REPORT

ISSN 1174 - 1406

Volume 22 No. 19 1997

ANALYSIS OF LOST TIME INJURIES - 1996 LOGGING
(Accident Reporting Scheme Statistics)

RICHARD PARKER

Summary

- There were 218 lost time injuries.
- There was a total of 2835 days off work.
- Chainsaw lacerations to feet continue to be the single most common injury resulting in 23 injuries and 282 days lost.
- Felling, trimming, breaking out and skidwork accounted for 26, 21, 12 and 25 % of all lost time injuries.
- There were no chainsaw lacerations to the lower legs in 1996.
- There was a 3 % increase in volume of timber cut between 1995 and 1996.
- There was an 80 % increase in the number of fractures since 1995.
- There was a 280 % increase in the number of multiple injuries since 1995.
- The most frequent cause(s) of injury were;
  - -felling: being hit by material falling from above
  - -trimming: tensioned limbs and chainsaw lacerations
  - -breaking out: being hit by ropes and rigging
  - -skid work: being hit by rolling logs and/or a machine.

Result of chainsaw laceration to the foot

Table 1 - Injuries and incidents recorded by the Scheme from 1992 to 1996

	1992	1993	1994	1995	1996
Fatal injuries	9	6	10	9	4
Lost time injuries (LTI)	197	246	288	202	218
Minor injuries	36	37	107	101	106
Near miss incidents	32	46	154	122	124
Annual harvest (million m^3)*	14.1	14.9	15.1	16.4	16.9
Lost time injuries/million m^3	14	16.5	19.1	12.3	12.9

*Source: Ministry of Forestry, Round wood removals

Liro limited

PO BOX 2244, ROTORUA, NEW ZEALAND

TELEPHONE: 07 348 7168 FAX: 07 346 2886

Email: richard@liro.fri.cri.nz

Introduction

This is the twelfth 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.

Acknowledgments

Liro acknowledges the co-operation of the loggers, contractors and companies that supplied the data used for these analyses.

Analysis of lost time injuries

Lost time per injury

The average number of days lost per injury was 13, which is significantly more than the 9.2 days lost per accident in 1995. The number of days lost ranged from one to 150 days. The median number of days lost was five days. The number of days lost is occasionally estimated, so caution must be used when interpreting "number of days lost" information.

In 1996, there was a greater proportion of injuries resulting in one to five and 21+ days off work than in 1995 (Figure 1). More than half of all lost time injuries resulted in one to five days off work.

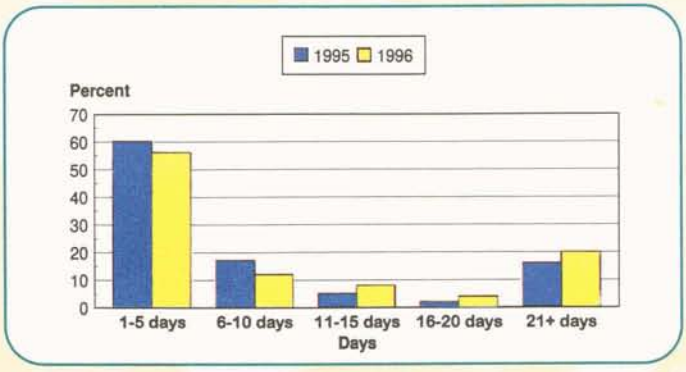

Figure 1 - Distribution of lost time per accident

A total of 2835 work days were lost in 1996. At 235 working days per year, this equates to 12.1 years of lost time. This compares with 7.6 years lost in 1995. The greater number of days lost in 1996 is due to a large increase in the number of fracture and multiple injuries (Table 2).

