



Review of Driver Protection During Log Truck Unloading

Prepared for:

Log Transport Safety Council

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INTRODUCTION

Worksafe have asked the log marshalling companies who unload log trucks at ports to review their safety practices in the light of a couple of recent incidents where logs have fallen onto truck cab roofs during the unloading process. It is industry standard practice for the truck driver to remain in the cab during unloading. No injuries were reported because of these incidents.

The log marshalling companies have asked the Log Transport Safety Council (LTSC) for their assistance in responding to Worksafe's concerns and LTSC in turn have engaged TERNZ for an independent review of the issues. This report presents this review.

LOG TRUCK DRIVER SAFETY DURING UNLOADING

Industry Standards for Loading/Unloading

The LTSC has developed a set of Industry Standards covering all aspects of log transport operations which are publicly available [Industry Standards - Log Transport Safety Council \(logtruck.co.nz\)](http://logtruck.co.nz). Section 4 of these standards covers loading and unloading.

The key elements for unloading are:

- (A) Loader Driver is in control of operation.
- (B) Unloading will not commence until the truck driver signals the loader driver that the load is ready to be removed (i.e. all chains and stops removed)
- (C) During the unloading phase, the driver will remain in the cab of the truck with the door and windows closed unless site specific instruction differs, where the driver is asked to vacate the vehicle and stand in the recommended safe area.
- (D) Loaders unloading will not drive past the cab during the unloading phase, always clearing the truck by travelling past the rear of the truck.

The key elements for loading are:

- (A) The Loader Driver is under direction of the truck driver and the truck driver will always be on the loader operating side of the truck.
- (B) Where practicable the truck driver will always be in the recommended safe area, as shown below¹. Furthermore, it is recommended that the driver be least 6 metres forward of cab guard.
- (C) The truck driver has full responsibility for their load and must observe the whole loading procedure to ensure the load complies with all safety and statutory requirements.
- (D) If the truck driver identifies further hazards (e.g.: other loaders operating in the vicinity), then the driver should stand close to, or sit inside, the truck.

Thus, in general, the driver will be in the cab during unloading and will be in safe area that is not in the cab during loading. Feedback from an industry expert indicates that at some multi-hazard sites drivers will be in the cab during loading as provided for in point (D) of the Industry Standards above.

Loading and Cab Strength

All heavy vehicles imported into New Zealand are required to meet the requirements of at least one set of the major international vehicle standards. The most widely used standard for cab strength is UNECE R29 "Occupant Protection in Cabs of Commercial Vehicles". Most new trucks imported into New Zealand meet this standard and it is likely that nearly all log trucks do. The most widely used make, Kenworth has complied with this standard on most models since 2011.

¹ The diagram shows the area forward of the cab guard. As noted above, it is recommended that the driver is at least 6m forward of the cab guard.

For vertical loading, UNECE R29 requires the cab to withstand a static load equal to the mass rating of the front axle(s) up to a maximum of 98kN. 98kN is 10,000kg and as most logging trucks are twin-steer vehicles with a legal maximum front axle weight of 11,000kg, the 98kN limit will apply.

This loading, however, is a static load applied across the whole roof of the cab. The typical loading situation that we are concerned with is a single log slipping out of the grip of the loader and impacting the roof. An example is shown in Figure 1 below.



Figure 1. Example of log impacting truck cab roof.

At the time of impact, half of its weight is supported by the packet in the loader and half impacts the cab roof, but the impact force is significantly higher than half the weight. For example, if the log has fallen from 1.5m above the roof and makes a 0.3m dent in the roof, the deceleration on impact is 5g meaning that the impact force would be 2.5 times the log weight.

The maximum weight of a log is about 2000kg, although the log in Figure 1 weighs much less than this. Even with the heaviest logs, this force is still well below the UNECE R29 test load, but it is applied to a very localised area of the cab roof rather than uniformly across the whole roof. Furthermore, we do not have data on the heights that the logs could fall from or the magnitude of the resulting dents. However, we do know that, to date, there have been no significant injuries to drivers because of these incidents.

Incidence Rate

As part of assessing the risk posed by logs falling onto truck cabs, we should determine how often these incidents occur.

This review was initiated because of two reported incidents at C3 Limited. The Forest Owners Association maintain a database of incidents called IRIS. All relevant incidents on IRIS in the last five years are listed in Table 1. ISO Limited, who handle port logistics at the Port of Tauranga, reported no other occurrences. Thus, the total number of reported incidents in the last five years is thirteen of which five occurred during unloading, seven occurred during loading and one is unclear as to whether it was loading or unloading. As noted previously, drivers are generally in the cab during unloading but outside the truck in a safe area during loading but there are exceptions. The incident reports in Table 1 indicate that the driver was in the cab in two of the loading incidents. This indicates that, over a five year period there were seven incidents (five unloading and two loading) where a log hit the cab roof while the driver was in the cab. There were no reported injuries from any of these incidents. It is possible that there have been other incidents which were not captured in the reports but, if so, it is extremely unlikely that there were any injuries from these because injuries would have led to reporting.

