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Analysis of Lost Time Injuries -1998 Logging

(Accident Reporting Scheme Statistics)

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It is safer for skid workers to be seperated from landing machinery

Year January to December	1992	1993	1994	1995	1996	1997	1998
Fatal injuries	9	6	10	9	4	7	5
Lost time injuries (LTI)	197	246	288	202	218	172	115
Minor injuries	36	37	107	101	106	103	147
Near miss incidents	32	46	154	122	124	147	183
Annual harvest (million m^3)	14.1	14.9	15.1	16.4	16.9	16.8	15.2*
Lost time injuries/million m^3)	14	16.5	19.1	12.3	12.9	10.2	7.6

Table 1 - Injuries and incidents recorded by the Scheme from 1992 to 1998

*Source: Provisional data, Ministry of Agriculture and Forestry, Round wood removals

Summary

- There were 115 lost time injuries reported which is less than in previous years
- There was a total of 1608 days off work, 9% less than in 1997
- Average severity increased to 14 days from 11 days in 1997
- Most injuries occurred between 7 and 9:59 am
- Greatest proportion of injuries were in hauler operations
- Less trimming injuries occurred than in 1997
- Less skid work injuries occurred than in 1997 but they were more severe
- Most frequent causes of injury were:
  - felling: being hit by tree being felled
  - trimming: chainsaw laceration
  - breaking out: slipping over
  - skid work: hit by rolling log and/or machine.

Positive signs:

- No chainsaw lacerations to the lower legs in 1998 - first time in 14 years!
- No "hit by carriage" injuries in 1998.

Introduction

This is the fourteenth year of data collection by the Accident Reporting Scheme (ARS).

The following definitions are used by the ARS:

- lost time - the injury causes the injured person to miss the next full day's scheduled work
- minor - first aid or medical treatment required, but lost time as defined above does not apply
- near miss - first aid or medical treatment not required but the incident could have caused injury.

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Analysis of lost time injuries

Lost time per injury

The average number of days lost per injury was 14.4, which is not significantly greater than the 11.1 days reported in 1997 (Parker, 1998). The number of days lost ranged from one to 100 days, (median five days). The number of days lost is occasionally estimated, so caution must be used when interpreting "number of days lost" information.

In 1998, as in previous years, the greatest proportion of injuries resulted in one to five days off work (Figure 1).

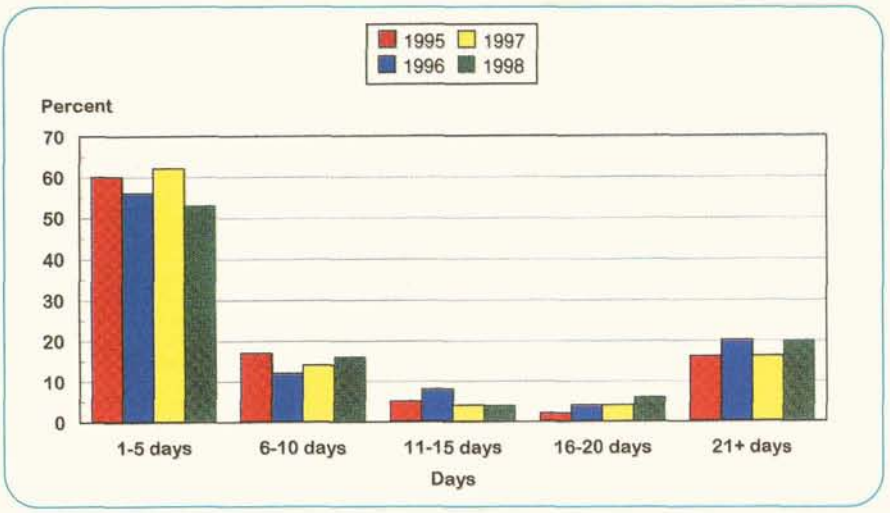

Figure 1 - Distribution of lost time per accident

A total of 1608 work days were lost in 1998. At 235 working days per year, this is equivalent to 6.8 years of lost time. This compares with 7.6 years lost in 1997, 12.1 years lost in 1996 and 7.6 years lost in 1995. A contributing factor to the smaller number of days lost in 1998 was fewer severe fractures (Table 2).

