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# Heavy Truck Exposure and Risk
# Insight Into Road and Traffic Mix

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## Abstract

This paper discusses accident risk and exposure relating to heavy truck movements on private and public roads. The paper examines the effects of mixed traffic streams and road type influencing risk. The work is based upon safety research carried out in the province of Alberta on public and private roads used by vehicles hauling raw forest products. The private road system consists of four separate road classes and is practically free of passenger cars. This unusual condition allows for the study of risk and exposure relating strictly to heavy vehicles and road type, free from the influence of passenger cars. These findings are compared with the findings from the public road system using similar vehicles. In this way the influence of passenger cars and light vehicles on the performance of heavy truck safety can be explored.

# 1.0 INTRODUCTION

One of the challenges currently facing the road safety community is a lack of quality information on variables affecting the safety performance of large trucks. The results presented in this paper were from a study conducted for Alberta's Senior Government & Industry Log Truck Task Force, which examined the safety performance of the Alberta raw forest product sector. This paper focuses on the crash data generated by this study and examines the significance of this information particularly with respect to variables such as vehicle mass, vehicle and road type. The study examined the performance of logging trucks on private and public road systems for the reporting period 1994 to 1997.

## 1.1 Alberta Forest Sector

Much of Albert's commercial forest grows on fragile solids, which are very sensitive to mechanical disturbance. As a result, logging operations are carried out during the winter months when the forest floor is frozen and protected with snow. Most wintertime logging operations function around the clock from freeze up to spring thaw (approximately 4 months). The wood is stockpiled at the mills as feedstock allowing the mills to operate at capacity during the balance of the year. This intense period of wood harvest and transport requires very efficient operations.

The wintertime log transportation activity compliments farming and gravel haul operations that are restricted to periods of the year when the weather is more favourable. Many of the truck operators and the power units used during the log haul in winter are also used for hauling gravel and farm products during the late spring, summer and fall.

## 1.2 Alberta Weight Limits

Alberta Transportation and Utilities governs heavy truck size and weight policy for the public road system. Table 1 contains a general summary of the permissible truck axle weights in the province of Alberta.

**Table 1: Alberta standard legal axle weights**

| Axle weights (kg) | | | |
|---|---|---|---|
| **Steer** | **Single** | **Tandem** | **Tridem** |
| 7,300 | 9,100 | 17,000 | 21,000; 23,000 & 24,000 |

Note: The three tridem weights contained in Table 1 depend on axle spread.

The enforcement tolerance for exceeding the legal weights is typically 500kg/axle or axle group.

The penalty system is for exceeding the axle weight regulations are as follows:

| | |
|---|---|
| 0 to 499kg | $0 |
| 500kg to 999kg | $100 |
| each additional 500kg | $100 |

The province also governs the allowable gross vehicle weight as follows:

- A-train 53,500kg
- Truck & pony 55,300kg
- B-train 62,500kg

During the winter months when the infrastructure is frozen, the logging industry is granted additional weight under special permit. The permitted winter log haul weights vary by road class and are identified by colour-coded route as follows.

**Table 2. Permitted Winter Weights by Route Code for Tractors**

| Route class | Axle weights (kg) | | | |
|---|---|---|---|---|
| | Steer | Single | Tandem | Tridem |
| Green | 7,300 | 9,100 | 25,000 | 27,000 |
| Blue | 7,300 | 9,100 | 23,000 | 25,000 |
| Yellow | 7,300 | 9,100 | 20,000 | 23,000 |
| Red | 7,300 | 9,100 | 17,000 | 23,000 |

## 1.3 Vehicle Information

The workhorse of the Alberta forest sector is the tractor pole trailer shown in Figure 1. The configuration consists of a conventional three-axle tractor with bunks fixed to its chassis on a rotating bearing and is the most common configuration found in Alberta. The pole trailer consists of a two-axle trailer with bunks fixed to a rotating bearing plate (referred to in the industry as a cup and saucer). The trailer pole (reach) consists of a sliding member that attaches to a stinger fixed at the rear of the tractor chassis. This system gives the long wheelbase vehicle improved off tracking performance. Other variations of this basic design include three-axle pole trailers and tri-drive tractors with pole trailers.

