

ACHIEVEMENTS IN IMPROVING LOG TRUCK SAFETY

Peter Baas¹
Warwick Wilshier²

ABSTRACT

Over the last 6 years there has been a major (over 65%) reduction in log truck crashes, especially rollover crashes, during a time of rapid growth in the industry. From being regarded as one of the worst sectors in the transport industry, it is now one of the better ones and no longer attracts the adverse media attention that it once did. Most of the gains can be attributed to the work undertaken by the Log Transport Safety Council in conjunction with the transport authorities. LTSC has as its members log transport operators, forest owners, equipment suppliers, researchers, Land Transport NZ and the Department of Labour. The improvements in safety have been achieved through a wide range of measures including improvements in vehicle performance and design, a strong commitment to driver training, major improvements in fleet safety management and the introduction of longer-lower log trucks. This paper describes what has been achieved as a case study for improving heavy vehicle safety more generally.

1 INTRODUCTION

Improving the safety of heavy vehicles is recognized as being a priority in most jurisdictions including in Australia and New Zealand. This is because crashes involving heavy vehicles tend to be more severe, can result in significant traffic delays and draw considerable media attention.

In the late 1990's log trucks were singled out as being of particular concern following a spate of high profile rollover crashes. This resulted in the formation of the Log Transport Safety Council, which has as its members, most of the log transport operators, Road Transport Forum NZ, the Forest Owners Association representing forest owners, trailer manufacturers specialising in logging equipment, TERNZ as a research provider, government agencies and other organisations with an interest in log transport. Land Transport NZ and Department of Labour are members and participate as observers and advisers. The broad spectrum of stakeholders involved is a major contributor to the success of LTSC.

This paper explains:

- The safety improvements that have been achieved by the log transport sector
- What steps were taken to achieve that improvement in safety
- Lessons learnt that could be applied more generally to improve heavy vehicle safety.

¹ TERNZ Ltd.

² Log Transport Safety Council Chairman

2 IMPROVEMENTS IN LOG TRUCK SAFETY

The incidence of on-highway rollover crashes per 100million km of travel involving log trucks has reduced dramatically over the last 6 years and is now less than of what it was in 1999 as shown in figure 1.

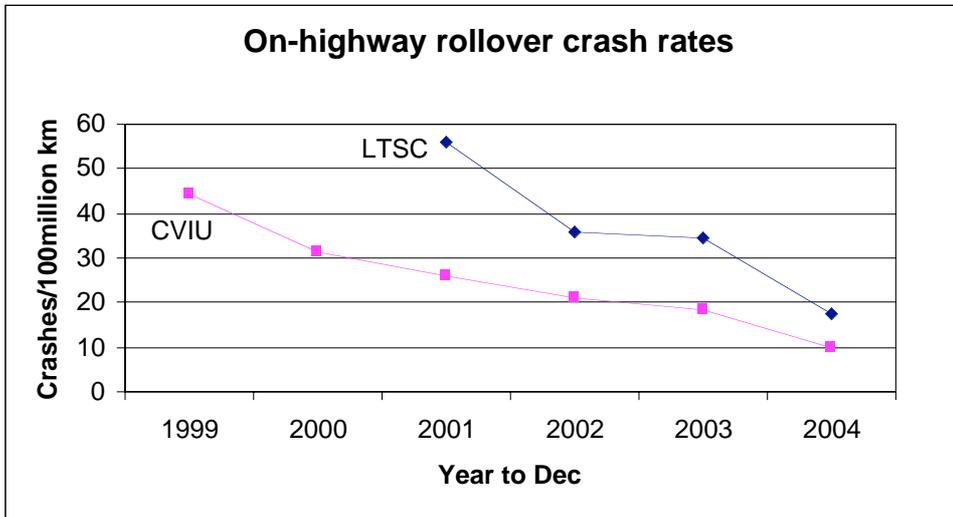


Figure 1: On-highway log truck rollovers per 100million km

One of the curves is based on an analysis of the crash data collected by the NZ Police Commercial Vehicle Investigation Unit (CVIU) from crashes they attend. The second curve shows the reduction in crash rate calculated from the more extensive LTSC database for the period 2001 to 2004. The LTSC database contains all known crashes and includes a number that were not recorded by the Police. Forest owners have a strict requirement that all crashes must be reported to the LTSC and LTSC committee members follow up on any crashes that are heard of through other means. A review of the LTSC database has confirmed that all CVIU reported crashes were included.

