It does not take much to cross the line of safety as the road variables such as road camber and crosswinds as well as vehicle parameters such as slump type can change frequently. Drivers need to adopt a very conservative speed - less than they think is the maximum safe speed - so as to maintain a greater safety margin when approaching, entering, driving through or departing a bend, roundabout or corner.

The findings of this safety study have been used by Holcim to produce a training video. The video aims to provide drivers with a better understanding of the influence of speed and moving loads on vehicle stability. Subsequently, videos relevant to other types of truck have been produced - all with the aim of improving understanding and reducing the risk of truck rollovers.

Acknowledgements

This safety study was a collaborative effort between ARRB Group and Holcim. For the purpose of the study, Holcim made available their facilities, staff, vehicles and drivers and funded the safety study to be completed via the testing and simulation methods employed by ARRB Group.

References

National Transport Commission 2008, Performance based standards scheme: the standards and vehicle assessment rules, National Transport Commission, Melbourne.

Australian major accident investigation report on 2009 NTI Data: Heavy vehicle losses > $50,000

by Owen P. Driscoll, National Manager – Industry Relations, National Transport Insurance, Director – TruckSafe Pty Ltd – Australian Trucking Association, National Coordinator – National Truck Accident Research Centre

Introduction

Fundamentally, truck crash research is a prerequisite for achieving sustainable improvements in road safety, with benefits not only for customers but for all transport operators who share the road.

This report continues a unique series of longitudinal studies involving the tracking of Australian heavy vehicle crashes where National Transport Insurance (NTI) is the insurer, since 1998. These studies are undertaken every two years by the National Centre of Truck Accident Research.

NTI provides insurance, risk appraisal, claims and accident management services to the road transport and earthmoving industry. It currently insures more than 131,000 items of plant and equipment having an insured asset value of $9.4 billion. Since 2002, NTI has settled 41,000 notified losses (per item) with claims payments exceeding $570 million (AUD).

The research into major losses in 2009 follows quantitative studies completed on major truck crash incidents reported during 2003, 2005 and 2007. Since the initial study conducted in 2003, NTI-insured equipment numbers has grown by 48% whilst major crashes over (>) $50,000 have increased marginally by 7%. There was a 1% decrease in the number of major incidents reported, when compared to those investigated for the prior period, the average financial loss per incident increased by 6.2% to $136,472. For the duration of the 2009 period, 323 major incidents were reported at a total cost of $44 million.

Methods

This research focuses on primary data specifically reviewing major heavy truck crashes managed by the National Claims Centre. Such incidents have an aggregate cost greater than (>) $50,000. The loss per incident includes property damage, crash scene repatriation, load transhipment, salvage, recovery and towing outlays. Losses in relation to freight on-board and personal injury are not included. This research concentrates on heavy vehicle accidents in the hire and reward freight sector with vehicles having a payload exceeding five tonnes where National Transport Insurance (NTI) is the insurance underwriter.

Findings

In terms of portfolio growth, during 2007, NTI insured 113,526 items that increased to 120,567 by the end of 2009. Representing a growth of 6.2% in numbers, the crash frequency rate, in relation to major incidents > $50,000, improved to 2.7 incidents per 1000 units. Figure 1 shows rates in years 2003, 2005, 2007 and 2009.

Information compiled and analysed in the 2009 study found the worst day of the week to be Monday with 18.9% of major incidents occurring within this 24 hour cycle (Figure 2). This was slightly down on prior results; nevertheless, Mondays and Tuesdays still accounted for 37.5% of crashes. This is consistent with earlier studies.

Otherwise, excluding Saturdays and Sundays, crash rates progressively decreased during each week before a marginal increase on Friday. Irrespective of the fact that for various freight tasks the working week may commence on different days, it could be argued that there is a correlation with a driver's fitness for duty, or lack thereof, where they have not worked and not had sufficient rest throughout the weekend.