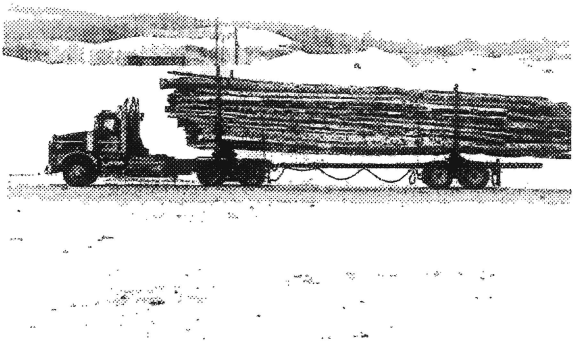

**Figure 1. Tractor pole trailer (5-axle)**

# 2.0 SAFETY PERFORMANCE ANALYSIS

The Traffic Safety Services Branch of Alberta Transportation provided log truck accident data for all roads in Alberta (public and private). In addition, accident data from mills operating on private road systems were complied. Upon review, the data from a single private road system was found to be of exceptional quality and it was selected for use in the analysis. The two independent data sources provide characteristically different data sets. The provincial data relates to log trucks that are operating under the summer weights and the weights associated with the Alberta winter weights program. The private road data relates to vehicles that are loaded to significantly higher weights than those on the provincial road system.

Additional truck crash data were compiled from the US Federal Highway Administration Office of Motor Carriers in an attempt to understand some of the influencing factors affecting truck safety.

## 2.1 The influence of Alcohol

At the time of this study, the most resent data available from Alberta Transportation was for the year 1997. In that year, there were 429 traffic fatalities. Fatal crashes occurred most frequently in rural areas and 21.7% of drivers involved in fatal crashes had consumed alcohol prior to the crash. Of the truck drivers involved in casualty collisions within Alberta, only 0.6% were alcohol impaired. The US statistics were very similar revealing

that in collisions between passenger cars and trucks, only 2% of truck drivers had any level of alcohol in their blood and only 0.8% had blood alcohol content levels greater than the legal limit. Similarly 21.6% of US passenger car drivers involved in fatal crashes had alcohol in their blood. There is strong consistency in the Alberta and US data with respect to the proportion of fatal accidents involving blood alcohol. Given that 99.2% of truck drivers involved in fatal accidents were not legally impaired, suggests that alcohol use by truck drivers is not a significant risk factor. Since 21.7% of drivers involved in fatal crashes in Alberta had consumed alcohol prior to the crash suggests that alcohol is a considerable risk factor for vehicle drivers other than truck drivers. This finding has implications of reduced risk on private logging road operations where few other vehicles than vehicles than log trucks use the road network.

Table 3 shows an annual summary of the Alberta truck crashes the occurrence of fatal and non-fatal log truck crashes compared with those of all other vehicles. It shows that on average there are 2.3 fatal log truck crashes per year compared with 36.5 fatal truck crashes and 327.3 fatal crashes from all vehicle types. Expressed as a percentage, log track fatal crashes account for 6.3% of all fatal truck crashes and 0.7% of all fatal vehicle crashes in the province of Alberta.

