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30 August 2019

Dr Gillian Miles
Chief Executive Officer and Commissioner
National Transport Commission
Level 3, 600 Bourke Street
Melbourne VIC 3000

Dear Dr Miles,

National Transport Commission Issues Paper
Vehicle Standards and Safety August 2019

Firstly thank you for the opportunity to provide a submission to the National Transport Association Issues Paper on Vehicle Standards and Safety.

This submission is being provided by Advanced Braking Technology Limited ("ABT"). ABT is an Australian company that designs, manufactures and supplies innovative braking solutions to customers around the world. The industries in which our customers operate are diverse and include defence (the Hawkei Project for Thales Australia and the Commonwealth of Australia), mining, civil construction, waste management and we are also working with operators within the heavy haulage and logistics industry.

Whilst this submission may not address the specific questions outlined in the Vehicle Standards and Safety paper, we believe that the issue of brake technology is an important aspect of the Heavy Vehicle National Law review and should therefore be considered when developing policy.

When reviewing the causes and circumstances around heavy vehicle related road fatalities there is a high reliance placed on the heavy vehicle operators to make the right choices. This puts a lot of responsibility on the operators to manage these risks while trying to run an efficient business.

When looking at the National Road Transport Associations Hierarchy of Risk Control, we believe increased focus needs to be placed on implementing additional engineering controls. This would reduce the risk for the operator and allow them to focus on their core business with the confidence that the equipment that they are using will not only keep them and their employees safe, but also the general road user, providing them with a more productive, efficient and safer business.

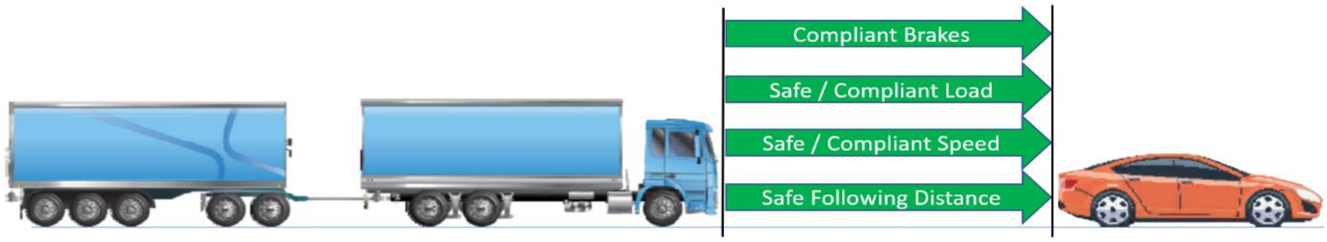
When reviewing the NTC's draft regulatory principles for improving vehicle standards and safety, there is a proposal that suggests using an engineering control solution would allow the operator to focus on being more efficient with the confidence that they are operating safer engineered equipment. The other three proposals are administrative in nature and include inspection controls which may make the operators less productive (see table below).

NRTA Hierarchy of Risk Control

		Aspirations for a better law	Future HVNL Focus	HV Life Cycle Stage
Most Effective	**Remove the hazard completely**			
	Substitute with something safer			
	Isolate the hazard from people			
	Use engineering controls	**Draft regulatory principle 1:** Encouraging safer vehicles	The future HVNL should promote greater use of vehicles that perform to higher standards and deliver productivity benefits. It should support the use of safer vehicles from other markets and recognise and encourage the use of safe technology.	**Build & Design** (Design)
	Use administrative measures	**Draft regulatory principle 2:** Effective maintenance & inspection	The future HVNL should support effective, flexible, risk based maintenance regimes to improve safety outcomes. It should support efforts to bring consistency to inspections.	**In-service** (Maintenance & Inspection)
		Draft regulatory principle 3: Effective, repair & clearance of defects	The future HVNL should support proactive, efficient identification, repair and clearance of defects. It should support getting vehicles back to service quickly.	**In-service** (Damage, Defect & Repair)
		Draft regulatory principle 4: Common sense approach to minor breaches	Technical breaches that do not pose a safety risk to operators, drivers or other people should be managed proportionally	**In-service** (Operation)
Least Effective	**Personal Protective Equipment**			

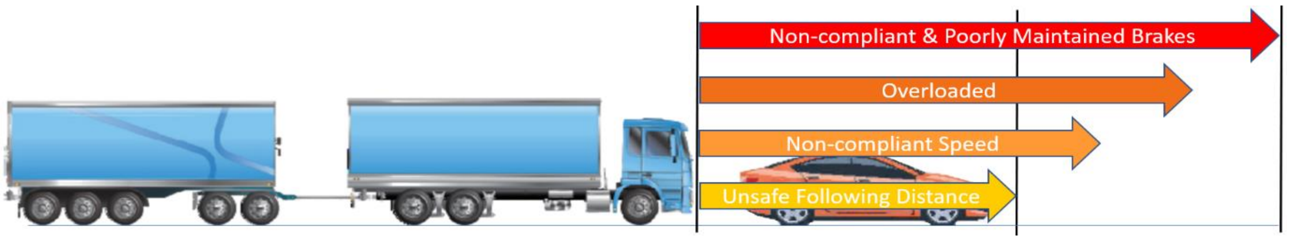
The biggest challenge when trying to avoid impact with another vehicle or obstacle is the ability to bring the vehicle safely to a standstill before impact occurs (see below).

Safe Heavy Vehicle Braking



Increased weight/load, combined with increased speed results in a longer safe braking distance, this situation puts additional demand on the performance of the braking system of the vehicle, which if not maintained and serviced correctly will result in a major vehicle failure (see below).

Unsafe Heavy Vehicle Braking



Two key areas which need to be addressed include:

1. Managing speed and following distances is key to effective braking. Implementing an autonomous emergency braking (AEB) system will assist the driver to ensure safe following distances that will allow the vehicles brakes to bring it to a standstill safely. This will also assist the driver in braking at the right time to avoid an accident, while also not abusing the brakes thereby avoiding premature brake pad wear, ensuring safer braking support.