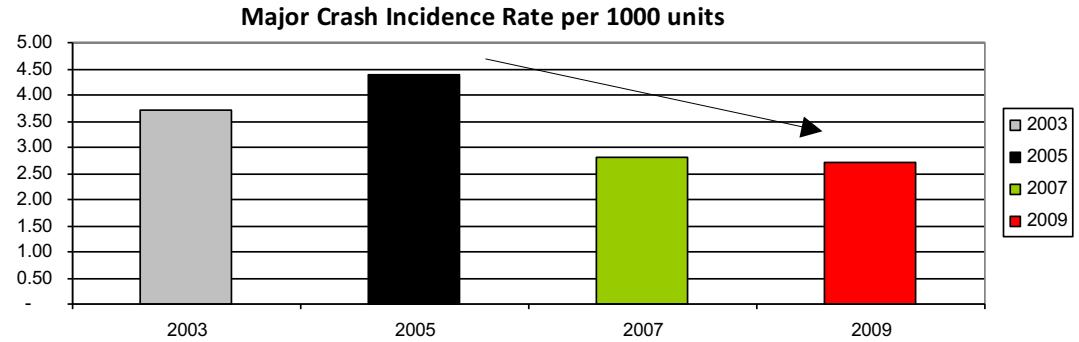

Figure 1. Crash rates of NTI-insured vehicles per 1000 units

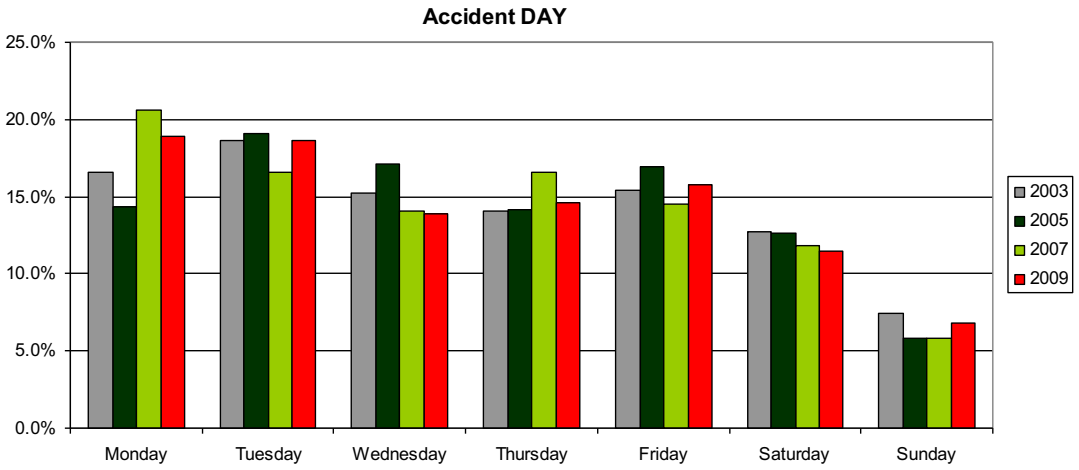

Figure 2. Per cent of crashes by day of week

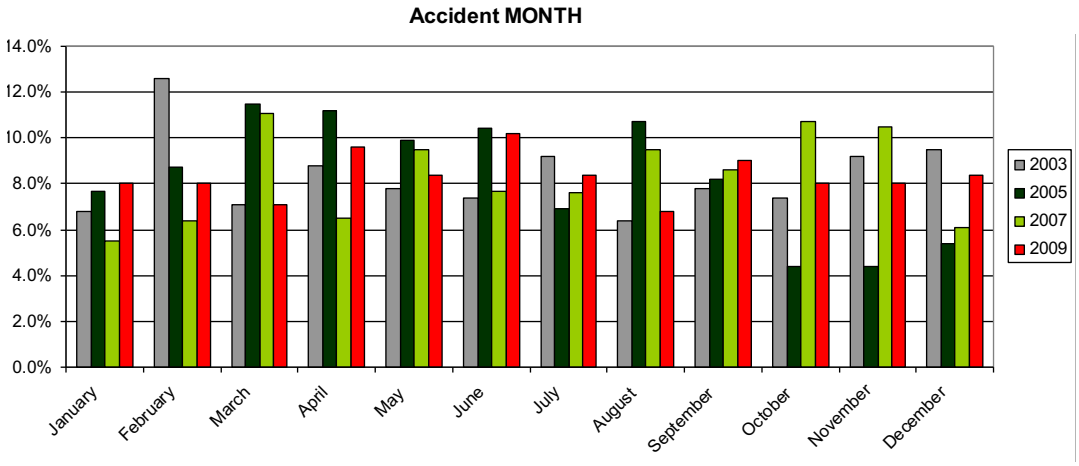

Figure 3. Crashes by month for years 2003, 2005, 2007 and 2009

It was also found that of single vehicle accidents (SVAs), 54.5% occur during the 3-day period Monday to Wednesday, with 27.5% between midnight and 0700. The question of increased pressure on the freight task during this period of the week is relevant.

A further investigation with regard to driver fatigue and day of week is detailed later in this report.

Data reviewed in the 2009 study found that the worst month was June with 10.2% of major incidents occurring in this period. Further, April incidents grew substantially when compared with previous studies (Figure 3). Unseasonal autumn weather conditions, particularly in central and eastern regions may have contributed to a marginal increase in crash incidents during this period.

Whereas in the past, accidents increased noticeably during the months of October through November, this was not apparent in the 2009 research.

Information processed and analysed in the 2009 study found yet again that the worst time of day was between 11.00 – 14.00 hours. This was consistent with findings in the 2005 and 2007 reports although these results differed from the 2003 study that found the predominant period to be between 04.00 – 06.00 hours. Taking into account all studies, it was evident in the 2009 research that incidents between the hours of midnight and 06.00 fell significantly.

It is further noted that there was a spike between the hours of 15.00 and 18.00 with fewer incidents reported between 20.00 and midnight.

Indisputably, the research consistently finds that most major crashes occur when most traffic is using the network. Further reference to the impact of fatigue and crash times is made later in this report.

Research into major incidents in 2009 again noted that New South Wales continued to dominate major crashes (36.5%), reporting 36.5% of crashes. However, this was lower than the 2007 result (30.7%) which had been an improved result on 2005 (35.4%) and 2003 (43.1%). Arguably the most recent research is a more indicative result of the NSW performance. However, 33.8% of road freight travels through or within NSW [1] thus putting the result into perspective. Statistically, the results for Queensland & WA result remained unchanged, whilst major incidents had decreased in Victoria, Tasmania and the ACT. South Australia experienced a marginal increase in major truck crashes. Figure 4 overlays the amount of freight carried through each state and territory, with percentages of crashes occurring in each state or territory.

With respect to crash location, the 2009 research highlights a worsening situation on Australia's National Highway 1. In earlier published studies, one in six major truck crashes had taken place on this segment of the network whereas this recent research concluded that almost 23% of major crash incidents occurred on the national highway. The previous study in 2007 identified an improvement on the Pacific Highway NSW; however, that outcome was not sustained, with 2009 showing an increase in major truck crashes in this research period (Figure 5).