In both cases the vehicle-kms used to calculate the crash rates were derived from data supplied by the Transport Registry Centre of Land Transport New Zealand. Log haulage vehicles were identified from vehicle registration information. The vehicle IDs were then used to extract the distance they traveled from the RUC database. Unfortunately a significant number of vehicles had no industry code recorded against them. A survey of log trucks undertaken in 1997 found that there were 650 in use at that time although the registration database records only 315. It was assumed that the shortfall in log haulage vehicles in the registration database compared to the LTSC survey was due to vehicles where no code had been recorded and that this number remained proportional to the total number of “no code” vehicles in subsequent years. This results in an estimate of 1378 log trucks in 2003, which is very similar to the 1400 estimated by the industry at that time.

Figure 2 shows the reduction in the number of crashes recorded in the CVIU and LTSC databases.

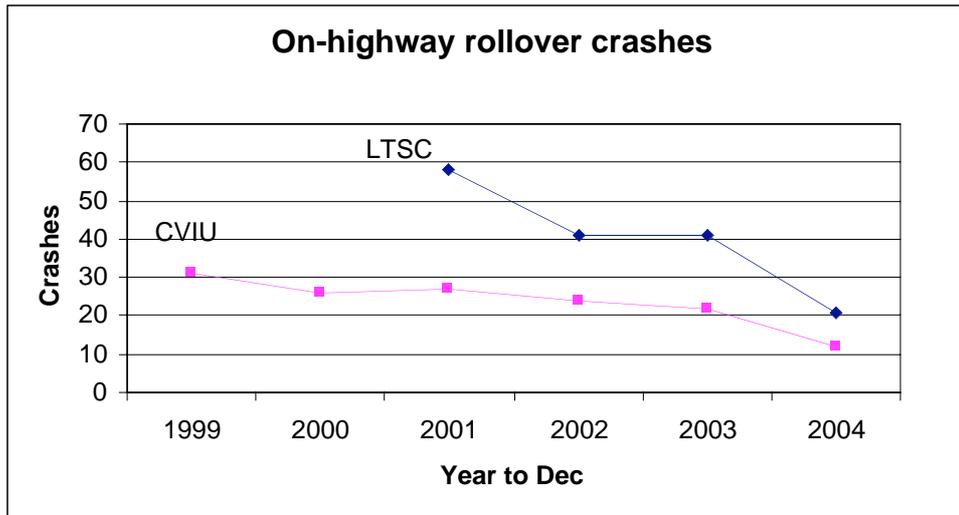


Figure 2: Number of on-highway log truck rollover crashes

The number of CVIU recorded crashes reduced by 61% from 1999 to 2004. The reduction shown by the LTSC data is greater for the period from 2001 to 2004 (64% LTSC versus 56% reported by CVIU). This may be a reflection of the increase in resources available to CVIU over that period which would have enabled them to attend a higher proportion of crashes.

Figure 3 shows the 12 month rolling total number of log truck on-highway rollover crashes recorded in the LTSC database. The trend line shows an on-going reduction in crashes.