**Table 3. Comparison of Log Truck Fatal Crashes and all Vehicle Fatal Crashes in Alberta**

| Year | Log trucks only | | All Trucks | All Vehicle Types | |
|---|---|---|---|---|---|
| | All Crashes | Fatal | Fatal | All Crashes | Fatal |
| 1993 - 1994 | 126 | 1 | 38 | 84,588 (1993) | 330 |
| 1994 - 1995 | 169 | 4 | 39 | 84,640 (1994) | 352 |
| 1995 - 1996 | 112 | 2 | 34 | 85,220 (1995) | 328 |
| 1996 - 1997 | 118 | 2 | 35 | 93,832 (1996) | 299 |
| Average yearly occurrence | | | | | |
| 1993 - 1997 | 131.3 | 2.3 | 36.5 | 87,070 | 327.3 |

Note: Statistics are based on death, injury or property damage greater than $1000.00
Data supplied by Alberta Transportation and Utilities Driver Safety and Research Section.

## 2.2 Evaluating Crash Rates

The exposure data used in this analysis (Table 4) was supplied jointly and under full agreement by Alberta Transportation and Utilities with Alberta Forest Products Association.

The estimates of distance travelled were derived as follows:

For Permitted Winter weight Log Trucks (one way travel)

- Average portion of travel on public roads 85km
- Average portion of travel on bush or private roads 40 km

- Average total haul distance 125 km

For vehicles operating exclusively on the private road network the average haul distance was estimated to be 90 km.

## 2.3 Calculation of Total Distance Travelled

Under the winter weight program approximately 11,000,000 $m^3$ of wood is hauled in 245,000 trips (assuming 45 $m^3$ per trip). The accumulated round trip distance is 41,700,000 km on public roads and 19,600,000 km on bush or private roads. Mills not on the winter weight program, hauling year round with B-trains transport approximately 2,500,000 $m^3$ of wood requiring approximately 56,000 trips (assuming 45 $m^3$ per trip) over a haul distance of 125 km. The total distance travelled by these vehicles is 14,000,000 km round trip.

During the summer haul period, approximately 2,000,000 $m^3$ of wood fibre is transported by 70,000 trips under legal (summer weights, assuming 28 $m^3$ per trip). The average haul distance is estimated to be 125km, therefore the total distance travelled is estimated to be 17,500,000 km round trip.

Exclusive off highway system (private road network) moves approximately 4,500,000 $m^3$ (assuming 55 $m^3$ per trip) by approximately 82,000 trips at an average distance of approximately 90 km. The total distance travelled is estimated to be 14,800,000 km round trip.

**Table 4. Log Truck Travel Data for Public and Private Roads**

| Haul Type | Number of trips | Round Trip Distance travelled (km) | | |
|---|---|---|---|---|
| | | public road | private road | All roads |
| Winter Weight program | 245,000 | 41,700,000 | 19,600,000 | 61,300,000 |
| All season B-trains | 56,000 | 9,520,000 | 4,480,000 | 14,000,000 |
| Summer haul | 70,000 | 11,900,000 | 5,600,000 | 17,500,000 |
| Off highway | 82,000 | nil | 14,800,000 | 14,800,000 |
| *Totals* | *453,000* | *63,120,000* | *44,480,000* | *107,600,000* |

The total distance travelled by log trucks on all roads within the province of Alberta is estimated to be 107,600,000 km per year. On average, log trucks are involved in 131.3 non-fatal crashes and 2.3 fatal crashes per year. Based on these figures, the log truck crash rate is estimated to be 120 non-fatal cashes and 2.14 fatal crashes per 100,000,000 km travelled. Alberta Transportation and Utilities estimates the crash rate for all vehicles within the province to be 68.48 crashes per 100,000,000 km. Based on crash rate, it can be concluded that log trucks are over represented in crashes by a factor of 1.75.

The fatal crash rate for log trucks is approximately 2.14 fatal crashes per 100,000,000 km travelled. It is estimated that the fatal crash rate for all vehicles in Alberta is 2.57 per 100,000,000 km. The fatal crash rate for log trucks is 15.6% less than the estimated fatal crash rate for the general vehicle population in Alberta.