It is noteworthy that losses on the Hume Highway have dropped substantially since 2003. No doubt this can be attributed to the duplication of the Hume in Victoria and more

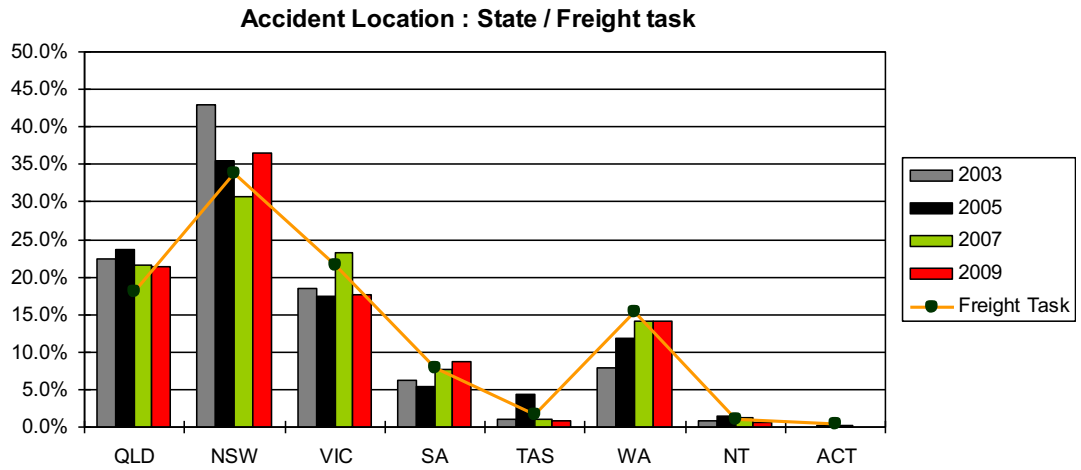

Figure 4. Crashes and freight movements by state

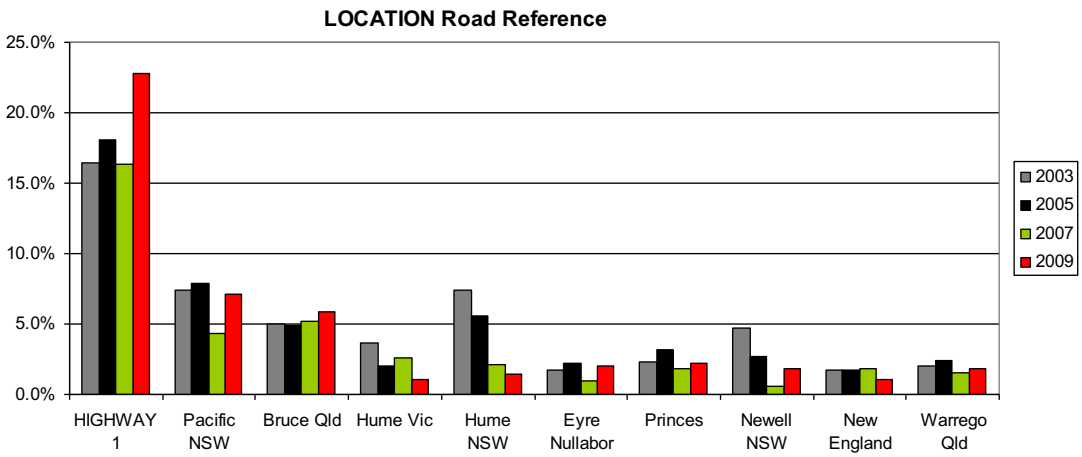

Figure 5. Location of crashes by highway names

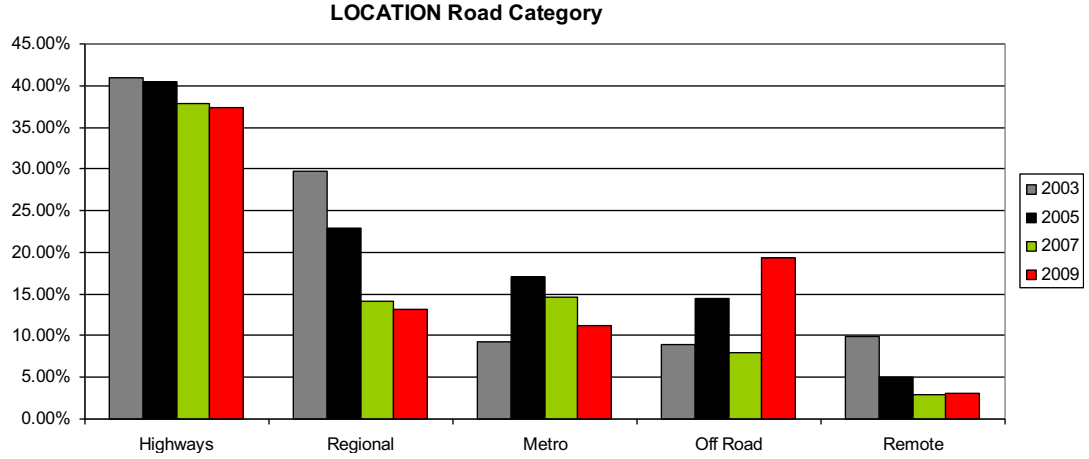

Figure 6. Location of crashes by road category

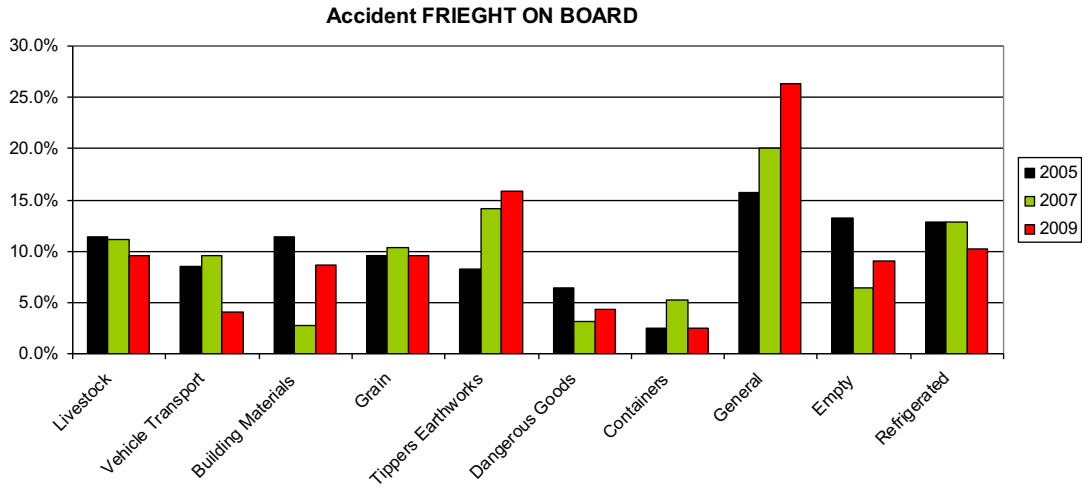

Figure 7. Crashes by freight carried

recent works from Wodonga to Woomargama, Holbrook, Kyemba, Gundagai and Coolac in NSW. Queensland's Bruce Highway experienced no improvement and remains as one of the most dangerous highways on the national network for all road users.

Overall, 37% of major crash incidents occurred on designated highways with improved results in metropolitan, regional and remote areas (Figure 6). The newest concern is that of accidents which have been identified as 'off road' and therefore outside the ongoing monitor of road enforcement agencies. Such losses were associated with vehicle theft, malicious damage or fire, food processing installations, road works or mine sites.

The 2009 research found that vehicles with general freight on board at the time of loss accounted for 26% of major incidents. There was a marginal improvement in grain haulage and livestock each of which accounted for 9.6% of major truck crashes (Figure 7).