	Number of injuries			Days lost		
	1996	1997	1998	1996	1997	1998
Fracture	36	24	21	1146	655	599
Multiple	23	4	6	459	260	251

Table 2 - Fracture and multiple lost time injuries by number and days lost for 1996, 1997 and 1998

Time of day of lost time injuries

As in previous years, the greatest proportion of the injuries occurred early in the day (Figure 2). There are two factors which may cause this effect:

- Timing of smoko - from 7 am to 9:59 am almost all loggers will be working, so exposed to hazards. In any hour after 10 am some loggers will be having smoko so the total number of loggers exposed to hazards each hour is less so less injuries will occur.
- Fatigue - most loggers will eat breakfast before work. The energy in the breakfast will only fuel them for up to four hours (Kirk, 1996). So by 9 am or 10 am they are low in energy and more likely to make errors because of fatigue. This effect will occur in the afternoon too, as energy from the morning smoko is exhausted and the logger becomes more dehydrated (Paterson and Kirk, 1997).

However, in 1998 there was an increase in the proportion of injuries occurring between 7 am and 7:59 am. Nine of the 11 injuries in this period occurred during summer months. Perhaps early starts resulted in the normal rise in injury rate occurring earlier in the day. There was an unexplained decrease in the number of injuries occurring between 8 am and 8:59 am.

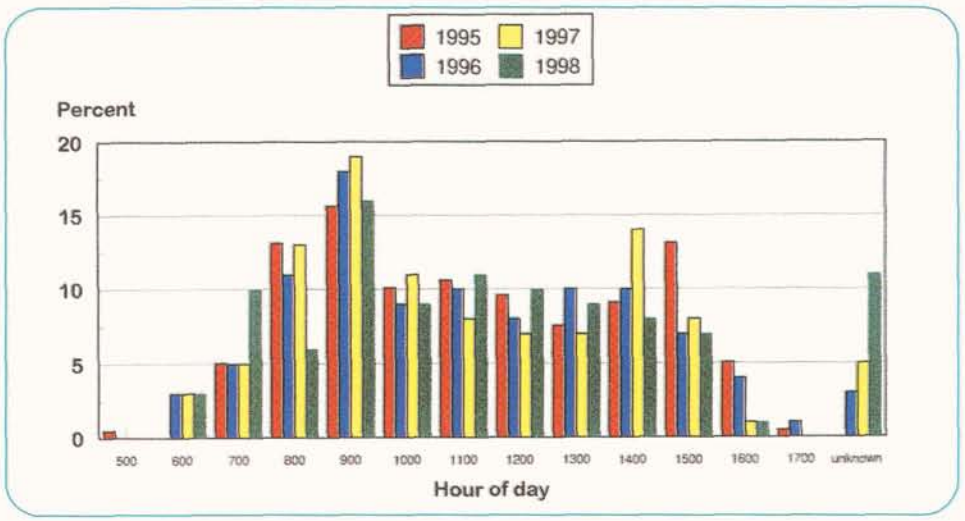

Figure 2 - Lost time injuries by time of day

More injuries occurred on Monday than any other weekday. There were 26%, 17%, 18%, 19% and 16% for Monday to Friday respectively. This is similar to the pattern in 1997 when 26%, 17%, 26%, 20% and 11% of injuries occurred on Monday to Friday respectively.