It is important to note that while log truck crash rates are over represented in crashes by a factor of 1.75, log truck fatal crash rates are under represented by 15.6%. Comparing log truck crashes with the general vehicle population crashes on the basis of fatalities per 1000 crashes, log truck crashes are 2.2 times less likely to result in fatal crashes than the general vehicle population. This finding is shown in Figure 2 where data is displayed as fatalities per 1,000 crashes. The finding suggests that compared with most vehicle crashes, log truck crashes are less likely to result in fatalities. This may be explained by the fact that compared with the general vehicle population, a significant amount of the distance travelled by log trucks occurs at lower speeds on lower class roadways with lower traffic densities. Data show that for the period 1993 to 1997, 54.2% of log truck crashes took place on roads other than primary or secondary highways. Such road systems likely result in increased crash risk at reduced vehicle operating speed resulting in decreased crash severity. Perhaps the most significant difference in the rates can be attributed to the fact that log trucks travel significant distances on roads with comparatively low traffic density.

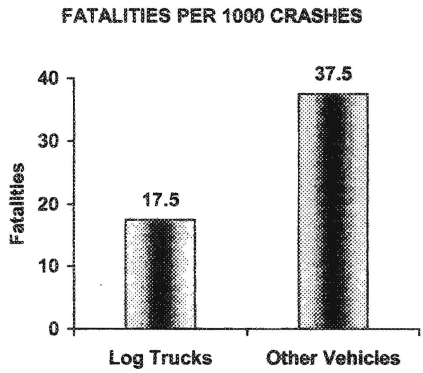


**Figure 2. A comparison of fatality rates per 1,000 crashes of log trucks and other vehicles**

## 2.4 Exposure

Table 5 contains a summary of all fatal log truck accidents in the Province of Alberta for the period 1992 to 1997 and shows that 73% of all log truck fatal crashes involved collisions with other vehicles. This finding shows that log trucks fatality rate is particularly sensitive to exposure. This means that reducing number of log trucks required to haul a fixed amount of wood fibre will result in reduced fatalities. It also means that log truck fatalities can be expected to be lower on roads where there are reduced general traffic volumes.

In the US, for the years 1993 to 1996, the average fatal crash involvement rate for large trucks is 1.6 per 100,000,000 km. For passenger cars, the fatal crash involvement rate is 1.3 per 100,000,000 km travelled. Fatal crashes involving large trucks represented 8.5% of all fatal crashes. In Alberta, large trucks are involved in 11.5% of all fatal crashes. Compared with the US, Alberta fatal truck accident rate is approximately 35% greater. The difference between the US and Alberta truck accident rates may be attributed largely to the fact that a significant proportion of the US truck transportation takes place on divided highways.

**Table 5 Description of all Log Truck Fatal Crashes 1992 to 1997**

| Logging season | # Fatal Crashes | Type of crash | # Killed | Deceased |
|---|---|---|---|---|
| 1992/93 | | Rollover | 1 | Log truck driver |
| | 2 | Rollover | 1 | Log truck driver |
| 1993/94 | 1 | Head on with car | 1 | Car driver |
| | | Rollover | 1 | Log truck driver |
| 1994/95 | 4 | Angle collision with pickup | 1 | Pickup driver |
| | | Head on with tractor trailer | 1 | Tractor trailer driver |
| | | Head on with car | 1 | Car |
| | | Rear end with pickup | 3 | Pickup driver & 2 passengers |
| 1995/96 | 2 | | | |
| | | Head on with pickup | 2 | Pickup driver & 1 passenger |
| 1996/97 | 2 | Head on with pickup | 1 | Pickup passenger |
| | | Head on with 2 pickups | 2 | 2 pickup drivers |

## 2.5 Road Type

Road type has a significant influence on large truck safety. Very little of the Alberta road network in northern Alberta is divided highway. Almost all the distance travelled by log trucks takes place on two lane undivided roads. By comparison, a significant portion of general truck traffic, especially inter-provincial trucking tasks place on primary divided highways.