The crash rate of bulk tippers, specifically working locally on earthworks, increased to 15.8% of major incidents. This result is up from 5.6% in 2005 and is evidence of the expanding fleet in metropolitan operations. Refrigerated goods and car/carrier hauliers, however, showed improved results.

Vehicle configurations, as shown in Figure 8, were introduced into NTI's research into major incidents in 2005. Such criteria were appropriate given the expected growth in the Australian freight task with an escalation in the size of articulated trucks and the augmented uptake of larger articulated truck combinations leading to a higher utilisation of multi-combination equipment. Factors contributing to the growth in the road freight task include improvements in inter-urban road infrastructure, increased demand in time-sensitive freight services and increased average vehicle carrying capacity.

The freight task (excluding rigid vehicles), based upon (articulated) loaded tonne-/km travelled, is shared between semi-trailers carrying 38% of all (artic) freight, with B-doubles carrying 46% and the rest being transported by roadtrains and an assortment of multi-combination units [2].

The share of freight carried by B-doubles continues to grow at 2.2% per annum [3]. The number of B-doubles has increased substantially since 2000, but their average annual kilometres have not increased at the same rate [4].

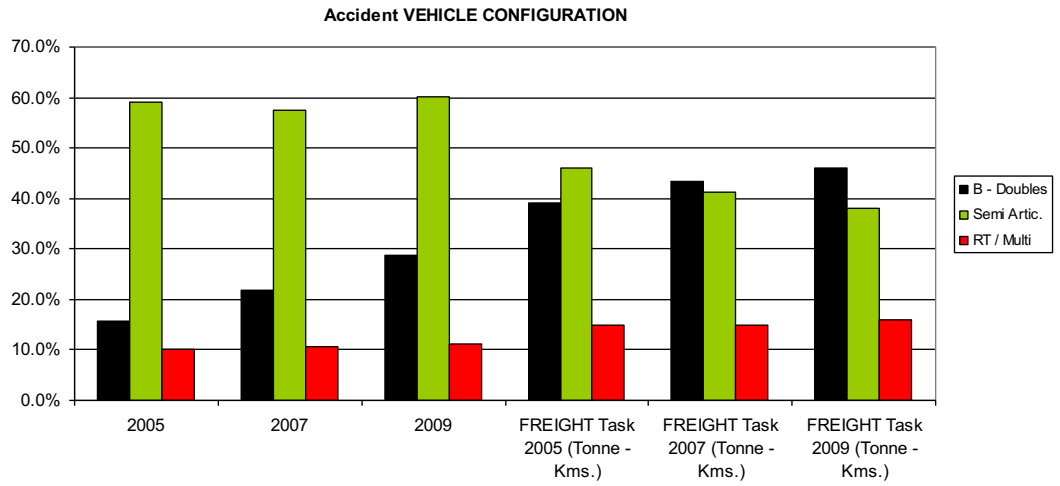

Figure 8. Crash percentages by vehicle configuration

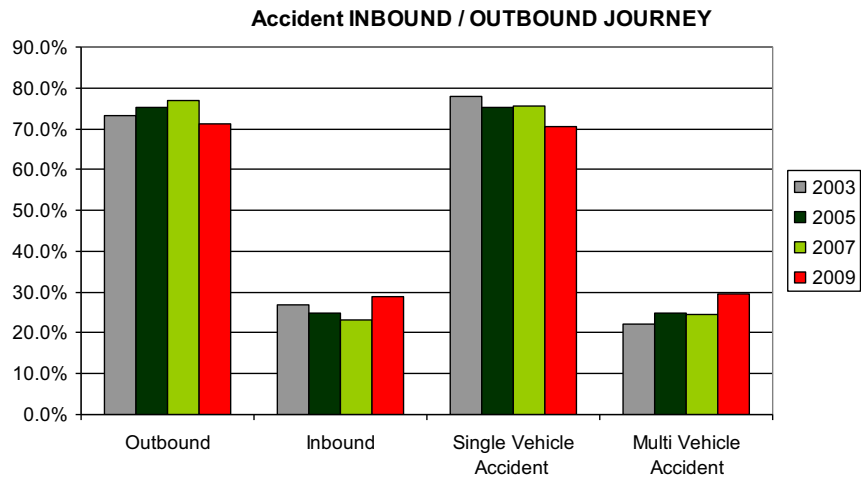

Figure 9. Crashes by inbound and outbound journeys, and by single and multi-vehicle crash