Type of operation

The proportion of lost time injuries in clearfell has risen slightly (Figure 3). There were seven lost time injuries reported in thinning operations in 1998 compared with 19 reported in 1997. Injury severity in thinnings has increased slightly to an average of eight days off work (Table 4). There were a total of 1338 days lost in clearfell and 58 days lost in thinning in 1997. This compares with 1420 days lost in clearfell and 141 days lost in thinning in 1997. Mechanisation and safety education programmes may have contributed to the decline in thinnings injuries. There was an increase in the volume of production thinning from 1997 to 1998 (0.8 to 1.1 million m^3 respectively - Ministry of Agriculture and Forestry figures).

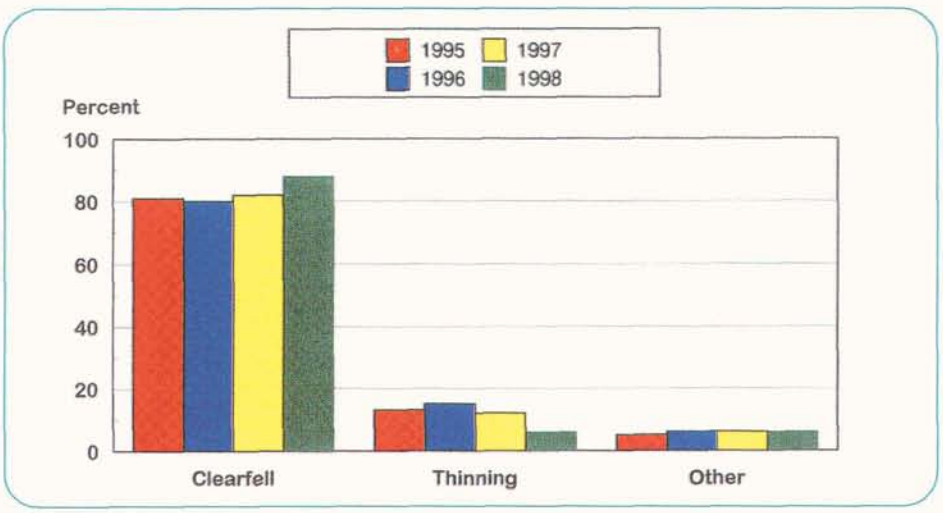

Figure 3 - Lost time injuries by type of operation

For the first time hauler operations accounted for the greatest proportion of known lost time injuries with 56%. This result is not unexpected because the number of hauler operations has been increasing relative to skidder operations. Results of a telephone survey of plantation forest logging operations in 1997 (T. Evanson of Liro, *pers comm.*) indicated that of the 308 logging crews identified, 66% were ground-based and 34% were hauler operations. There has been a definite trend to more hauler operations in 1998.

When comparing the higher number of injuries in hauler operations with ground-based operations, account must be taken of the following:

- in hauler operations almost all felling is motor-manual with no mechanisation to reduce injury
- in hauler operations more people are involved in the breaking out phase, which accounts for many injuries, than in ground-based operations
- hauler crews are generally larger (7.5 people per ground-based crew vs 10.7 people per cable crew in 49 crews - CHH Forests, Tokoroa region) than ground-based crews so there are more people available to be injured per crew
- hauler crews work in steeper terrain which may result in more injuries.

Extraction	1994	1995	1996	1997	1998
Skidder	104	78	77	59	28
Hauler	70	68	67	61	50
Tractor	42	35	35	24	12
Unknown	67	32	19	26	21

Table 3 - Number of lost time injuries by extraction method and year

Type of operation	Number of injuries		Severity (average days lost per injury)	
	1997	1998	1997	1998
Clearfell	140	94	10	14
Thinning	19	7	7	8
All lost time injuries	172	115	11	14

Table 4 - Injury severity - clearfell versus thinning (days lost)

* The number of observations does not correspond with the data in Table 1 due to missing information about the amount of time lost. This follows in all analyses involving lost time.