   Implementation of an autonomous emergency braking (AEB) system, which Canberra is currently considering making mandatory for new heavy vehicles, will assist in mitigating this risk. Assistant Minister to the Deputy Prime Minister Andrew Gee said the RIS (Regulation Impact Statement) proposes to adopt AEB in new trucks because it believes the technology to be the most effective countermeasure available.

2. In addition to the introduction of autonomous emergency braking technology, effective and disciplined maintenance of the brake system is a necessity. To assist in achieving the best possible braking performance at all times, a fully enclosed wet brake prolongs the life of the brakes assisting in mitigating the risk of poorly implemented maintenance of vehicles. Enclosed wet brakes will also assist in protecting the brakes from contamination which could impact the performance of the brakes in an emergency situation, especially in regional areas and in off-road working environments where brake damage is an issue for operators.

In addition to the above, the implementation of an enclosed wet brake system would have the added benefit to reducing overall heavy vehicle emissions. Heavy vehicle emissions do not result in road fatalities, but it does contribute to the health and wellbeing of the general public and the environment.

Below is an extract from the National Transport Commission with regards to the impact that heavy vehicles have on the environment:

"The transport industry is one of Australia's fastest-growing contributors to carbon emissions, accounting for 16 per cent of our nation's emissions. Excessive engine brake noise is also recognised as a public health issue. Better environmental outcomes, such as reducing emissions in the transport industry is a strategic priority for the NTC.

The NTC researches and establishes model laws addressing issues such as engine brake noise. We also deliver project initiatives such as performance-based standards and B-triples that are anticipated to reduce carbon emission by around 8 million tonnes, contributing to a better environment for all Australians."

A fully enclosed wet brake system, in either a wheel-end or driveline application, would also assist with emergency braking as they are designed to also function as a Fail to Safe brake. Fitting these types of failsafe brakes to heavy vehicles would assist in maintaining control of a loaded vehicle when descending steep declines.

There have been several fatalities in Australia in recent years as a result of heavy vehicles losing control when traveling down steep descents. As just one example, there have been numerous deaths on the South Eastern Freeway in South Australia caused by trucks losing control on the descent into Adelaide.

One of the main causes of this out of control condition is when the vehicle experiences brake fade due to the brakes being applied too late and the vehicle speed results in the brakes overheating. A solution to managing this problem is to combine a failsafe braking system with an early warning system to warn the driver to start braking on a decline and if the vehicle does not slow down the system will begin to use the failsafe brake to bring the vehicle back to a manageable speed while the situation is still controllable.

Appendix Q summarises evidence presented to the South Australian Coroner's Court with regards to one of the accidents in South Australia which resulted in a fatality. The evidence presented supports the findings of this paper where the main contributing factors to the fatal accident were as a result of excessive speed, inefficient operation of the trailer brakes due to poor maintenance, combined with a young inexperienced driver. An engineered failsafe brake solution could have prevented this and the many other fatalities and accidents involving heavy vehicles where brake failure was a contributing factor.

Failsafe brakes have long been used within the Australian mining industry and have prevented numerous accidents, thereby avoiding the possible deaths of Australian workers.

We would welcome the opportunity to discuss further with the National Transport Commission the issue of Safety Management in the Chain of Responsibility and the safety solutions that are already in existence and being used within other industries. These safety solutions should be considered within the Heavy Vehicle National Law review to ensure a safer working environment, not only for the vehicle operator but also for the general public.

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Supporting information

Current Situation

Budget Direct Car Accident report dated March 2018 (Appendix A) shows Australia has 5.4 road fatalities per 100,000 people which is almost double that of countries such as Switzerland, Sweden and United Kingdom. Their report claims that 15% of all road crash fatalities involved heavy trucks, however only 20% of these crashes are attributed as the truck drivers' fault.

In Safe Work Australia's report (Appendix B), the number of fatalities between 2003 – 2016, shows the industry with the highest fatalities to be transport, postal and warehousing. When reviewing the mechanism for these fatalities, the top cause is vehicle collisions recording 42% of all fatalities for 2016, this is above the 10-year average of 38% (Appendix C). This report shows that more than two thirds of fatalities occur on publics roads as opposed to non-public roads.

According to this report, they found that in 2017 68% of crashes involved single vehicles and 46% of collisions involved heavy vehicles (Appendix D). Between 2013 – 2017 there were 181 bystander (members of the public) fatalities. In 2017 there were 41 bystander fatalities compared to 2016's 25 fatalities. Most of the fatalities fall within the 25-44 age group and the 45-64 age group with 8% of fatalities being 14 years and below (Appendix E).

Analysis

The following have been identified as potential contributing factors in heavy vehicle fatalities:

1. Traveling directions/patterns
2. Location
3. Speed
4. Vehicle roadworthiness
5. Driver qualification/experience
6. Weather conditions

1. Traveling Directions

The Department of Infrastructure and Regional Development has classified vehicle crashes into two main categories, single vehicle crashes and two vehicle crashes. The most common type of single vehicle crash is off path when traveling straight (Appendix G). The most common two vehicle type crash is a head on collision or opposing directions (Appendix H).

According to Budget Direct the most common causes of accident is speed (Appendix J) and in the case of a two-vehicle accident, nose to tail or not maintaining following distances (Appendix F).

2. Location

When reviewing the location of accidents, Appendix I shows that the highest number of fatalities involving heavy vehicles occurs in regional areas (55%), followed by major cities (35%).

3. Speed

According to Budget Direct, 31% of fatal accidents are as a result of speed (Appendix J). The Department of Infrastructure and Regional Development supports this in their study (Appendix K), which shows almost half of the accidents studied occurred between marked speeds of 91 – 110km.

4. Vehicle Roadworthiness

In a report published by the National Heavy Vehicle Regulator – National Roadworthiness Baseline Survey – 2017 they highlight the relationship between vehicle age and non-conformity (Appendix L). This report shows that there is currently a trend that as vehicles age they become more of a risk on our roads. It also shows that as vehicles age their maintenance becomes less effective (Appendix M).

