures for November 2000 show a third of all employees usually worked overtime in their main job. And 14 percent, or more than a million employees, were shift workers.

Statistics show we work the same amount of hours as people did 30 years ago and rank second only to the USA for developed country working hours.

American studies have found young men and shift workers to be at high risk for drowsy driving, due to chronic sleep deprivation.

Shift workers attempt to fit sleep around work, family and social commitments. They work, drive home when tired and their sleep is usually limited and interrupted.

Young men accumulate their sleep deficits by over-socialising. They see tiredness as a weakness and believe it is not 'macho' for them to stop for rest when driving.

Lack of sleep, then, is the main culprit.

But another obstacle is identifying driver fatigue in the first place.

As it stands, there is no accurate way for authorities to measure fatigue-related accidents. There are no blood tests, no walk-the-line measures and no physical evidence.

Indications are that governments will not legislate to make driving while fatigued an offence until they have the means to prove it.

However, drivers are not above the law.

The RACQ believes police are within their rights to prosecute fatigued motorists for dangerous driving. And despite the efforts required, police are increasingly likely to investigate the actions of drivers in the days pre-crash.

Fatigue-related crashes are generally more serious than normal and commonly involve a single vehicle leaving the road at high speed and a driver who does not attempt to avoid the crash.

"Once you get to a certain point, you lose your capacity for self-assessment - it basically goes out the window," Dr Adam Fletcher, from the Centre for Sleep Research, said.

"We are trying to come up with some metrics so that people switch their focus from individual self-assessment to a community baseline, or common denominator, for all drivers.

"That may mean, for example, that if in a 24-hour period you've had less than five hours sleep you really, really need to think about not driving."

Dr Narelle Haworth, a fatigue expert from Monash University's Accident Research Centre (MUARC), says drowsy driving deaths will continue until community standards and individual behaviours change.

She said fatigue was seen as a side effect of hard work by responsible citizens and did not carry the stigma of drink driving.

"We need to change that attitude to one where driving while fatigued is seen as morally wrong," Dr Haworth said.

"It's not just a long distance driving or rural roads issue. We're seeing a lot more urban fatigue crashes."

Medications such as anti-depressants and some anti-histamines can cause drowsiness.

People with sleep disorders, such as sleep apnoea, are also at higher risk. And alcohol consumption adds to drowsiness.

Fatigue monitors hold some hope, although there are fears that costs, complexity and the tendency of technology to alter behaviours may limit the effectiveness of these devices.

Victoria's push for 15 to 30 minute powernaps has been effective but drivers need to remember to wake up properly before driving again.

So it seems rest breaks still have a role to play. There are additional benefits in eating light snacks, such as fruit and sandwiches, with those 15 minute stops every two hours.

Questionable short-term fatigue aids include use of the radio, proper ventilation to avoid stuffiness and caffeine-based drinks.

Other such measures as anti-lock brake fitment, better education, fewer working hours, reducing vehicle vibration, and engineering fixes such as adding rest areas, rumble strips, road duplication and better road shoulders help reduce fatigue risks.

But quality sleep remains the only real cure.

TRUCK STOP

The trucking industry is well aware of the dangers of fatigue.

For the 20 percent of heavy vehicle drivers involved in long- distance operations, night-time hauls, long hours, high annual driving distances and commercial pressures ensure fatigue is a regular problem.

When a member of the industry succumbs to the grasp of fatigue, heavy vehicle crashes tend to be dramatic and occasionally deadly.

Truckies currently operate under prescriptive legislation which limits the amount of driving and work a driver may undertake per day, per week or on a fortnightly basis. But there is widespread agreement that current 'logbook' regulations are being flouted.

However, Queensland Transport recently completed a pilot fatigue management scheme, which is due to be presented to the National Road Transport Commission later this year.

The Fatigue Management Program draws together circadian, time of day and health issues. It was run in conjunction with 10 transport operators.

It basically used stringent checks and balances including accreditation, external audits, internal reviews, lifestyle seminars and health checks to develop flexible strategies for transport companies of all sizes.

Queensland Trucking Association executive director Peter Garske said his industry was opposed to simplistic moves to limit driving during fatigue danger periods.

"If we can't drive from 2am to 5am, then trucks would have to be on the roads from 5am to 10am when you also get families using the roads," Mr Garske said.

"But a fully fledged fatigue management scheme would provide added flexibility for operators prepared to embrace accreditation and audits."

FATIGUE WARNINGS

- Interrupted sleep in the days leading up to motoring trips.
- Minor aches and pains, headaches, tired eyes.
- Boredom or fidgeting.
- Short attention span, tenseness, difficulty concentrating.
- Yawning, drowsiness, nodding off.

News & Features - April/May 2002

Amenities angst

Story by Chris Bishop

There is increasing unrest about stopping times in Queensland's rest areas.