In 2009, semi-trailers were disproportionately over- represented with 60.1% of major incidents. This result has marginally worsened since the prior study irrespective of the fact that the freight task in this configuration has decreased to 38%. As previously reported, this result is to be expected given the fact that in many instances, this configuration operates on the worst of the network, with ageing equipment and drivers with less experience.

Importantly, with market pressure for higher capacity equipment, the result again confirms that the larger the vehicles, the safer they are. B-doubles now carry 46% of freight and accounted for 28.8% of major truck crashes. This followed the 2007 result where B-doubles were better performers with 21% of losses. This of course can be attributed to the fact that B-doubles are newer, better-maintained vehicles, with experienced and highly-trained drivers using the best of the road network.

Research into the aspect of whether a journey is inbound or outbound from home-port assists with fatigue management and provides indicators of the general health and wellbeing of drivers during the course of their work program (Figure 9).

Confirming past studies, it has again been established that a high proportion of crashes in 2009 occurred on the outbound leg (71.2%). Historically, the vast majority of severe incidents occur on outbound trips and, ironically, not on the return journey where the expectation would be that the driver has become fatigued during the journey.

Given that such incidents are found to occur on outbound legs, from a risk management perspective the driver must be required to satisfy management that he or she is 'fit for duty' at the commencement of the task. Additionally, stress created at the commencement of the trip through inefficient loading practices, late departures and unachievable time slots ultimately leads to driver fatigue. It is to be expected that the 'Chain of Responsibility' legislation will influence this current result.

Yet another indicator that fatigue influences major crash incidents is that of research findings into single vehicle accidents. Again it is noted in Figure 9 that seven out of ten major truck crashes are incidents where no other vehicle was involved. The 2009 result is an improvement on previous results; however, there was an increase in multi-vehicle incidents.