Logging task

There was a small and continuing decline in the proportion of lost time injuries occurring during felling (Figure 4). The proportion of injuries inflicted during trimming on the cutover has steadily decreased over the last four years. This trend has been seen in both hauler and ground-based operations. This may be due to better technique, improved protective equipment and the greater use of mechanised delimbing. There was a significant increase in the proportion of injuries occurring during skid work. As reported last year (Parker, 1998), this may be due to the intensification of work on the landing - more people (engaged in quality control?) and machines working together and greater volumes of wood passing through the landing.

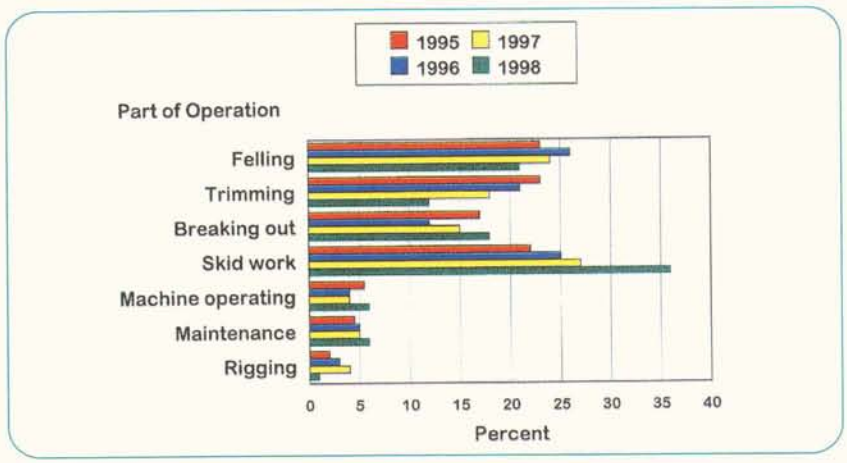

Figure 4 - Lost time injuries by part of operation

The average severity (days lost per injury) of falling injuries has not changed since 1997 but is high compared with earlier years (Figure 5). The average severity of injuries in trimming has increased. There were six injuries resulting in more than 15 days off work. Four were chainsaw lacerations to the left foot. Breaking out injuries have decreased in severity since 1996. There were no "hit by carriage" lost time injuries reported in 1998. These normally result in severe crushing and long periods off work. The average severity of skid work injuries has increased from previous years with eight fractures to the legs and a total of 199 days off work.

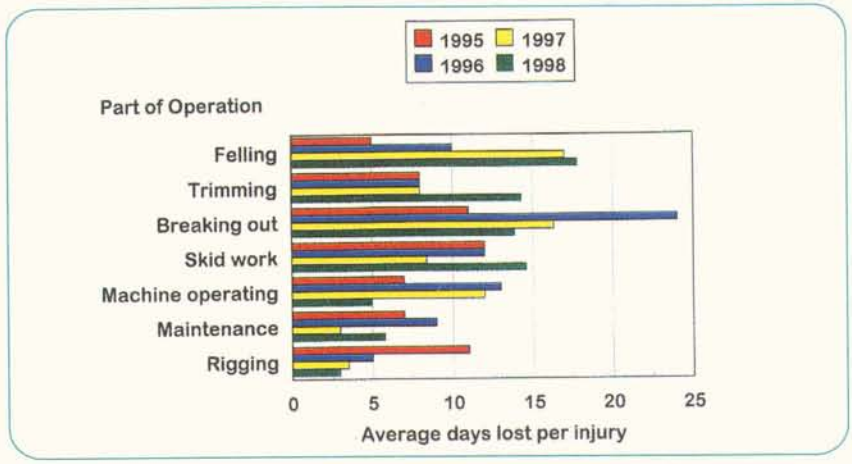

Figure 5 - Average number of days lost per injury by part of operation

Felling

The 23 felling injuries resulted in a total of 411 days lost. These were:

- hauler, 12 injuries, total of 328 days lost
- skidder, 7 injuries, total of 63 days lost
- tractor, one injury, total of five days lost
- unknown, three injuries, total of 15 days lost.