Debate continues to rage about whether roadside amenities, invaluable aids in the fight against the road toll, encourage freeloading travellers.

Queensland has around 500 roadside rest stops. Consensus from road safety experts is that a network of strategically placed amenities on major highways allows people to break up long-distance trips and avoid fatigue-related crashes.

But current rules for extended stays have local tourist operators up in arms, as they believe they are missing out on much-needed revenue.

Caravan Parks Association of Queensland vice president Ken Illich said abuse of rest areas was having a negative effect on local economies and environments and had already forced some parks to the wall.

"People are lobbying for overnight facilities that are already in existence in nearby caravan parks," Mr Illich said.

"Why should ratepayers and taxpayers be subsidising other people's holidays in the form of added legal liability costs, cleaning fees and water supply charges at rest areas.

"Of course people are not going to pay for something if they can get it for free. Rest areas are important, but why not make them 50 km down the road from caravan parks, not just on their doorstep?

"And let's put the costs into perspective. Caravan park sites range from $12 to $30 a night, with all the facilities."

The Campervan and Motorhome Club of Australia (CMCA) publishes a members-only touring guide, which includes amenity locations.

CMCA State rest area and environment committee spokesperson Matt Moran said the majority of people were responsible but added there needed to be better enforcement of roadside amenity abuse, perhaps using cleaners as spotters.

"Rest areas are greatly appreciated. If our mob is staying in caravan parks all the time, it means there is less money to spend in towns," Mr Moran said.

"A lot of members are on retirement incomes and need to spread their money a bit."

Queensland's Department of Main Roads (DMR) is currently reviewing the Roadside Amenities Policy to try and balance the needs of tourists and businesses.

Time limits are at the top of the list.

Although rules vary in different locations, currently motorists can stay up to 48 hours in some rest areas in a continuous month-long period. But DMR is considering slashing the time limit to combat people who 'overstay their welcome'.

Although there is a $1500 fine in place for people who overstay, fines are rarely issued.

A DMR spokesperson said all parties had worked hard to make rest areas comfortable but perhaps they had made them too comfortable.

"We don't want people to abuse the system and we definitely don't want people living in those areas. At the same time, motorists should not have to stop on the side of the road," she said.

Signage in all rest areas will be reviewed, while DMR wants more structured and designated parking areas to avoid damage to surrounding properties. Installation of barriers is being considered.

Showers at rest areas east of the coastal range may also be removed to discourage lengthy stays.

DMR controls about a quarter of roadside rest stops, with the remainder shared between forestry and water authorities, the state parks and wildlife service, local governments and service clubs.

REST EASY

There are three main types of roadside amenities:

- Rest areas offer park surrounds with shade, picnic tables, benches and rubbish bins. Toilets, water, barbecues, showers and lighting may be provided.
- Heavy vehicle rest areas offer similar features but are more rudimentary.
- Commercial establishments can take the form of service stations, truck stop catering or a designated highway service town, which has coordinated its facilities to cater for road travellers.
- Stopping places are the most basic form of rest stops, with a sealed space off the road, usually for two heavy vehicles, or a point of interest stop.

Regular Items - February/March 2002

Sick of cars

With Jon Dee

There's nothing more reassuring than the smell of a new car. Ever since the car was invented, it's a feeling that motorists have treasured.

But following groundbreaking research, Australian scientists have warned that the reassuring smell of a new car actually contains high levels of toxic air emissions which can make some drivers ill.

We're all aware of the problems associated with exhaust emissions. But pollution inside our cars is something that hasn't received much attention.

So, what have scientists found?

According to a report by Reuters, a study by Australia's main scientific body, the Commonwealth Scientific and Industrial Research Organisation (CSIRO), found high levels of toxic emissions existed in cars for up to six months and longer after they left the showroom.

"Just as air inside our homes and workplaces is often much more polluted than the air outside, so sitting in a new car can expose you to levels of toxic emissions many times beyond (health guideline) goals," said Steve Brown, head of the CSIRO's air quality control research unit.

The toxic emissions they found included benzene, acetone, ethylbenzene and xylene isomers.

"To avoid some exposure to this toxic cocktail, people who buy new cars should make sure there is plenty of outside air entering the vehicle while they drive," Brown said.

In other words, keep your windows open.

The two-year study of three new vehicles found anecdotal evidence that drivers were becoming ill when they drove their cars.

A lawyer reported being ill with headaches, lung irritation and swellings for several days after collecting a new car and driving it for only 10 minutes. When he swapped his new car for an 18-month-old car, he no longer felt ill.

A public servant felt ill when driving a new government car for the first six months, a chemically sensitised person felt "spaced out" when driving any new car and a salesperson who regularly updated his car became lethargic on long trips.

The study found two new Australian-made cars had very high levels of volatile organic compounds, up to 64,000 micrograms per cubic metre, three to 10 weeks after manufacture.