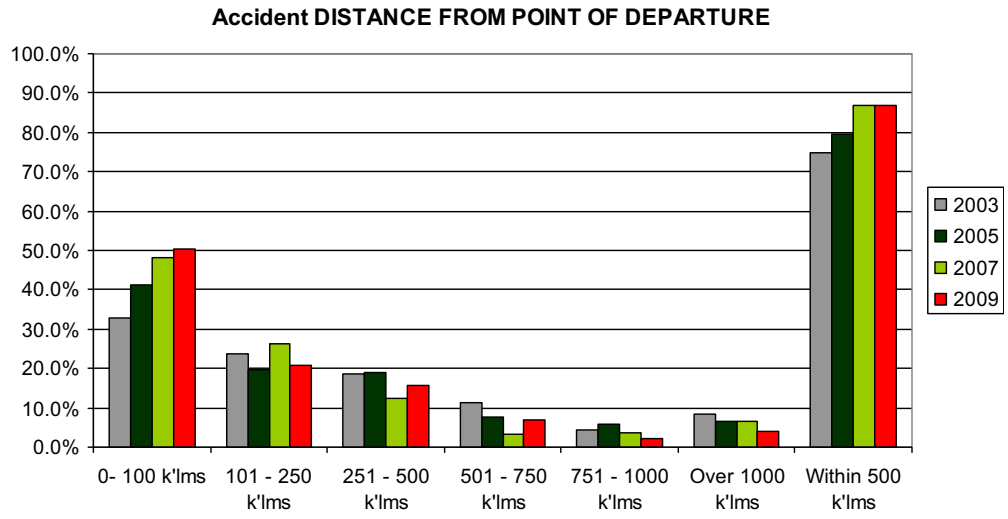

Figure 10. Crashes by distance from point of departure

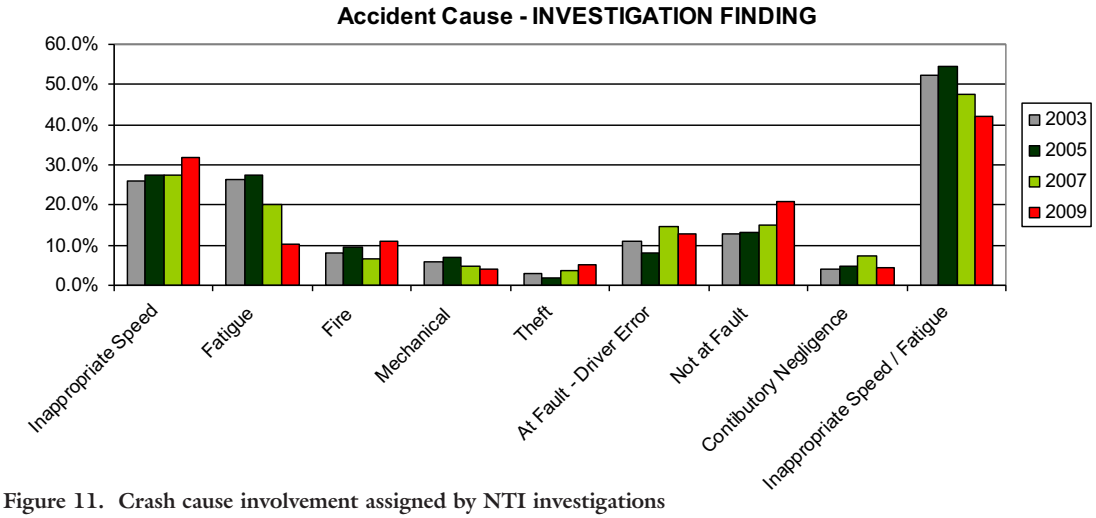

Figure 11. Crash cause involvement assigned by NTI investigations

Furthermore, in cases of serious multi-vehicle crashes, it was found that the driver of the heavy vehicle was negligent 44% of the time. In fatal crash incidents involving more than one vehicle, the other driver was at fault in 82% of cases. This report questions the relevance of road safety agencies highlighting the increase of fatalities involving heavy vehicles given that in most cases the driver of the goods-carrying vehicle is not responsible. Undoubtedly there needs to be an increased safety focus on all road users, particularly those sharing the roads with heavy vehicles.

The 2009 evaluation established that 86% of major crash incidents occurred within 500 kms of point of departure, irrespective of whether the journey was outbound or on the homeward leg. This is an identical result to prior research. Further, more than 50% of incidents occurred within 100 kms of the point of commencement of the journey (Figure 10). The greatest exposure is within the initial five to six hours of a journey, hence the importance of strictly monitoring 'fitness for duty'.

Figure 11 shows the risk factors that were determined by NTI investigators to be involved with the crashes, irrespective of those alleged by the driver at the time of the incident. This most recent research found that inappropriate speed for the prevailing conditions accounted for 31.8% of crashes. This was an increase on past findings. However, whilst it was established in the 2007 report that fatigue was the cause in 20.3% of major crashes, this improved substantially to 10% in 2009. No doubt this improved result may be attributed to a range of reasons not limited to the 2008 introduction of driving hours reform.

This improved result reduced the combined speed/fatigue factor to 41.9% although all of the gain here was in the fatigue result. These two causal factors remain a major concern, even though there is strong evidence of improvement. Inappropriate speed for the conditions is a training and vehicle management issue.

Vehicle theft continued to be insignificant and there was a marginal increase in losses attributed to fire. There were less incidents involving mechanical failure.

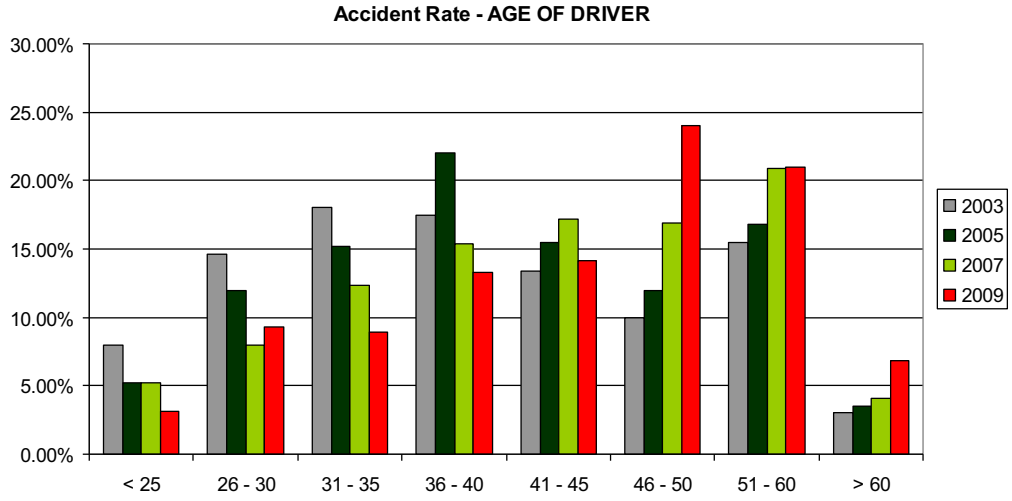

Figure 12. Crash rates by age of driver

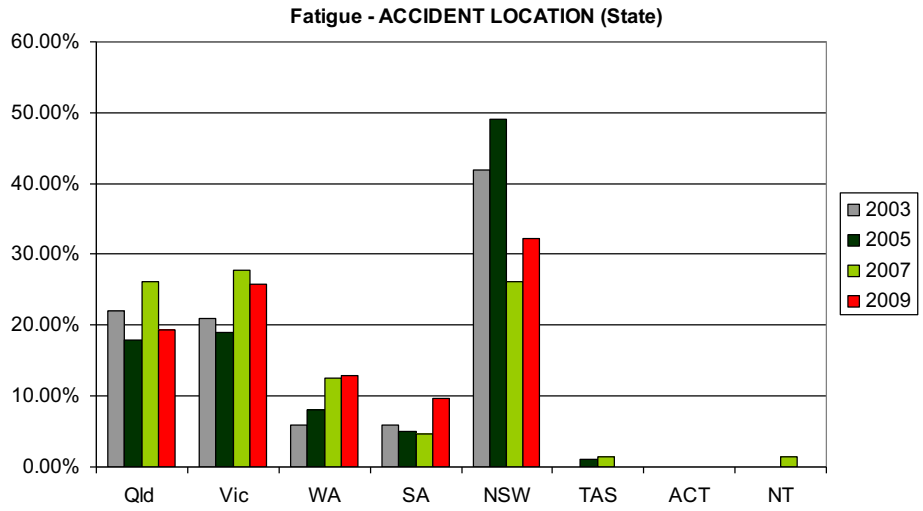

Figure 13. Fatigue-involved crashes for each State and Territory

The 2009 study found that drivers under the age of 45 were involved in considerably fewer accidents proportionally than was found in the investigations conducted in 2003, 2005 and 2007 (Figure 12). Again, drivers over the age of 45 were involved in higher proportions when comparing the studies, but this could obviously be attributed to the fact that the average age of all heavy vehicle drivers continues to escalate. Consequently, the average age of drivers involved in major truck crashes continues to increase: from 38.5 years in 2003, to 40.5 years in 2005, 43.2 years in 2007 and 44.8 years in 2009. Further, the 2009 research found that in 27.8% of serious truck crashes, the driver was over 50 years of age.