Importantly, the number one non-conformance on all vehicle types inspected was their brakes.

The NHVR minimum brake efficiency requirements is 4.5 kN/t for a safe vehicle. The NHVR audit the brake efficiency of a range of vehicles (Appendix N) and found that out of the vehicle types trailers performed the worst with only 36% of trailers tested performing above 4.5 kN/t. An interesting observation was that the vehicle that had the highest performance (90% above 4,5 kN/t) were buses. This raises a few questions as buses would be using their brakes a lot more frequently than other heavy vehicles, yet they have the highest score, is this possibly because the load they are transporting is seen to have a higher value (human life inside the bus) as opposed to a cargo load?

5. Driver Qualification & Experience

Volvo Group Australia published a report in 2016 "Professional Truck Driver Shortage", in this report they claimed that the average age of an Australian truck driver was 47 which was higher than in 2014 when the average age was 43. This combined with the comment that only 15% of drivers were under the age of 30 would imply that Australia could be facing a shortage of experienced and skilled drivers in the near future, adding further to the safety risk.

6. Weather Conditions

When reviewing the weather conditions, it was found that most accidents occur on clear days (Appendix K), so bad weather did not seem to contribute to heavy vehicle accidents.

<u>Analysis Summary</u>

Based on the above one could conclude that the follow are key contributors to heavy vehicle related deaths on Australian roads:

1. Collision Type:
   - Nose to tail (following distances)
   - Straight path, single vehicle
   - Opposing direction, two vehicles
2. High risk areas:
   - Public roads
   - Regional (58%)
   - Major Cities (33%)
3. Speed
4. Effective vehicle roadworthiness / servicing
   - Brake efficiency is the highest risk out of all the key safety components in a heavy vehicle.
   - Age of vehicle, older than 3 years increases the risk exponentially over time.

<u>Improvements</u>

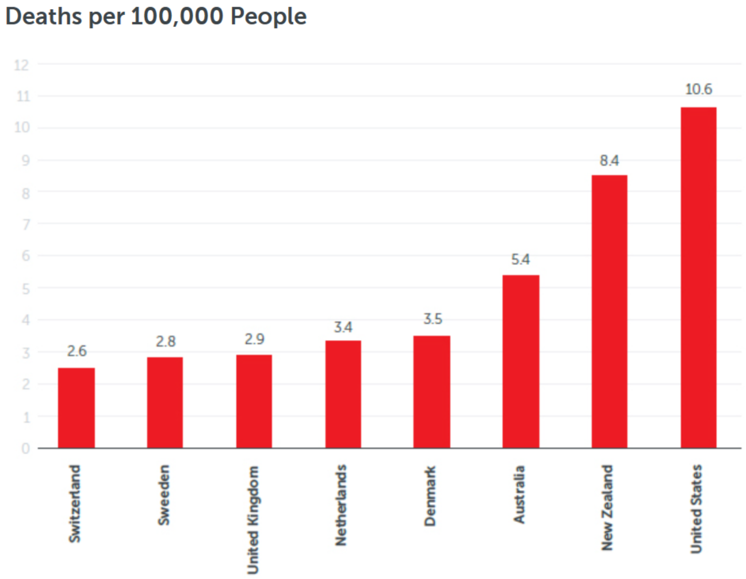
Do safer vehicles solve the safety problems on our roads? When reviewing the National Road Safety Strategy, it is claimed that as a result of their initiatives between 2011 – 2017 they have reduced the death toll on Australian roads by 14% (Appendix O).

During 2008 – 2010 ANCAP claims that 47.5% of vehicles on Australian roads were 5 star rated, compared to 2017 where this figure increased to 90%, this would imply that between 2011 and 2017 the number of safer vehicles on Australian roads almost doubled (Append P).

One could conclude that between the efforts of the National Road Safety Strategy and the 42% increase in safer vehicles on our roads we only achieved a 14% reduction in road accident fatalities.

Appendix A: Global Deaths per 100,000

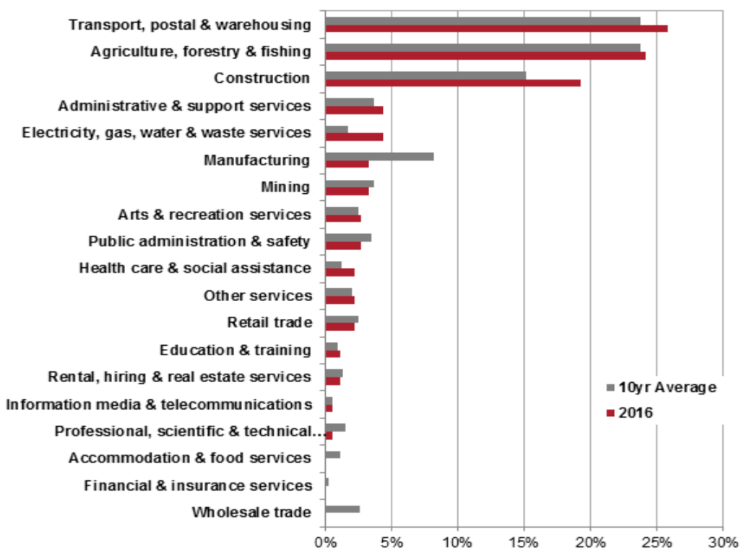
(Budget Direct Car Accident Report March 2018)



Appendix B: Worker Fatalities by Industry

(Safe Work Australia)

Figure 2: Worker fatalities: proportion by industry of employer, average of last 10 years (2007 to 2016 combined) and 2016



- Over the 10 year period from 2007 to 2016, 64% of worker fatalities involved vehicles, of which just over 45% were due to a vehicle collision on a public road (Table 1).