The most common reasons given for injury during felling were:

- too close and hit by tree being felled, nine injuries, total of 213 days lost
- slipping and tripping over, eight injuries, total of 63 days lost
- hit by material falling from trees, two injuries, total of 105 days lost.

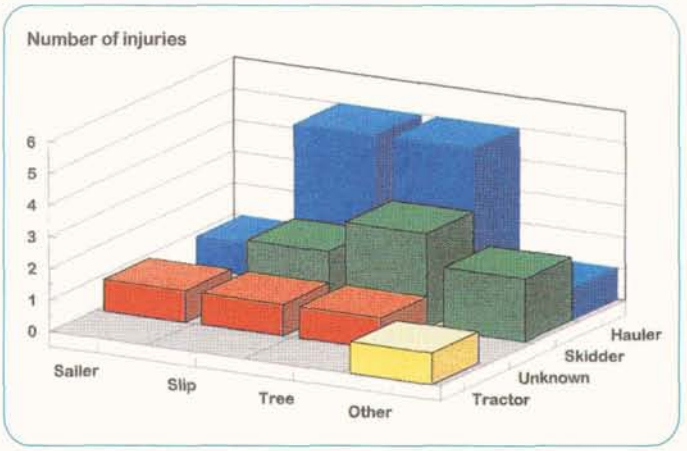

Figure 6 - Cause of felling injuries by extraction method - 1998

Focus

The most frequent causes of injury during falling were being hit by the tree as it falls and slipping over while walking between trees.

- Hit by tree - as reported in previous years, more of these injuries occur in hauler operations because the tree can roll on the steeper country. Good felling technique and moving down the escape route well out of the way are the best ways to avoid injury. There is no protective equipment which will prevent injury from a falling tree.
- Slipping over - a greater proportion of these injuries occur in hauler operations where the terrain is steeper. Careful walking technique coupled with spiked boots (or at least logging spurs) will reduce slipping injuries. Spiked boots have been proven to improve traction even on slash and bare dirt.

Trimming

Twelve lost time injuries occurred while trimming on the cutover and accounted for a total of 153 days lost. These were:

- hauler, two injuries, total of 20 days lost
- skidder, four injuries, total of 37 days lost
- tractor, four injuries, total of 84 days lost
- unknown, two injuries, total of 12 days lost.

The main causes of injury were:

- chainsaw kickback (no other information given), five injuries, 80 days lost
- cut by chainsaw (no other information given), two injuries, 12 days lost
- hit by tension wood or saw hit by tension wood, three injuries, total of 47 days lost - one was a chainsaw laceration
- slipping over, two injuries, total of 45 days lost - both were chainsaw lacerations.

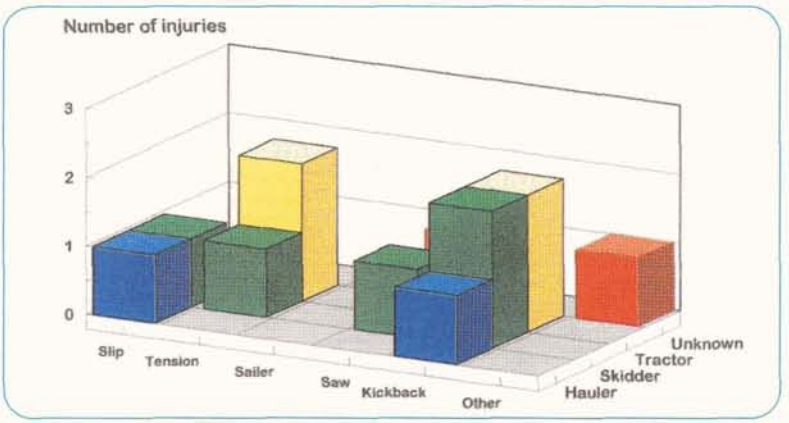

Figure 7 - Cause of trimming injuries by extraction method - 1998

Focus

Most of the lost time trimming injuries were chainsaw lacerations to the feet (seven of 12).