Table 1. List of “log hitting cab roof” incidents in the last six years from Forest Owners IRIS database

No	Date	Description
1	27/10/2023	A log has slipped forward during loading and slid over the roof of the truck hitting the windshield. The driver was assisting a workmate chain down their truck, so he was in a safe area at the time.
2	9/03/2023	Log slipped while being unloaded and hit the roof.
3	9/03/2023	Was being loaded when a log slid from the top of the truck bunk through the gap in the top of the headboard and across the roof of the cab damaging the visor before landing on the ground in front of the truck.
4	10/06/2022	Loader unloading first grab off truck and collected steel grating for cab window protection off truck and broke brackets and lifted over height headboard and has fallen off and over onto the trucks roof of cab and damaged x aerial antennas and damaged roof and then fell to left of cab.
5	8/09/2021	Loader operator on the last 4 logs of truck packet to finish it off, grabbed them all at once and as the operator was placing the logs on top of the truck, one slid forward over the headboard and skimmed over the roof and bonnet (causing minor damage) and landed on the ground in front of the cab. Truck driver was in cab. Could have been ugly if they were standing beside cab.
6	12/08/2020	During loading a log has slipped off/out of the grapple over the truck roof. The log has stopped resting on the trucks sun visor. Only extremely minor damage to the sun visor and marker light. AM/FM aerial damaged.
7	17/09/2018	Log slide off while loading truck, hit air intake exhaust, and smashed airhorn off roof tearing hole in roof.
8	12/02/2018	Loading log on a log truck, the operator grabbed 3 logs 2 on the bottom and 1 on the top. As he went to load the logs onto the truck the top log slipped out of the grapple and went over the headboard of the truck and partially landed on the passenger side roof of the truck. The driver was in the cab
9	03/07/2017	Loading pulp onto truck, log smashed into left hand side of cab, smashing the MT data aerial, and cracking the roof where the airhorn is mounted.
10	07/04/2017	The log slid through the headache rack and rested on the roof of the truck. When the loader has tried to retrieve the log, he has lifted it and in conjunction with the top bar of the headache rack as a pivot point, the log has pushed down on the roof bending it.
11	14/02/2017	Unloading first grab, the centre P1 slid forward as lifting, slipped as far forward as the truck roof aerial.

Although we don't have accurate data on the number of loading and unloading operations that occur we can estimate them based on the total log harvest and the size of the log truck fleet. The annual forestry harvest is around 34,375,000m³ (from Facts and Figures 2022/23 New Zealand Plantation Forest Industry published by the Forest Owners Association). The density of newly harvested pinus radiata logs is typically 1000kg/m³, so the average annual harvest is about 34,375,000 tonnes. The average load of an on-highway logging truck is 32 tonnes and so this requires at least 1,074,220 truck trips with the same number of loading and unloading events. This calculation assumes that each log is only transported once and thus is conservative. For some types of forestry operations, the logs are transported more than once.

An alternative approach to estimating the number of loading and unloading events is to consider the size of the log truck fleet. There are approximately 1500 log trucks in the fleet. If we assume that each vehicle works for 225 days per year and undertakes three trips per day, we get a total of 1,012,500 trips with a

loading and unloading event each trip. This value is very similar to the one calculated from the harvest volume.

Over the last five years there will have been more than 5 million loading events and 5 million unloading events (10 million in total). In that period there have been 13 reported incidents of a log hitting a cab roof and no reported injuries. Of these 13 incidents, there were only 7 where the driver was in the cab. Thus, over the last five years, the chance of a log falling on a cab roof with the driver inside has literally been less than one in a million.

In the feedback to the draft of this report, one of the larger processors pointed out that they have achieved a very substantial reduction in the number of incidents of logs falling from loaders by concreting the log yard and providing a hard flat surface without potholes for the loaders to operate on. This is particularly important during the sap season when the logs are more slippery than usual. Note that this comment relates to all incident of logs falling from loaders not just those that hit the truck cab roof.

CONCLUSIONS

This review was prompted by Worksafe in response to two incidents at C3 Limited where a log fell onto the roof of the truck cab during unloading with the driver inside the vehicle. There were no injuries associated with these incidents.

A review of past incident reports shows that these incidents occur very rarely with fewer than one incident per million unloading or loading movements over the past five years. Because of the infrequency of these incidents, there were only 13 incident reports over a five year period and only 7 of these had the driver in the cab. No injuries were reported in any of these incidents.

Because of the small number of reported incidents, it is impossible to say that there will never be a risk of injury to the driver but almost all log trucks currently operating comply with the UNECE R29 requirements for cab strength which, for most log trucks, means that the roof can withstand a load of 10 tonnes. This is many times the weight of the heaviest log that could fall and so the cab roof will not collapse under the impact of a falling log. However, the UNECE R29 requirements are based on the load being applied to the whole roof while a falling log applies the load to a small, localised area of the roof. This will often cause a dent in the roof, but it is difficult to predict the magnitude or location of this dent. None of the 13 reported incidents produced dents that risked causing injury to the driver.

The LTSC Industry Standards provide detailed instructions covering the loading and unloading processes. As these log loss incidents hitting the cab roof are rare and there have been no reported injuries associated with them, there is no reason to believe that the current standards and practices are not adequate for protecting drivers.