Appendix C: Worker fatalities by mechanism

(Safe Work Australia)

Table 1: Worker fatalities: number by mechanism of incident, 2003 and 2012 to 2016 (sorted by 2016 fatalities)

Mechanism of incident	2003	2012	2013	2014	2015	2016	% of 2016	10yr average (2007-2016)
Vehicle collision	108	91	68	74	60	76	42%	38%
Falls from a height	27	30	26	22	29	25	14%	12%
Being hit by moving objects	40	28	24	22	28	17	9%	11%
Being hit by falling objects	15	27	25	17	21	17	9%	10%
Being trapped by moving machinery	6	10	10	11	9	8	4%	5%
Contact with electricity	13	6	8	5	8	7	4%	4%

Appendix D: Worker fatalities by collision type

(Safe Work Australia)

Table 22: Worker fatalities due to vehicle collision: number by type of collision and breakdown agency, 2013 to 2017

Type of collision	2013	2014	2015	2016	2017	% of 2017	% of 5yr average
Single vehicle collision	**42**	**51**	**35**	**46**	**41**	**68%**	**64%**
Heavy vehicle	18	24	17	21	19	46%	46%
Aircraft	10	9	5	7	13	32%	21%
Light vehicle	5	9	6	13	3	7%	17%
Quad bike	4	5	5	..	2	5%	7%
Motorbike	2	3	..	..	3	7%	4%
Agriculture vehicle	2	..	..	3	..	0%	2%
Other single vehicle	1	1	2	2	1	2%	3%
Multi vehicle collision	**25**	**23**	**25**	**31**	**19**	**32%**	**36%**
Two heavy vehicles	7	8	6	10	6	32%	30%
Occupant in a light vehicle killed in collision with a heavy vehicle	7	5	6	5	5	26%	23%
Two light vehicles	4	4	7	9	4	21%	23%
Occupant in a heavy vehicle killed in collision with a light vehicle	4	3	2	4	1	5%	11%
Other multi-vehicle collision	3	3	4	3	3	16%	13%
Total – vehicle collision	**67**	**74**	**60**	**77**	**60**	**100%**	**100%**

* The percentages shown in this table have been rounded to the nearest whole number; therefore the sum of percentage figures for each column may not equal the total.

Appendix E: Bystander fatalities by age group

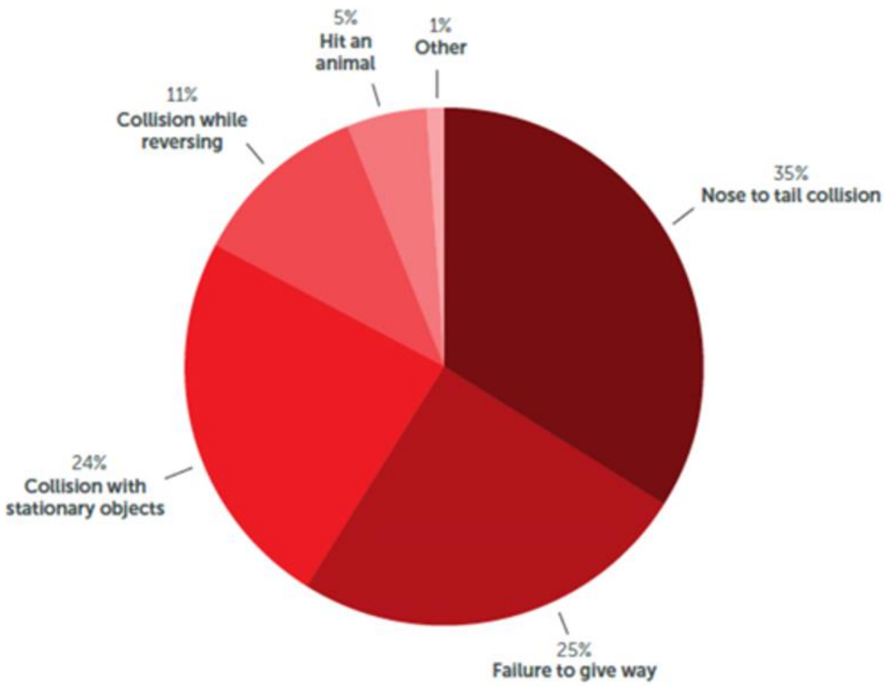
(Safe Work Australia)

Table 24: Bystander fatalities: number by age group, 2013 to 2017

Mechanism of fatality	14 & under	15–24	25–44	45–64	65 & over
Vehicle collision	16	24	57	58	26
Being hit by moving objects	12	2	8	18	15
Drowning	1	3	3	4	7
Falls from a height	4	2	2	2	8
Being hit by falling objects	5	2	2	2	3
Other mechanisms	3	1	7	3	10
Total	41	34	79	87	69

Appendix F: Common Type of Accidents

(Budget Direct Car Accident Report- March 2018)



The majority of these types of accidents all fall into the human error category rather than external factors and indicate that greater attention and care needs to be taken while driving.

In 2016 the most common type of car accident was nose to tail collisions. These types of collisions are often the result of impatience, distraction and tailgating, the practise of driving too close to the car in front.

Appendix G: Single Vehicle Crash Types

(Department of Infrastructure and Regional Development)

Predominant single-vehicle crash types

Main category	Examples	
Off Path (Straight)		
Off Path (Curve)		
Other	 On Path–animal	

Single-vehicle casualty crashes—by crash type, 2010-2014

	Off Path – Straight	Off Path – Curve	Other	Number of casualty crashes
Involving a heavy rigid truck	50%	39%	11%	693
Involving an articulated truck	43%	51%	5%	1,201
Involving a light 4-wheeled motor	54%	37%	9%	41,409
All SVC	**53%**	**37%**	**10%**	**28,130**

Single-vehicle casualty crashes—by crash type and SUA, 2010-2014

	SUA				Non-SUA				χ^2_2
	Off Path – Straight	Off Path – Curve	Other		Off Path – Straight	Off Path – Curve	Other		
Involving a heavy rigid truck	50%	28%	22%	100%	46%	42%	12%	100%	21 ***
Involving an articulated truck	41%	48%	12%	100%	41%	48%	11%	100%	0.2
Involving a light motor vehicle	56%	28%	16%	100%	44%	41%	15%	100%	960 ***
All SVC	**56%**	**27%**	**17%**	**100%**	**41%**	**43%**	**16%**	**100%**	**1,925 *****