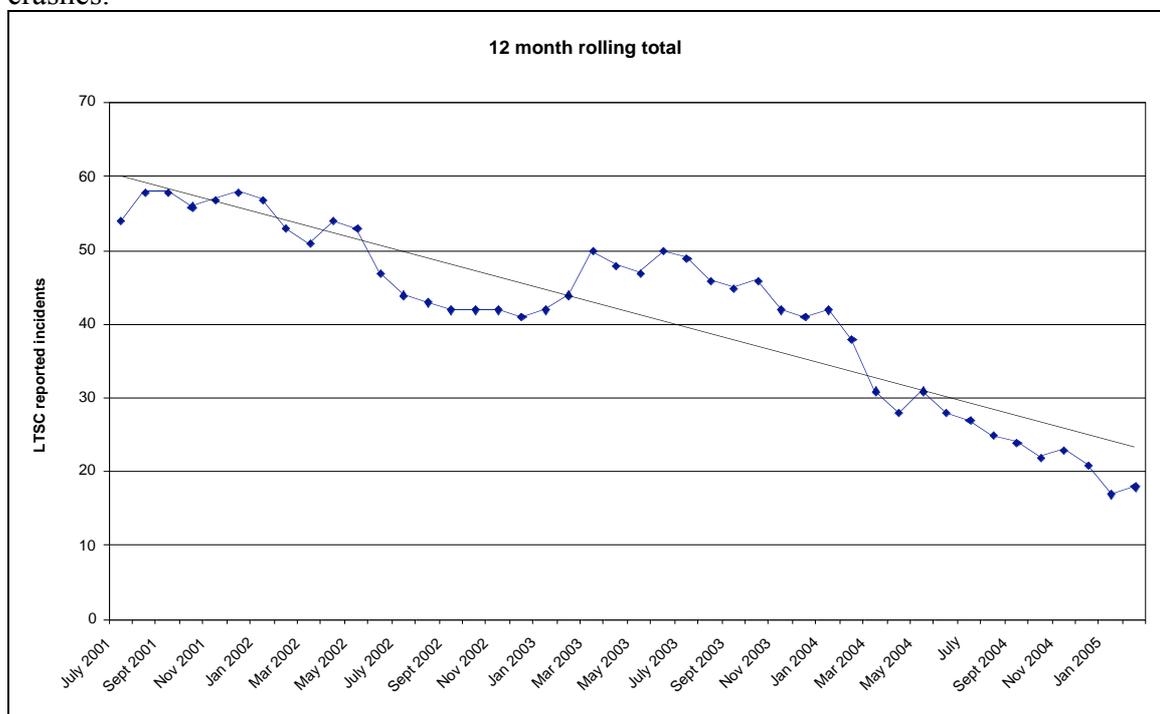


Figure 3: 12-month rolling total of log truck rollover crashes in the LTSC database

Table 1 shows the total number of rollover crashes attended by CVIU and the number of log truck rollover crashes. In 1999 over 22% of the rollover crashes CVIU attended were log trucks. By 2004 this had reduced to 7%.

Table 1: Number of rollover crashes in CVIU database per annum

Year to Dec	Total number of heavy vehicle rollover crashes attend by CVIU	Number of log truck rollover crashes attended by CVIU	% of log trucks as a proportion of all rollover crashes attended by CVIU	Number of heavy vehicles on the road (powered units)	Distance travelled by all heavy vehicles (powered units) km
1999	136	31	22%	72,489	1,938,993,610
2000	133	26	20%	73,475	1,995,519,439
2001	155	27	17%	74,657	2,072,579,366
2002	145	24	17%	76,894	2,174,137,887
2003	173	22	13%	79,567	2,233,969,785
2004	162	12	7%	84,770	2,376,960,741

Figure 4 and Table 2 show the rollover crash rate of log trucks and all heavy vehicles. While the risk of a log truck rolling over was more than 4 times that of the average heavy vehicle back in 1999, the risk of a logging truck rolling over is now very similar to that of an average heavy vehicle. This is a remarkable result, especially as log trucks often operate on secondary roads that are less safe than the roads used by many of the other heavy vehicles.

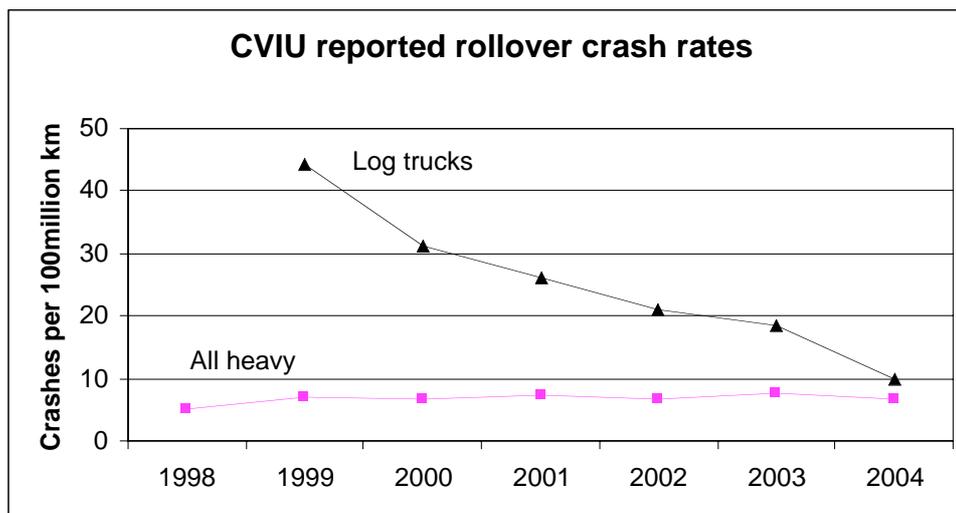


Figure 4: Rollover crash rates of log trucks and all heavy vehicles based on CVIU data.

Table 2 Rollover crash rates of log trucks and all heavy vehicles

Year to Dec	All vehicles rollover crashes per 100million km	Log haulage rollover crashes per 100million km
1998	4.9	
1999	7.0	44.4
2000	6.7	31.2
2001	7.5	26.1
2002	6.7	21.0
2003	7.7	18.4
2004	6.8	9.9

3 INITIATIVES INTRODUCED TO IMPROVE LOG TRUCK SAFETY

The reduction in crashes has been achieved through a range of measures that include improvements in:

- Vehicle design
- Vehicle operation
- Driver behaviour and
- Company management.