Although it could be argued that many insurers desist from the practice of accepting drivers under the age of 25 years, NTI for some time has guardedly supported the acceptance of younger drivers which would suggest that those accepted under 'managed and monitored' apprenticeships are returning improved results. In 2009, as in prior research, there was no evidence of drivers under the age of 25 years being at increased risk of involvement in major truck crashes.

In 10.1% of major incidents in the 2009 study, fatigue was found to be a significant cause. This was an improved result as stated earlier in this report. Although results improved in Queensland and Victoria, there was a notable deterioration in NSW and SA after a substantial improvement in 2007. The Western Australian result worsened marginally at 12.9% of large crash incidents reported in that state. There were no reported incidents in Tasmania, the ACT or the Northern Territory (Figure 13).

The 2009 study also establishes that 80.06% of fatigue-related incidents occurred within 500 km from commencement of the journey, either outbound or on the homeward leg. This finding was a substantial increase on 2007 (72.3%). Some 81% of major crashes found to be attributed to driver fatigue occurred on outbound journeys within 500 km of the point of departure. This result followed the 2007 finding of 89.3%. This finding raises obvious concerns about driver management and particularly fitness for duty. The average age of fatigued drivers involved in these incidents (44.3 years) continues the trend of

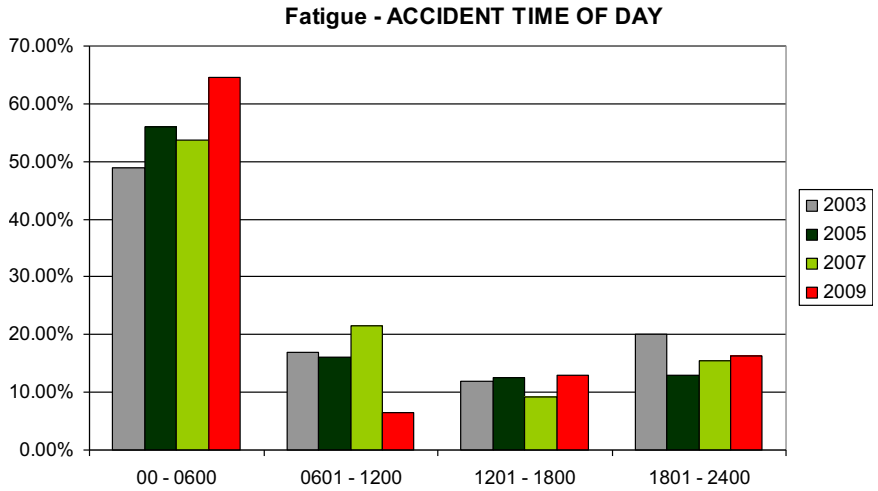

Figure 14. Fatigue crashes by time of day

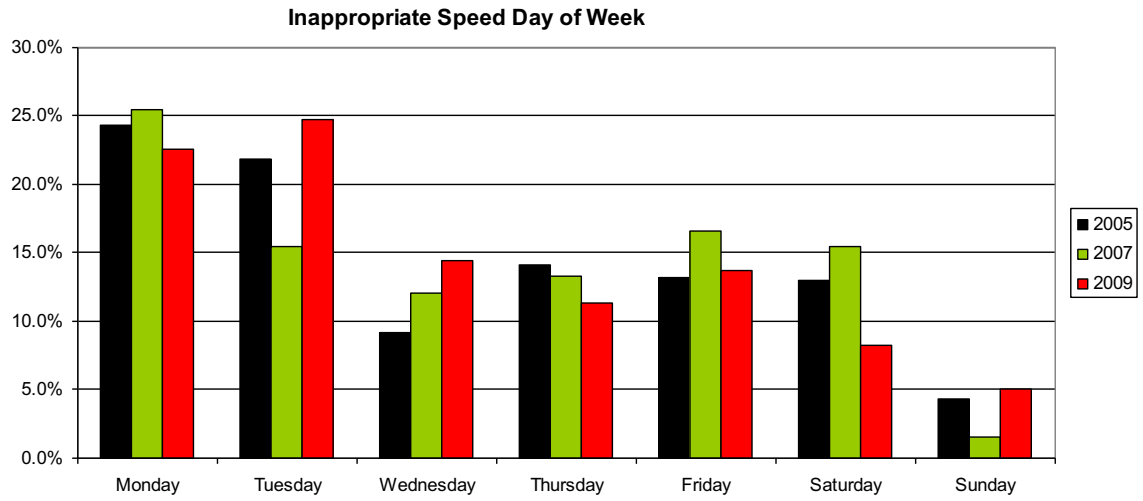

Figure 15. Crashes involving inappropriate speed by day of week

earlier findings: 36.75 years in 2003, 40.56 years in 2005 and 42.5 years in 2007, confirming that the driver pool is ageing.