Appendix H: Two Vehicle Crash Types

(Department of Infrastructure and Regional Development)

We now turn to two-vehicle crashes[16], categorised as follows:

- Heavy rigid —with Light
- Articulated— with Light
- Light —with Light
- Heavy truck — with Heavy truck

Predominant two-vehicle crash types

Main category	Examples		
Same directions	Rear-end	Sideswipe	
Adjacent directions (Intersection)	Cross traffic	Right-near	Right-far
Opposing directions	Head-on	Right-thru	
Manoeuvring	Emerge from Driveway	U-turn	

Two-vehicle casualty crashes by crash type, 2010-2014

Vehicles involved	Severity	Same Directions	Adjacent Directions	Opposing Directions	Manoeuvring	Other	Number of casualty crashes
Heavy rigid—Light	Fatal	8%	24%	53%	5%	9%	**98**
	Injury	51%	19%	16%	7%	8%	**2,522**
Articulated —Light	Fatal	10%	19%	56%	6%	10%	**161**
	Injury	54%	15%	16%	5%	10%	**2,002**
Light—Light	Fatal	9%	20%	53%	4%	12%	**666**
	Injury	36%	26%	21%	9%	8%	**86,646**
Heavy—Heavy	Fatal	33%	12%	28%	5%	23%	**43**
	Injury	49%	12%	12%	8%	20%	**653**

For fatal crashes, a test was performed for differences in crash type: excluding the Heavy–Heavy category, there are no differences in crash type amongst the other three groups (X^2_8 = 3). The

Appendix I: Vehicle Crashes by Location

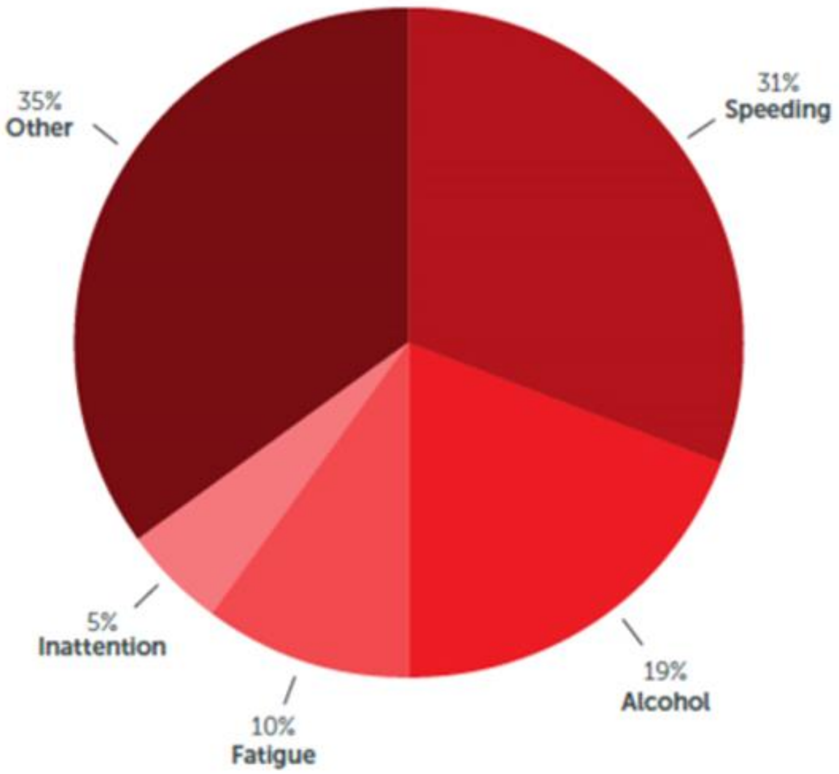
(Department of Infrastructure and Regional Development)

Table 5A Fatal crashes — Distribution by Remoteness Area and Urban Area, 2010–2014

	Remoteness Area				Urban/Non-urban Area		
	Major cities	Regional	Remote		SUA	Non-SUA	
Involving a heavy rigid truck	43%	52%	5%	**100%**	54%	46%	**100%**
Involving an articulated truck	20%	69%	11%	**100%**	30%	70%	**100%**
Involving a light motor vehicle	36%	53%	11%	**100%**	49%	51%	**100%**
All fatal crashes	**35%**	**55%**	**10%**	**100%**	**48%**	**52%**	**100%**

Appendix J: Fatal Incidents As A Result of Speed

(Budget Direct Car Accident Report- March 2018)