Underlying this has been the commitment of all parts of the industry to safety. Of note is that LTSC is one of the few organizations in the transport sector that includes all of the key stakeholders including forest owners as transport users, transport operators, contractors, researchers, equipment suppliers and government. A significant step in achieving this level of commitment was the signing of the Log Transport Safety Accord by the New Zealand Forest Owners Association, Road Transport Forum, Log Transport Safety Council and the New Zealand Farm Forestry Association.

3.1 Vehicle design

There have been major improvements in vehicle design with:

- bolster bed heights now typically up to 300mm lower than previously, significantly improving stability
- longer wheelbases further improving vehicle performance
- greater use of multi-bunk trailers. Almost all new trailers are now multi-bunk
- improved component design, including bolster design
- the use of more roll-stiff suspensions improving rollover stability and handling.

Modern log trailers now typically have a Static Rollover Threshold (SRT)³ of up to 0.42g compared to less than 0.35g before LTSC was formed. This is a significant improvement in stability. Steps taken to achieve this included:

- a comprehensive study into log truck crashes and the stability of log trucks in 1997
- The lowering of load heights as a temporary measure
- stability analysis of new vehicles at the design stage

³ SRT is the maximum lateral acceleration a vehicle can withstand before it starts to rollover in a steady state turn.

- the development of a paper-based method of assessing the stability of log trucks for use by operators, drivers and manufacturers
- assistance with the development of the LTSA SRT calculator
- industry meetings, articles, newsletters and other means of technology transfer to encourage the move more stable vehicles.

A significant turning point was when McCarthy Transport demonstrated the vehicle performance improvements possible by designing and constructing a low, long-wheelbase trailer based on the research undertaken by TERNZ.

A number of codes have been produced including one on the safety of off-highway log trucks.

A significant amount of work has also been undertaken on improving log load securing. This has included physical tests of different load securing systems and participation in the work the Australians are also doing on load securing. The tests included hard braking and tilt tests using the vehicles and facilities provided free of charge by Williams and Wilshier Ltd. Improvements in log load securing are being introduced as part of the new LTNZ Rule on Load Security.

3.2 Driver behaviour

A number of initiatives have been introduced aimed at improving driver behaviour. These include:

- An 0800 LOG TRUCK compliments and complaints scheme that has been in operation since the early 1990's. All calls are monitored by a commercial call centre and the details of the calls forwarded to the transport operator and to LTSC. All calls must be followed up by the operator. A new standardised 0800 sign was introduced in 2001 which improved both the legibility of the signs and increased the conspicuity of the rear of log trucks.
- Surveys of the speed log trucks when traveling around curves. Three surveys have been completed and have found that there has been no significant change in speeds from 2002 to 2005. All heavy vehicles travel around curves at speeds averaging 10% above the advisory speed. Log trucks travel slower but still 5% above the advisory speed. These results suggest that the benefits in improved vehicle stability have not been eroded by drivers driving faster.
- LTSC operates an extensive crash database that focuses primarily on rollover crashes. It is a Forest Owner requirement that operators report all log truck crashes to LTSC, ensuring that all crashes are reported, not just those attended by the Police.
- Driver training is seen as a top priority and 240 drivers have obtained their National Certificate in Log Truck Driving and a further 40 drivers have obtained their National Certificate in Commercial Road Transport with a logging strand. There are a further 330 drivers who are currently enrolled for these qualifications. This represents a high level of participation given that the log truck fleet is made up of approx 1,200 to 1,400 vehicles.
- Special training sessions were also undertaken throughout the country to make drivers aware of the stability of their vehicles and the need to slow down.
- a number of easy-to-read information pamphlets and articles have been produced for the drivers

- The forestry sector is a leader in alcohol and drug testing and has a zero tolerance to the use of drugs by its employees.
- The LTSC and Forest Owners Association contributed to half of the cost of the Driver Recruitment and Retention project and have been very active in implementing the recommendations. This has included establishing training programmes for the unemployed and school leavers.

3.3 Vehicle operation

One of the earliest operational measures introduced was to restrict log load heights to 3.8metres for 4 axle trailers and 3.5metres for 2 and 3 axle trailers. While this measure only eliminated the excessively high loads, it acted as a catalyst for many of the other changes.

A major breakthrough was the granting of approval to increase the overall length of log trucks to 22metres when carrying 2 packets of logs on multi-bolster trailers. The adoption of these longer-lower log trucks significantly reduced the load height and increased the stability of these rigs. This concession required gaining the support of Members of Parliament, regional councils, NZ Automobile Association and Land Transport NZ.