- Kickback - be aware of the location of the bar tip at all times and keep out of the possible path of the saw
- Slipping over - careful walking technique is needed at all times when using a chainsaw. In addition, spiked soled boots substantially reduce the chance of slipping, whether walking on wood, slash or dirt.
- Tension wood - it takes training and experience to recognise the tension in a limb or stem. Keep your body well out of the expected path of the chainsaw.
- Saw - these injuries had no other cause of injury given, but may have resulted from any of the causes mentioned above. When filling out accident reports, please include the cause of injury.

Breaking out

There were 19 breaking out injuries resulting in a total of 264 days lost. These were:

- hauler, 15 injuries, total of 248 days lost
- skidder, three injuries, total of six days lost
- tractor, one injury, 10 days lost.

The main causes of injury were:

- slipping over, five injuries, total of 22 days lost
- hit by dislodged material, four injuries, total of 102 days lost
- hit by the drag, three injuries, total of 14 days lost
- hit by ropes, three injuries, total of 33 days lost.

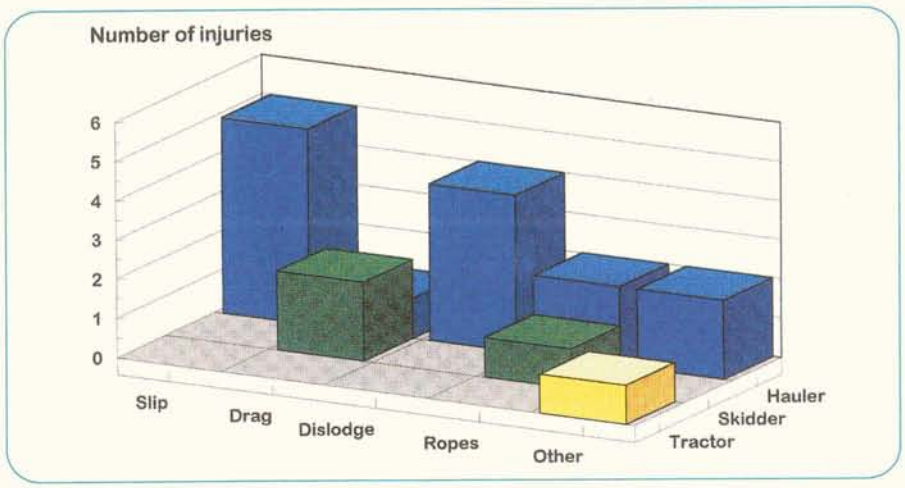

Figure 8 - Cause of breaking out injuries by extraction method - 1998

Focus

In previous years, the greatest cause of injury for breaker outs was being hit by the ropes or carriage. In 1998, no one reported a lost time injury caused by being hit by a carriage. The most serious cause of injury was dislodged material rolling down the hill and hitting breaker outs.

Skid work

There were 39 lost time injuries in skid work resulting in a total of 570 days lost. These were:

- hauler, 14 injuries, total of 71 days lost
- skidder, 13 injuries, total of 255 days lost
- tractor, two injuries, total of 65 days lost
- unknown, 10 injuries, total of 179 days.

The main causes of injury were:

- hit by machine or by material moved by machine, 16 injuries, 249 days lost
- slipping and tripping over, seven injuries, 87 days lost
- rolling log, five injuries, 76 days lost
- cut by chainsaw (no other information given), five injuries, 76 days lost.