Appendix K: Fatal Crash Distribution by Speed, Weather and Crash Type

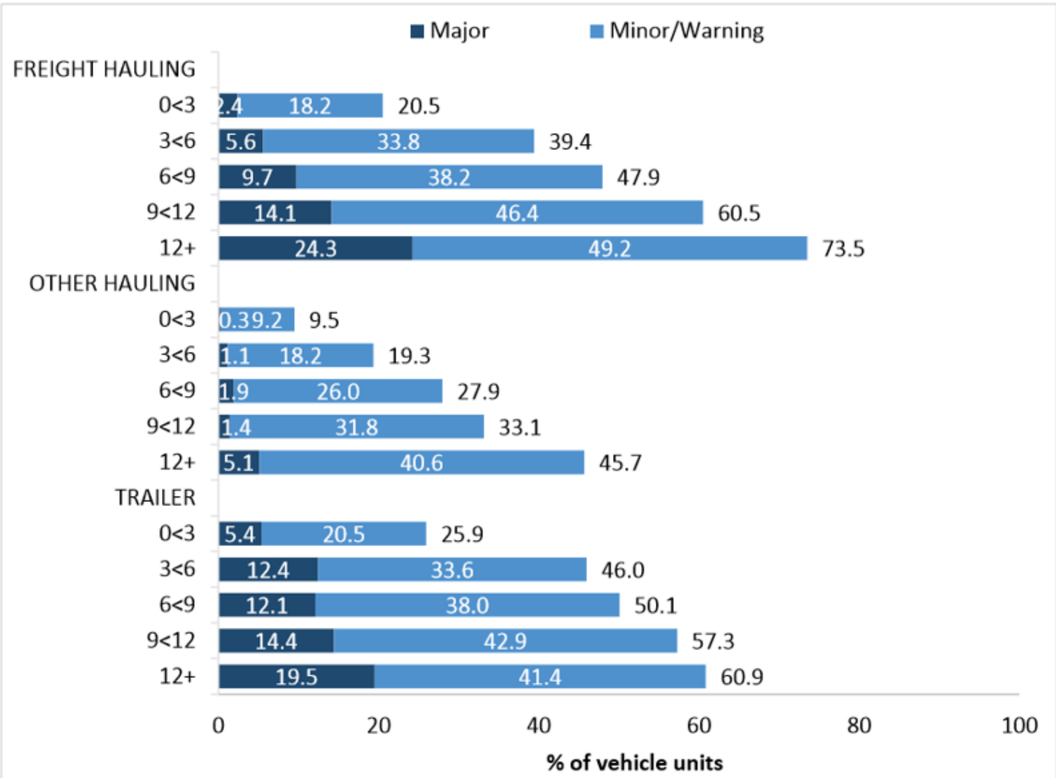
(Department of Infrastructure and Regional Development)

	% crashes
Posted speed limit	
≤ 50km-hr	11.8%
51-60km	18.7%
61-90km	24.3%
91-110km	43.4%
Other (DK or unposted)	1.8%
Weather at the time	
clear	71.3%
overcast	7.9%
raining	12.5%
fog/smoke	4.5%
Type of crash	
Single vehicle	22.6%
Collision with another vehicle	77.4%

Appendix L: Incidence of non-conformaties by vehicle age

(National Heavy Vehicle Regulator – National Roadworthiness Baseline Survey – 2017)

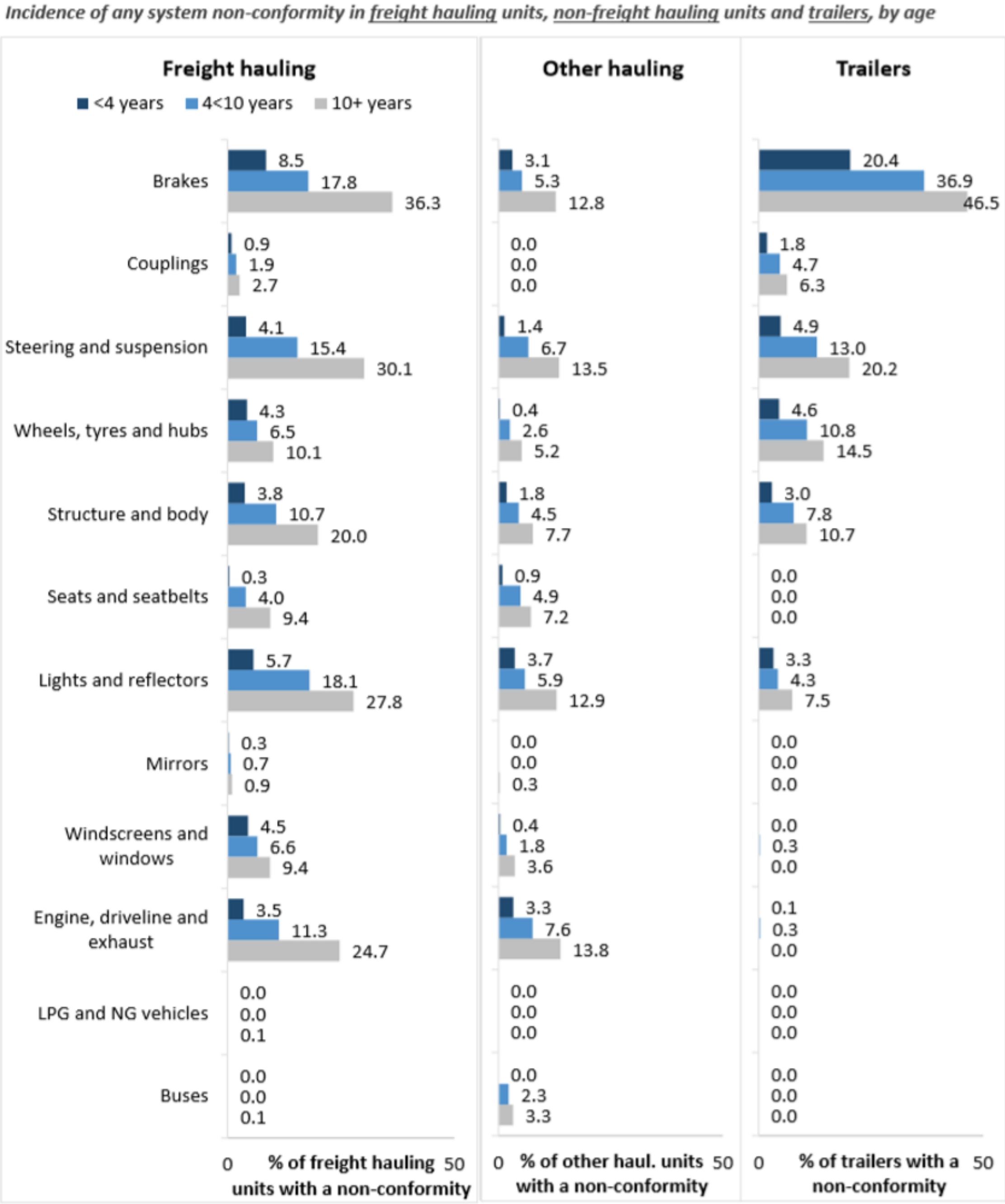
Incidence of highest categorised non-conformities among vehicle units by age (year groups)