Although this research established less fatigue- related serious heavy vehicle crashes, 64.5% of accidents deemed to be fatigue-influenced were reported between the hours of midnight and 06.00. This followed the 2007 finding of 53.8%, with 56% in 2005, and continued to be a serious concern for those operations continually working through these hours. As seen in Figure 14, there was a substantial improvement in the period from 06.01 hours to midday.

Inappropriate speed for the conditions continues to be the predominant cause for heavy truck crashes in Australia. The 2009 study found that 31.8% of reported incidents could be attributed to inappropriate speed, particularly when altering direction. Although showing a marginal increase since prior studies, this result was comparable with previous years: 27.4% of major accidents attributable to inappropriate speed in 2007, 27.3% in 2005 and 26.1% in 2003. Travelling during the early part of the week presents the most risk: as seen in Figure 15, Mondays and Tuesdays accounted for 47.3% of losses attributed to inappropriate speed.

Summary of Findings 2009

The key findings from an analysis of the 2009 NTI crash data are:

- Inappropriate speed for the conditions continues to be the predominant cause for heavy truck crashes in Australia. The 2009 study found that 31.8% of reported incidents could be attributed to inappropriate speed, particularly when altering direction.
- Fatigue and inappropriate speed were found to be responsible for almost one in two serious truck crashes (41.9%).
- Fatigue- related serious truck crashes had reduced by 50%.
- 1 in 4 serious truck crashes occurred on Australia's National Highway 1.

- Since 2002, there has been a 27% decrease in serious truck crash incidents reported (damage > $50,000). When comparing the 2009 result to crashes investigated in the 2007 period, the average financial loss per incident increased by 6.2% to $136,472.
- With 18.9% of losses, Monday was found to be the worst day. Mondays and Tuesdays account for 37.5% of serious crashes.
- June and April were the worst months for major incidents.
- The worst time of day is 11.00 – 14.00 hours.
- NSW, with 36.5% of major truck crashes, experienced deterioration since the 2007 study. This could be attributed to an increase in crash incidents on the Pacific Highway.
- It is noteworthy that losses on the Hume Highway have dropped substantially since 2003 from 11.1% to 2.5% of major truck crashes.
- Semi-trailers are over-represented with 60.1% of major crashes, though only responsible for 38% of the articulated freight task (loaded tonne- /- km).
- B -Doubles are the safer alternative, carrying 46% of the freight task with only 28.8% of major accidents.
- In 7 out of 10 serious truck crashes, no other vehicle is involved.
- In 86% of serious truck crashes, the vehicle was within 500 km of point of departure. 50% of incidents occurred within 100 kms.
- In 71.2% of serious truck crashes, the vehicle was involved in an outbound journey from home base.
- In 29.5% of serious truck crashes where another vehicle was involved, the truck driver was totally responsible in 44% of the incidents.
- In fatal crash incidents involving another party, the other driver was at fault in 82% of incidents.

Conclusions

The Australian road freight sector remains in transition. Fundamentally, the freight task is in growth; nevertheless, weak trading conditions on the high volume eastern seaboard are being experienced as demand contracts. Operations without a specific niche and long term, well- established customers are further exposed to fluctuations in the cost of doing business. Environment, equipment finance and safety compliance outlays remain a growing concern for the foreseeable future with expected long term ramifications.

Be that as it may, road transport safety in Australia continues to maintain a high standard and, as evidenced in this research, results continue to improve particularly with regard to the frequency of serious truck crash incidents. Road quality and infrastructure, particularly rest areas and parking bays, are an ongoing concern in regional areas and of an improved standard on new motorways; however, in country areas and some major highways, road quality is sometimes severely affected by lack of funding and poor maintenance.

During the course of these studies since 2003, the insurer's portfolio (vehicles insured) has increased by 48% whilst major crash incidents have increased marginally by 7%. In the 2009 research, the overarching finding is that there were fewer major truck crashes recorded. However, such losses have increased by 6.2% in average cost of claim when compared to prior research.

Fatigue-related crash incidents have reduced substantially during the period since 2003.

On a case-by-case basis, to ensure consistency of the comparable model, the National Centre of Truck Accident Research reviews all truck accidents where material damage exceeds $50,000. This study of major truck accidents focuses on claims settled during 2009. This is the fourth in a series of quantitative evaluations conducted every two years tracking the behaviour of a cohort of Australian heavy vehicle operators.

Acknowledgement

The National Centre of Truck Accident Research is an independent research facility wholly funded by National Transport Insurance in Australia & New Zealand. NTI supports the analysis of its data and other available data with the view that effective research focusing on current information is crucial to a greater insight into serious heavy vehicle crashes.

References

1. BITRE Report 121 - Road freight estimates and forecasts in Australia: interstate, capital cities and rest of state, DOTARS ID INFRASTRUCTURE09202 2010
2. ATRF 2010 David Mitchell & others BITRE
3. ABS Survey of Motor Vehicle use 1992-2005. Australian Bureau of Statistics http://abs.gov.au / ausstats/abs@nsf/productsbytitle/A01D73D3FC683459CA256B7C007DF414
4. National Transport Commission; http://www.ntc.gov.au National Transport Policy.

   Australian Transport Safety Bureau http://atsb.gov.au/publications/2004nti_working_paper.aspx

   DoTaRS Bureau of Transport and Regional Economics – Road freight productivity – trends and prospects June 2007.

   National Transport Insurance – National Centre of Truck Accident Research – Studies 1998 – 2002, 2003, 2005, 2007.

   National Transport Insurance (Major Incidents) Crash Data 1998 – 2009

   National Transport Insurance Risk Services unit – Accident Investigation.

Editor's note: This is an edited (slightly abridged) version of the NTI Report. The full report can be viewed at www.nti.com.au, as can previous reports referred to in this article.