The US data is sufficiently detailed to allow for a general understanding of the influence of road type on large truck safety. According to the 1999 US data, 39% of truck distance travelled in the US was on the interstate system (a divided highway network) yet only 24% of truck crashes occurred on the interstate. In addition, 90% of trucks involved in fatal crashes were operating on highways where the opposing lanes were not separated by barriers.

On private road systems, all of the roads are either single lane or two-lane undivided. The private road network is defined by road class, designated by the numbers I to IV. The roads are designed to specific construction standards. Table 6 and the Figure 3 show crash the rate by private road class for a particular
private road system. Considering two lane undivided roads, crash rates on Class II roads are 3.45 times greater than Class I roads. The principal difference between these roads is the design speed and road surface width. This finding clearly demonstrates that road quality of two lane undivided roads is strongly linked to crash rate.

The crash rate for Class III roads is very low. The crash rate is approximately 4 times lower than Class I roads and 14.5 times lower than Class II roads. The Class III road is a well-built single lane road with turnouts for passing oncoming vehicles. The improvement in crash rate is in part related to reduced vehicle speed but the most significant factor is the single lane use.

The Crash rate on Class IV roads is extremely high. The class IV roads are generally primitive temporary winter roads. On Class IV roads, log trucks travel at very slow speeds (under 10 km/h) and the uneven ground occasionally results in "flop over" (low-speed rollover) crashes. The risk of significant damage or personal injury from crashes on Class IV roads is very small.

**Table 6 Data by road class for a particular private road network**

| Road Type | Description | Surface Width | speed (km/h) | | Crashes 100 M-km |
|---|---|---|---|---|---|
| | | | Design | Avg. | |
| Class I | 2-lane permanent | 10 m | 90 | 50 | 218.9 |
| Class II | 2-lane permanent | 8-10 m | 80 | 40 | 755.7 |
| Class III | 1-lane permanent | 6-8 m | 60 | 25 | 52.19 |
| Class IV | 1 –lane temporary | 3 6 m | 40 | 7 | 1225.0 |
| Class V | 1 – lane temporary | 5- 7 m | N/A | N/A | N/A |

N/A – data not available

Table 7 shows that on the basis a four-year average, 10% of the log truck crashes occurred on the secondary road system, 36% occurred on the primary road system and 54% of logging truck accidents occurred on roads other than those within the primary and secondary provincial system. From these data, it appears that the majority of the log truck crashes occur on roads with lower traffic volume roads.

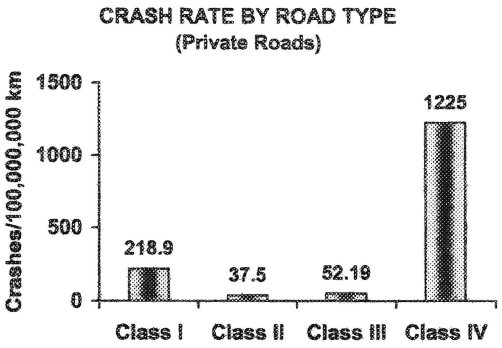


**Figure 3. A comparison of crashes by road type within a particular private road network.**

**Table 7 Location of Logging Truck Crashes**

| Road Type | 1993 – 94 | 1994 – 95 | 1995 – 96 | 1996 – 97 | Average |
|---|---|---|---|---|---|
| Primary Highways | 35.7% | 33.1% | 39.3% | 34.7% | 35.7% |
| Secondary Highways | 11.1% | 5.9% | 9.8% | 13.6% | 10.1% |
| Other Roads | 53.2% | 61% | 50.9% | 51.7% | 54.2% |

Other roads include local roads, logging roads, streets, log yards and parking lots.
Data supplied by Alberta Transportation and Utilities Driver Safety and Research Section.

Table 8 shows that on the primary road system, most accidents occur on straight roads or at intersections. On secondary roads, most accidents occur on straight sections and on curves with slightly fewer accidents occurring at intersections. On other roads, more accidents occur on curved sections.