Note: Adding percentage results may give a rounding error of ±0.1% on the total

Appendix M: Incidence of any system non-conformance by vehicle age

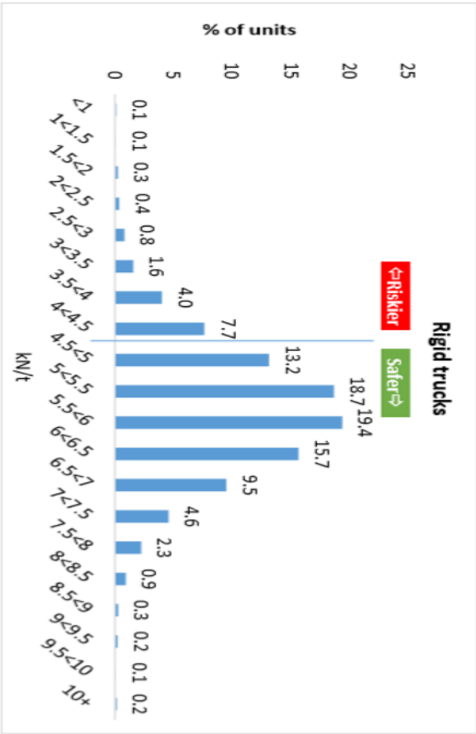
(National Heavy Vehicle Regulator – National Roadworthiness Baseline Survey – 2017)



Note: There may be cases of a system non-conformity recorded which is atypical for the type of unit

Appendix N: Brake Efficiency as a Total of kN/tonne By Vehicle Type

(National Heavy Vehicle Regulator – National Roadworthiness Baseline Survey – 2017)



Brake efficiency measured as total kN/tonne for the vehicle: rigid trucks

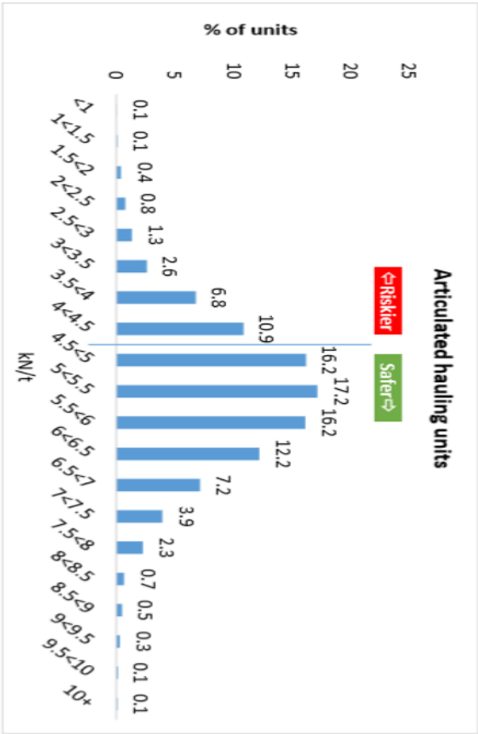
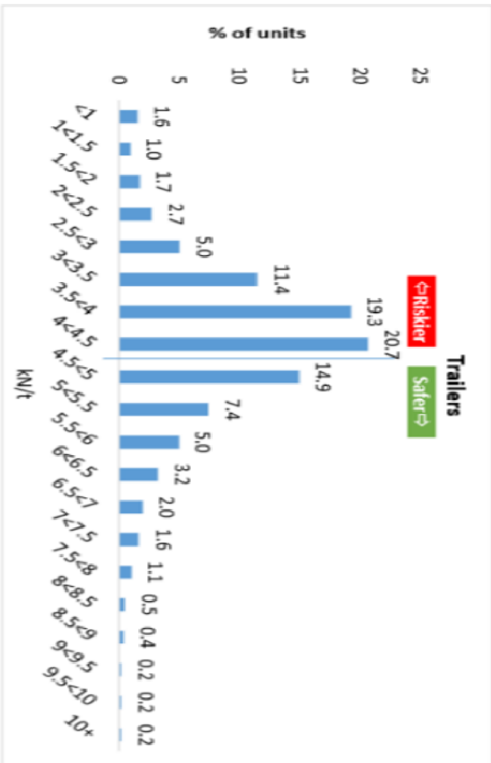
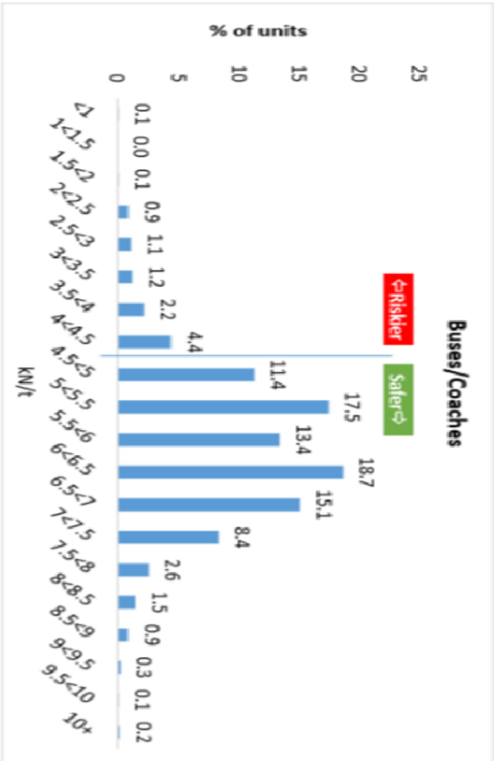


Figure 2-15. Brake efficiency measured as total kN/tonne for the vehicle: articulated hauling units