A control group of people exposed to half this amount reported within minutes feeling discomfort, drowsiness, fatigue and confusion, headaches and eye, ear and nose irritation.

The CSIRO said the toxic air emission levels decrease 60 percent in the first month but were still well above the Australian recommended health level of 500 micrograms per cubic metre.

A third car in the study was imported to Australia, but four months after manufacture it contained high levels of toxic air emissions, recording 2,000 micrograms per cubic metre.

"This is still four times more than the recommended goal and remains a concern," said Brown.

Regardless of whether you've just bought your car, or you're driving a new hire car, the CSIRO message seems clear.

With new cars, they recommend that you keep your windows open for six months. Or at least until the 'new' smell fades away.

News & Features - June 2000

Gas Busters

by Chris Bishop

Life-saving technology aimed at preventing carbon monoxide poisoning in vehicles is at the crossroads in terms of its potential worldwide applications, according to industry specialists.

For the past 18 months, researchers at the Royal Melbourne Institute of Technology (RMIT) have been developing a relatively small and inexpensive vehicle air quality monitoring system. Aimed initially at prevention of suicides in cars, the monitor also is proving effective in battling the effects of poor air quality in today's well-sealed vehicle cabins.

Some estimates have fatigue accounting for as many as a quarter of all crashes and poor in-cabin air quality can increase fatigue problems. RMIT researchers found the use of the recirculating function on ventilation systems can allow levels of oxygen to drop and carbon dioxide (CO2) concentrations to increase. The mix can cause a range of symptoms from headaches to drowsiness, fatigue and poor coordination.

Their tests showed that oxygen levels in car cabins could drop below established standards within 20 minutes, with an accompanying rise in carbon dioxide.

The RMIT monitor has CO, O2 and temperature sensors which are read electronically every second. When carbon monoxide (CO) or CO2 concentrations exceed set limits a warning signal is activated, or the monitor can be linked into the car's engine management system to switch the vents to fresh air, lower windows or shut off the engine.

In suicide simulations, researchers found oxygen levels could plummet to 7 percent after 30 minutes and carbon monoxide levels were off the measurement scale by that time.

Researchers say there needs to be further research to refine the monitor in terms of its packaging, placement, anti-tampering features and final settings before it can fulfil its potential use by automotive manufacturers around the world. There also are plans to reduce the monitor to the size of a car key fob.

RMIT project leader Professor Wojtek Wlodarski said there needed to be short and long-term testing in fleet applications to provide further analysis of the monitor's effectiveness. Prof Wlodarski said work on the detection of carcinogens such as benzene in the cabin and the effect of different numbers of passengers on cabin air quality also was required.

"We are in the middle of the river and operating on a shoestring budget at the moment," he said.

It is estimated the device could cost as little as $20 a unit to be mass produced.

The project initially was backed by the Federal Government, the Australian Automobile Association and RMIT, with input from other health and regulatory bodies.

Australian Medical Association vice president Sandra Hacker said the anti-suicide project was long overdue, as it would prevent access to the very Australian problem of carbon monoxide poisoning from cars. Dr Hacker said the technology had grown with the cabin air quality applications and she now hoped it would be incorporated as an Australian Design Rule (ADR) for vehicle manufacture.

She said carbon monoxide suicide was perceived as quick and painless but also could be incredibly expensive for the community if it failed, as people could sustain massive brain damage from very small quantities of the gas.

Carbon Monoxide (CO) is a product of the combustion of carbon-rich fossil fuels.

The exhaust systems of motor vehicles produce the gas which is colourless, odourless and poisonous.

When inhaled, CO combines with haemoglobin, the oxygen-carrying part of red blood cells, which reduces the capacity of those cells to carry oxygen. Because CO binds so well to haemoglobin, it can cause cells and tissues to die from a lack of oxygen.

More than 600 Australians chose their car as a suicide method in 1998.

Ventilation systems, seals and panel gaps all allow gases to enter the vehicle cabin.

The RMIT study suggests passengers switch the ventilation mode to fresh air or open their windows when driving in heavy traffic.

There currently is no standard for air quality in car cabins, although work is being done by Standards Australia to finalise a standard for air quality in car cabins.

Regular features - February/March 1999

Around the Traps

Laws fight fatigue

The fight against fatigue in the heavy vehicle industry was bolstered recently by the introduction of new driving hours laws in Queensland.

The reforms are designed to make driving hours more uniform and to crack down on companies that force bus and truck drivers to spend long hours at the wheel.

The management of fatigue will be handled through a regulated approach based on the 12-hour driving day, and a optional transitional arrangement for the trucking industry which allows more flexibility in working hours.

National Road Transport Commission chairperson Stuart Hicks said the laws would send a strong message to those transport companies which gambled with road users' lives by making drivers work long hours.

Victoria already has similar rules and New South Wales, Tasmania and South Australia are set to join the national scheme.

The Northern Territory and Western Australia deal with fatigue management under their occupational health and safety laws.