Table 8. Log Truck Crashes by Road Geometry

| Reference | 1993 – 94 | 1994 – 95 | 1995 – 96 | 1996 – 97 | Average |
|---|---|---|---|---|---|
| Primary Roads | | | | | |
| Straight | 38.8% | 58.9% | 50.0% | 51.2% | 49.7% |
| Curve | 20.0% | 8.9% | 13.6% | 7.3% | 12.5% |
| Intersection | 41.2% | 19.6% | 27.3% | 26.8% | 28.7% |
| Hill/Grade | 0% | 12.6% | 9.1% | 14.7% | 9.1% |
| Secondary Roads | | | | | |
| Straight | 28.6% | 30.0% | 45.5% | 43.8% | 37.0% |
| Curve | 35.7% | 30.0% | 45.5% | 12.5% | 30.9% |
| Intersection | 35.7% | 30.0% | 0% | 25.0% | 22.6% |
| Hill/Grade | 0% | 10.0% | 9.0% | 18.7% | 9.4% |
| Other Roads | | | | | |
| Straight | 35.9% | 37.9% | 26.3% | 26.2% | 31.5% |
| Curve | 38.8% | 36.9% | 40.4% | 36.1% | 38.1% |
| Intersection | 13.4% | 9.7% | 15.8% | 18.0% | 14.2% |
| Hill/Grade | 11.9% | 15.5% | 17.5% | 19.7% | 16.2% |

Other roads include local roads, logging roads, streets, log yards and parking lots.
Data supplied by Alberta Transportation and Utilities Driver Safety and Research Section.

Table 9 shows that almost all fatalities occur on the primary and secondary roads and that property damage and injury is consistently distributed among primary, secondary and other roads.

Table 9 Log Truck Crashes by Road Class

| Crash Category | 1993 – 94 | 1994 – 95 | 1995 – 96 | 1996 – 97 |
|---|---|---|---|---|
| Primary Highways | | | | |
| Fatal | 2.2% | 3.6% | 4.5% | 0% |
| Injury | 24.4% | 19.6% | 13.6% | 29.3% |
| Property Damage | 73.4% | 76.8% | 81.9% | 70.7% |
| Secondary Highways | | | | |
| Fatal | 0% | 20.0% | 0% | 6.3% |
| Injury | 14.3% | 0% | 9.1% | 25.0% |
| Property Damage | 85.7% | 80.0% | 90.9% | 68.7% |
| Other Highways | | | | |
| Fatal | 0% | 0.9% | 0% | 0% |
| Injury | 11.9% | 21.4% | 10.5% | 19.7% |
| Property Damage | 88.1% | 77.7% | 89.5% | 80.3% |

Other roads include local roads, logging roads, streets, log yards and parking lots.
Data supplied by Alberta Transportation and Utilities Driver Safety and Research Section.

## 2.6 Rollovers Vs Collisions

As referenced above, of all fatal log truck crashes occurring in Alberta between 1992 to 1997, 73% involved collisions with other vehicles and 27% were rollovers. From Alberta Transportation and Utilities data on log truck crashes, rollovers account for 23% of crashes on all roads. The proportion of log truck rollover fatalities is reasonably consistent with the proportion of rollover crashes for all truck types.

## 2.7 Other US Findings of Interest

The US statistics show that 78% of large trucks involved in fatal crashes and 73% of large trucks involved in non-fatal crashes experienced a collision with another vehicle as the first harmful event. Only 1.8% of fatal truck crashes and 1.3% of non-fatal truck crashes were non-collision events. It is clear that in the US the primary risk factor for large trucks are collisions with other vehicles. The limited fatal crash data form Alberta log trucks shows a similar relationship for the period 1992 to 1997 where 73% of all log truck fatal crashes involved collisions with other vehicles

In the US, 56% of fatalities involving large trucks occurred on undivided highways and 90% of the trucks involved in fatal crashes were operating on highways where the opposing lanes were not separated by barriers. In addition, 39% of all truck miles driven on interstate, only 24% of crashes occurred on interstate. This finding shows that divided highways greatly reduce the risk of fatal crashes.