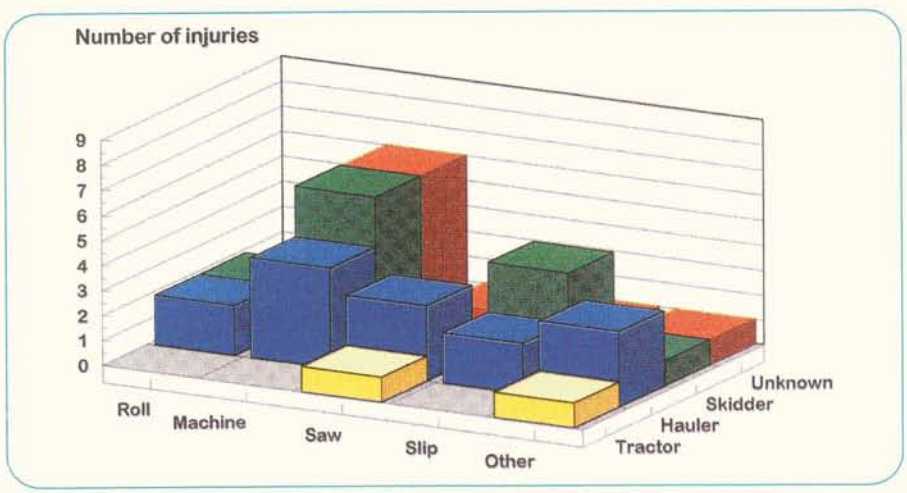

Figure 9 - Cause of skid work injuries by extraction method - 1998

Focus

The main cause of injury to skid workers was being hit by machines or logs which were moved by machines. Most injuries were to the lower legs. If the operation cannot be dephased (machines and workers on separate landings), skid workers must have a safe area where machines or logs cannot hit them.

Other operations

Machine operating - six injuries and 31 days lost:

- Closing excavator door from outside, bent knee, aggravated old injury - five days lost
- Climbed out of forwarder cab and rolled ankle on ground - ten days lost
- Dropped pen down between window and dash of loader, moving wiper mechanism pulled finger nail off - one day lost
- Excavator canopy fell forward, broke safety chains, safety pins failed, no seatbelt worn at time - two days lost
- Hit elbow on extinguisher clip when skidder went over stump - 11 days lost
- Boots not laced up, rolled ankle on loose metal - two days lost.

Maintenance - seven injuries and 40 days lost:

- Hit chainsaw spanner with hammer repairing drive sprocket, hit in eye, four days lost
- Caught arm in shaft of fuel pump - two days lost
- Splicing eye into wire rope, strand flicked across cornea scratching it - two days lost
- Slipped between machine and tracks while refuelling, twisted knee - fifteen days lost
- Greasing Bell when slipped off and landed in mud - five days lost
- Motorised carriage - motor off, when switched power off clamp crushed hand - 10 days lost
- Knocking dirt out of arch hitch with pin, pin slipped through catching his finger - two days lost.

Part of Body Injured

The lower legs and feet continue to be the most frequently injured parts of loggers bodies. Injuries to the head and arms have shown a small decrease in number. Upper and lower torso injuries have increased by a small proportion. Injuries to the eyes, hands, upper leg, lower leg and foot have shown no significant change (Figure 10).