Industry codes-of-practice have been prepared on, for example, the safety of personnel when loading log trucks and for the lifting of trailers onto log trucks for piggybacking purposes.

Further steps have been taken to increase the cartage of double packet loads although the proportion of logs that can be transported this way is limited by forest harvest considerations.

3.4 Company management

There have been major improvements in the safety awareness of transport operators and in the professionalism of the industry since the mid 1990s. The leading log transport operators are now amongst the leaders in the application of good safety management practice.

4 RECOMMENDATIONS

The following are the recommendation of the Log Transport Safety Council on how the lessons it has learnt could be applied more generally to improve heavy vehicle safety.

4.1 Industry-government partnership

The improvements in log truck safety would not have been possible without the active participation of all of the parties involved, including transport operators, forest owners, government and researchers. To achieve the same level of improvement across the whole transport industry will require a similar commitment by the industry and the support of government. Major gains will not be achieved by simply creating more rules and enforcing them. It is recommended that government actively encourages industry initiatives to improve road safety.

4.2 Roads

In order to further improve log truck safety, priority needs to be given to improving the roads. Further gains in the safety of the vehicles themselves are limited and only so much can be done to improve driver behaviour through enforcement and training. The following are LTSC's recommendations based on the evidence in the LTSC crash database, comments made by the drivers and other sources.

- Improve the condition of road shoulders, especially on secondary roads. A number of rollovers have been caused by drivers having to pull over to the side of the road to avoid on-coming cars. Problems with shoulders include inadequate strength to support a truck and steep drop-offs.
- Provide more passing opportunities. Of major concern to all truck drivers is the overtaking behaviour of car drivers. Insufficient passing opportunities increases the frustration of motorists and the prevalence of risky overtaking.
- Increase lane widths on secondary roads. On many roads there is limited room for error.
- Implement self explaining and self enforcing road measures. This involves the manipulation of road features that evoke the correct response from drivers. Such features can, for example, reduce the incidence of inadvertent speeding and the misjudging of the severity of curves.
- Give urgency to upgrading of the most dangerous sections of road.
- Take greater cognizance of the requirements of heavy vehicles when designing, constructing and maintaining roads. Many traffic and road engineers have limited knowledge of the limitations of heavy vehicles and how to increase their safety through road improvements.

4.3 Enforcement

Enforcement is important, but insufficient on its own to achieve the safety targets set in the New Zealand Safety Strategy to 2010. Enforcement needs to be seen as part of a package of measures. It is recommended that the CVIU's performance targets should be linked to the safety outcome the government is seeking as that would encourage the CVIU officers to be more innovative in how they contribute to improving safety. That would, for example, encourage Police to take a greater role in supporting industry initiatives and in providing advice to drivers on what is required. The Driver Recruitment and Retention Project found that many drivers only found out about law changes when ticketed by CVIU officers.

Of considerable concern is the lack of consistency in enforcement, including vehicle inspection. The development of the categorization of defects is a step in the right direction and this approach needs to be extended to all areas of enforcement and mandatory inspection. Deficiencies in the accuracy and consistency of brake testing have been an issue of particular concern that needs to be addressed.

4.4 Vehicles

There is some scope to further improve safety through vehicle-based measures but, especially in the case of logging, the greatest gains may have been achieved through improvements in stability. Government needs to ensure the introduction of new technologies is not restricted through an inflexible Rules process and other barriers to

their use. Safety gains will also be achieved through increased productivity that lead to a fewer, more efficient trucks on the road.

4.5 Drivers

Effective driver training is essential if heavy vehicle safety is to improve. Training needs to be at all levels (new and experienced drivers) and in multiple ways to suit the drivers and the circumstances. It can be, for example, through company health and safety meetings, informal advice provided by the CVIU at the roadside and formal qualifications at the National Certificate level. It needs to be relevant to actual operational practice both on-road and in the transport operation. It also needs to be based on modern educational thinking that focuses not so much on simply gaining knowledge but on the effective use of information integrated into everyday activities. Government and the industry need to work together on continuously improving training, its delivery and uptake.

4.6 Transport operators

It is well proven that companies with good safety management systems in place run safer operations and transport is no exception to this. Support is required with the adoption of safety management within the transport sector.

5 CONCLUSIONS

The improvements in the safety of log trucks could not have been achieved without the direct involvement of the industry through the Log Transport Safety Council. Government needs encourage the sharing of responsibility for safety with the industry as a largely regulatory and enforcement approach as, in our view, is likely to be much less effective in producing the improvements in safety required to meet the Government's road safety goals.