## 2.8 Private Road Operations

The private logging road network in northern Alberta is very extensive. Vehicles carry much heavier loads on the private network than on public roads. The economies gained through the higher vehicle weights makes this road network economically viable. The advantage of the private road system with respect to public safety is significant. Without the private road system, much of the wood fibre would be transported on the public road network resulting in increased vehicle to vehicle collisions.

There has been a long-standing practice within the private road system to haul extremely heavy loads on the drive axles of the tractors. Tandem drive axle loads range from 34,000 kg to 40,000 kg.

The research found that the crash rate for log trucks operating on the private permanent road system (Class I – III) is 342 non-fatal crashes per 100,000,000 km. The private road crash rate was found to be 2.85 times greater than the over all log truck crash rate. While the crash rate difference is high, the accident records show that most of the crashes on the

private road system studied, were slow speed, relatively minor crashes with little risk to injury. During the period of 1995 to 1998, of the 55 crashes reported on the private system studied only one serious injury (cracked ribs) and one fatal crash occurred. The injury collision occurred when the driver of a picker truck failed to stow the hydraulic picker boom properly and it struck a bridge structure causing the vehicle to stop suddenly. The driver struck the steering wheel cracking his ribs. In the fatal case, a pickup truck operated by an alcohol-impaired driver crossed the centreline of the road and collided with an empty log truck. To avoid the oncoming pickup truck, the log truck had pulled off the road as far as possible and was almost stationary when struck by the vehicle. These two incidences represent the most serious vehicle casualties that occurred in this particular private road system for the period 1995 to 1998. The estimated cumulative distance travelled during this period is approximately 13,400,000 km.

The provincial statistics show that for the period 1993 to 1997, except for the alcohol fatality referred to above, all other fatal crashes have occurred on the provincial primary or secondary highways. During this period there were 6 fatal crashes on the provincial primary system and 2 on the provincial secondary system.

From the detailed analysis of the crash history on this private road network, it can be concluded that while crash rates are high, most of the crashes that do occur are minor and the safety performance in terms of injury is low. It is also important to note that many of the crashes that appear in the private road records would not qualify for inclusion in the provincial data base due to insufficient damage.

The following Tables 10-13 contain data from a single private road system (data does not include the Super B configuration). The data is of high quality and the road system has been in operation for many years.

**Table 10 Truck Kilometres Driven By Road Class – Round Trip on a Specific Private Road System**

| Road Class | Total distance travelled (km) |
|---|---|
| Class 1 | 2,192,480 |
| Class 2 | 688,086 |
| Class 3 | 383,192 |
| Class 4 | 81,630 |
| Total all classes | 3,345,388 |

**Table 11 Crashes By Road Class on a Specific Private Road System**

| Year | Class 1 | Class 2 | Class 3 | Class 4 | Mill site | Hwy | Total | SVA |
|---|---|---|---|---|---|---|---|---|
| 1998 | 5 | 4 | 1 | 2 | 2 | 2 | 16 | 14 |
| 1997 | 4 | 6 | 0 | 3 | 0 | 0 | 13 | 9 |
| 1996 | 7 | 5 | 0 | 0 | 1 | 0 | 13 | 11 |
| 1995 | 5 | 6 | 0 | 0 | 0 | 2 | 13 | 7 |
| 1994 | 3 | 5 | 0 | 0 | 0 | 1 | 9 | 9 |
| Avg. | 4.8 | 5.2 | 0.2 | 1.0 | 0.6 | 1 | 10.2 | 10 |