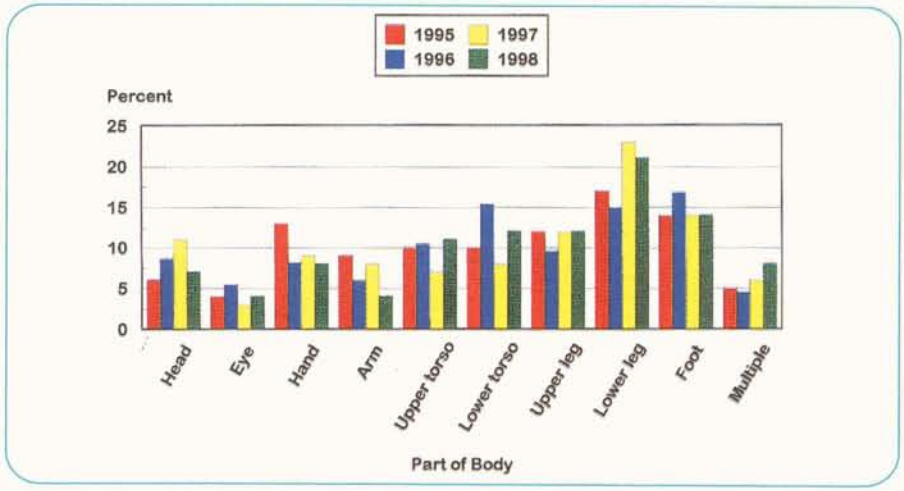

Figure 10 - Lost time injuries by part of body

The proportion of injuries to the lower legs continues to be high. There were 24 injuries resulting in 306 lost work days. Half (12) of these were injuries to the ankle - nine sprains, total of 69 days lost and three fractures - total of 95 days lost. Most injuries to the lower leg above the ankle were caused by rolling logs moved by machines on the landing - five injuries, 26 days lost and one fracture with unknown days off work.

The proportion of injuries to loggers' feet have declined to 1995 levels (Figure 10). Most (10 of 16 foot injuries) were chainsaw lacerations to the feet resulting in a total of 198 days lost (Table 5). All chainsaw lacerations were to the right feet. Although chainsaw cut-resistant boots are available they are not an absolute barrier to the chainsaw. Correct chainsaw technique must be used to ensure the feet are kept well clear of the cutter bar. Other injuries to the feet included crushing and bruising caused by rolling logs (five injuries and 74 days lost).

Part of body	Total number of injuries		Chainsaw inflicted injuries Number		Days lost	
	1997	1998	1997	1998	1997	1998
Hand	14	10	4	3	44	33
Arm	13	4	7	0	37	0
Upper Leg	19	14	2	1	10	1
Lower Leg	36	24	2	0	2	0
Feet	22	16	17	10	194	198

Table 5 - Chainsaw inflicted injuries to the hands, arms, legs and feet - 1998

There has been a decrease in the severity of chainsaw lacerations to the legs (Table 5). For the first time in fourteen years there were NO CHAINSAW LACERATIONS TO THE LOWER LEGS. This completes the decline in the number of chainsaw lacerations to the legs over the last decade. This decline could be due to improved chainsaw cut resistant legwear being worn by loggers, the greater level of training in the workforce and more mechanisation, of felling and delimbing.

Discussion and Conclusion

The total number of work days lost in 1998 was less than in 1997. This was mostly due to a decrease in the total number of injuries. Fractures, which result in a long time off work, occurred less frequently in 1998.

The major findings to come from the 1998 Logging ARS were:

- There were 115 lost time injuries reported which is less than in previous years
- There was a total of 1608 days off work, 9% less than in 1997
- Average severity increased to 14 days from 11 days in 1997
- Most injuries occurred between 7 and 9:59 am
- No chainsaw lacerations to the lower legs
- No "hit by carriage" injuries
- Greatest proportion of injuries in hauler operations
- Less trimming injuries occurred than in 1997
- More skid work injuries occurred than in 1997 and they were more severe
- Most frequent causes of injury were:
  - felling: being hit by tree being felled
  - trimming: chainsaw laceration
  - breaking out: slipping over
  - skid work: hit by rolling log and/or machine.

Quality of the Data

Overall, the quality of the data supplied to the ARS has been improving with each year. However, there are still many accident reports which do not state the extraction machine(s) used - hauler, skidder, tractor, combo, forwarder or the date when the injury occurred. Please complete all sections of the accident reports.

It is vitally important that the forest industry continues to maintain its support of the Accident Reporting Scheme

Reports of lost time and minor injuries and near miss incidents are used to focus research, development and training efforts to improve logging safety.

Injury information has guided research and development into:

Effective use of personal protective equipment

- helmet life
- high visibility clothing
- spiked boots
- cut resistant foot wear
- cut resistant leg wear
- penetration and UV resistant eyewear
- retractor seatbelts for machine operators

Effective use of logging systems:

- two staging
- safe zones for skid workers
- adequate fluid intake and nutrition
- fatigue awareness
- rest breaks

References

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