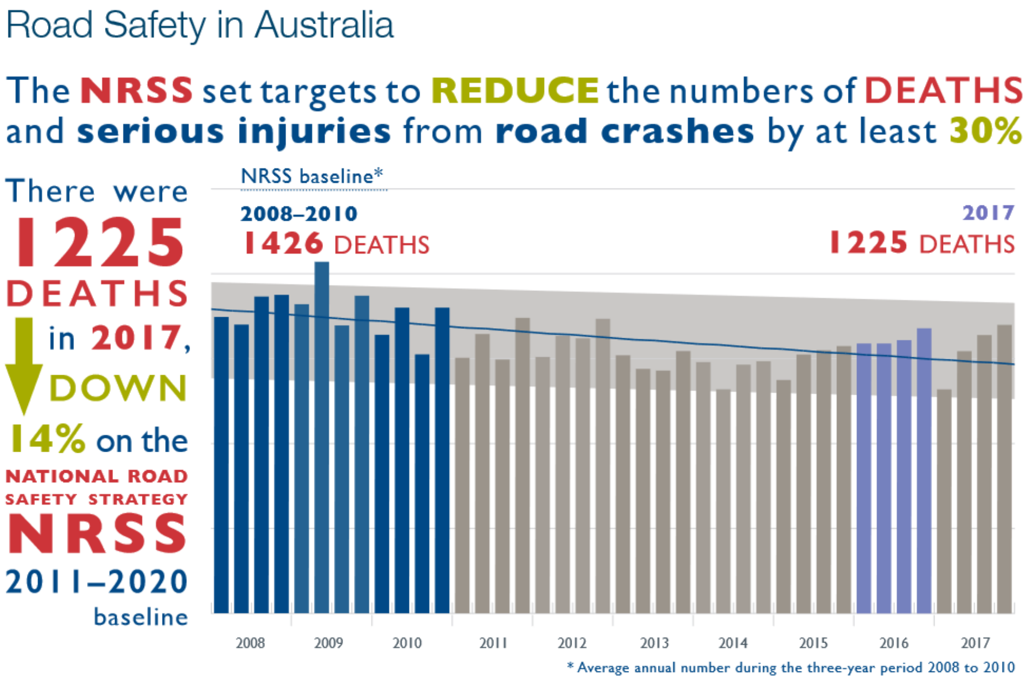
Brake efficiency measured as total kN/tonne for the vehicle: trailers



Brake efficiency measured as total kN/tonne for the vehicle: buses/coaches

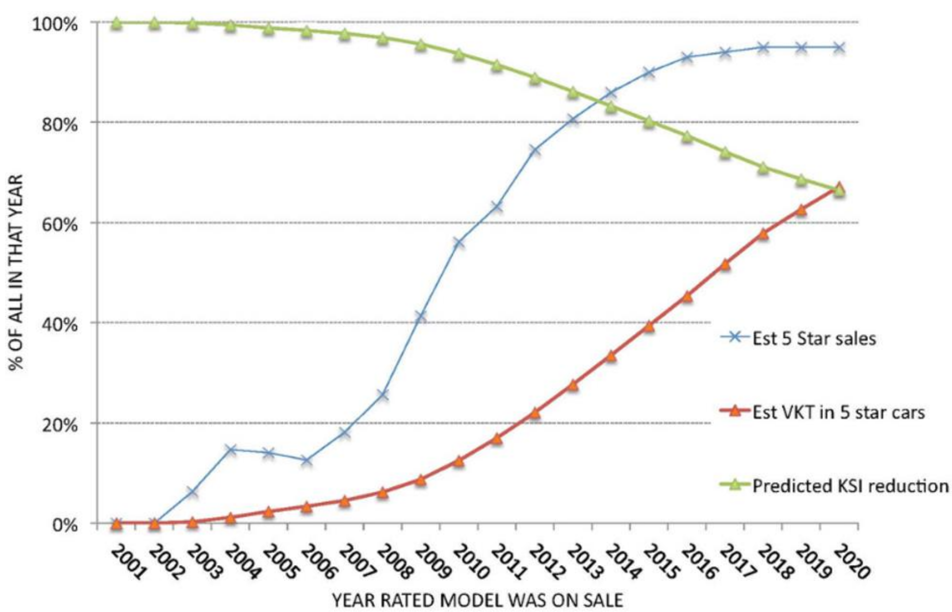
Appendix O: Australian Road Death Trend 2008 – 2017

(National Road Safety Strategy)



Appendix P: ANCAP 5 Star Rating Trend 2001 – 2020

(ANCAP Presentaton June 2015)



Trends with 5 star models & projected savings

Appendix Q: Summary of Finding of Inquest into heavy vehicle related fatality at Princes Highway, Urrbrae, South Australia.

South Australia Finding of Inquest 6 December 2013 – 12 January 2015.

The Coroner's Court found that Mr John Posnakidis died on the 12 October 2010 as a result of sustaining "multiple injuries which were rapidly, if not immediatley, fatal when he was struck by a heavy vehicle."

It was found that a prime mover and semi trailer traveling at high speed (in excess of the speed limit) down Princes Highway, lost its ability to brake resulting in the fatal impact with Mr Posnakidis.

The court was presented with evidence which showed that the prime movers brakes were in working order and showed evidence of over heating which would have been caused by excessive braking. When the trailer was examined there was no evidence of over heating, this was an indication that the trailer brakes had not been operating effectively at the time of the incident. The court heard "the braking system of the trailer was in extremely poor condition prior to the collision." After reviewing video footage of the incident it was observed that there was smoke coming from the wheels on the prime mover, but not from the trailer wheels, which supports the evidence that the trailer brakes were not working properly at the time. Further evidence was given that implied that the poor condition of the trailer brakes would have been evident to the driver not only when on a decline, but also on flat roads, as the driver should have felt the trailer pushing the prime mover.

The court heard testimony from a previous employee who told the court that the transport company did not follow standard maintance proceedures.

The court was also presented with evidence that the driver of the heavy vehicle was at the time of the incedent 30 years of age. The court also heard that the driver of the vehicle was employed by the transport company on the 4 October 2010 (the accident occurred on the 12 October 2010). The court was also presented with evidence which showed that the driver only received his heavy rigid (HR) licence in 2008 and his heavy combination (HC) licence in October 2009. Previous concerns over the drivers inexperience were also highlighted.