**Table 12 Crash Rates by Road Class**

| Road Class | Total distance travelled (km) | Average crashes | Crashes 100,000,00 km |
|---|---|---|---|
| Class 1 | 2,192,480 | 4.8 | 218.9 |
| Class 2 | 688,086 | 5.2 | 755.7 |
| Class 3 | 383,192 | 0.2 | 52.19 |
| Class 4 | 81,630 | 1 | 1225 |
| Total all classes | 3,345,388 | 11.2 | |

**Table 13 Crash Contributing Factors on a Specific Private Road System**

| Year | Total collisions | Single vehicle | Pull-over rollover | High-speed Rollover | Collide with other vehicle or object | Low speed rollover | Driver attention | Mech. Failure |
|---|---|---|---|---|---|---|---|---|
| 1998 | 16 | 13 | 1 | 5 | 3 | 1 | 2 | 4 |
| 1997 | 13 | 9 | 4 | 0 | 4 | 1 | 4 | 0 |
| 1996 | 13 | 10 | 2 | 1 | 3 | 4 | 2 | 1 |
| 1995 | 13 | 9 | 1 | 2 | 4 | 2 | 3 | 1 |
| 1994 | 9 | 8 | 1 | 3 | 1 | 1 | 2 | 1 |
| *Avg.* | *12.8* | *9.8* | *1.8* | *2.2* | *3* | *1.8* | *2.6* | *1.4* |
| *Avg %* | *100* | *76.6%* | *14.1%* | *17.19%* | *23.4%* | *14.1%* | *20.3%* | *10.9%* |

# 3.0 SUMMARY AND CONCLUSIONS

1) Less than 1% of truck drivers involved in fatal accidents were found to be legally impaired while 21.7% of other vehicle drivers involved in fatal crashes in Alberta had consumed alcohol prior to the crash. The finding suggests that alcohol is a considerable risk factor for vehicle drivers other than truck drivers. This finding has implications of reduced risk on private logging road operations where most of the vehicles are log trucks and where few other vehicles are found.

2) Compared with the general population of vehicle crashes, log truck crashes are 2.2 times less likely to result in fatalities. This may be explained by the fact that compared with the general vehicle population, a significant amount of the distance travelled by log trucks occurs at lower speeds on less sophisticated roadways with lower traffic densities. Such road systems likely result in reduced vehicle operating speed thereby resulting in decreased crash severity. Perhaps the most significant difference in the crash rates can be attributed to the fact that log trucks travel significant distances on roads with comparatively low traffic density.

3) 1)In the Province of Alberta for the period 1992 to 1997, 73% of all log truck fatal crashes involved collisions with other vehicles. This finding show that log truck fatality rate is particularly sensitive to exposure. ·Reducing number of log trucks required to haul a fixed amount of wood fibre will result in reduced fatality rates. Log truck fatalities can be expected to be lower on roads where there are reduced general traffic volumes.

4) Compared with the US, Alberta fatal truck accident rates are approximately 35% greater. The difference between the US and Alberta truck accident rates may be attributed largely to the fact that a significant proportion of the US truck transportation takes place on divided highways.

5) The proportion of log fatal truck crashes involving rollover (27%) is similar to the proportion of truck crashes involving rollover (23%). The proportion of log truck rollover fatalities is reasonably consistent with the proportion of rollover crashes for all truck types. Given that most log trucks operate in low-density traffic, the finding suggests that that log truck rollover crashes are not strongly linked to traffic density.

6) The crash rate on permanent private roads (class I-III) is approximately 2.85 times greater than the overall log truck crash rate. While the crash rate difference is high, the accident records show that most of the crashes on the private road system studied, were slow speed, relatively minor crashes with little risk to injury. From the detailed analysis of the crash history on this private road network, it was found that while crash rates are high the occurrence of injury is low. It is also important

to note that many of the crashes that appear in the private road records would not qualify for inclusion in the provincial database due to insufficient damage.

7) The road class type within the private road network has a very significant effect on log truck crash rate. The averaged log truck crash rate on Class III single lane permanent roads is 2.3 times lower than the provincial average.

## 4.0 REFERENCES


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