Table 2 - Fracture and multiple lost time injuries by number and days lost for 1995 and 1996

	Number of Injuries		`Days lost	
	1995	1996	1995	1996
Fracture	20	36	641	1146
Multiple	6	23	43	459

Time of day of lost time injuries

As in previous years, the greatest proportion of the injuries occurred early in the day (Figure 2) and on Monday and Tuesday. The first run of the day is the longest continuous work period (700 hours to 1000 hours) so all loggers will be working and exposed to hazards. Later in the day, crews break for smoko so fewer loggers will be working during any particular hour. Also, in the morning, loggers may be suffering from fatigue due to a poor breakfast (low in energy) and do not recharge their energy level until after smoko (Kirk, 1996). The increase in injuries later in the day may be due to fatigue and dehydration (Paterson & Kirk, 1997).

Optimum physical and mental performance of the worker may be ensured by maintaining an adequate intake of fluid and food throughout the day (Kirk, 1996).

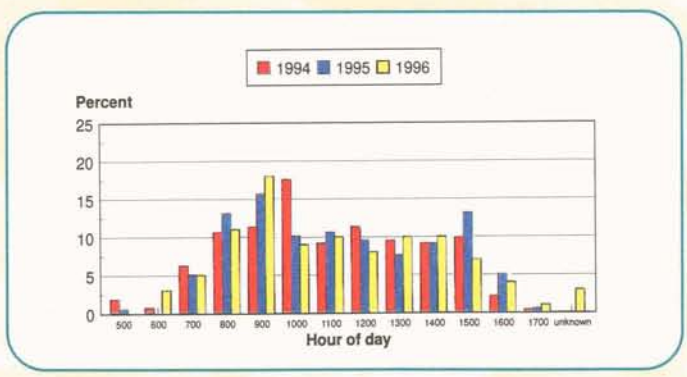

Figure 2 - Lost time injuries by time of day

Type of operation

The proportion of lost time injuries in clearfell has remained the same since 1995 (Figure 3). There were 24 lost time injuries reported in thinnings operations in 1995 compared with 32 reported in 1996.

Injury severity in thinnings has increased slightly to an average of nine days off work (Table 4). There were a total of 2318 days lost in clearfell and 265 days lost in thinning in 1996. This compares with 1456 days lost in clearfell and 158 days lost in thinning in 1995.

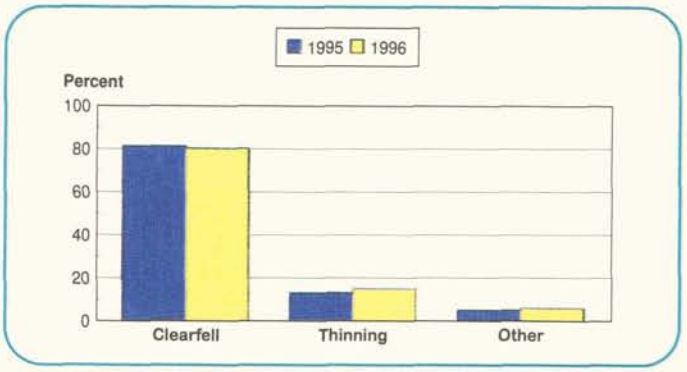

Figure 3 - Lost time injuries by type of operation

As in previous years the greatest proportion of lost time injuries, 42% occurred in skidder extraction operations (Table 3). Hauler operations continued to account for a large proportion of lost time injuries with 37 % compared with 37 % in 1995, 32 % in 1994 and 18 % in 1993. This levelling out in hauler injury numbers may reflect the greater level of experience now found in hauler operations in the New Zealand forest industry. Expressed as a proportion of all lost time accidents, tractor operations are unchanged from last year, 21 %.

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

	1994	1995	1996
Skidder	104	78	77
Hauler	70	68	67
Tractor	42	35	35
Unknown	67	32	19

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

Type of operation	Number of Injuries	Severity (average days lost per injury)	
	1996*	1995	1996
Clearfell	174	10	14
Thinning	31	7	9
All lost time injuries	218	9	12

** 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 has been little change in the proportion of lost time injuries occurring during the felling, trimming and skidwork phases (Figure 4); they accounted for 26 %, 21 % and 25 % of lost time injuries respectively. There was a small but non-significant decrease in the proportion of lost time injuries sustained during breaking out in hauler, skidder and tractor operations - 12 %.

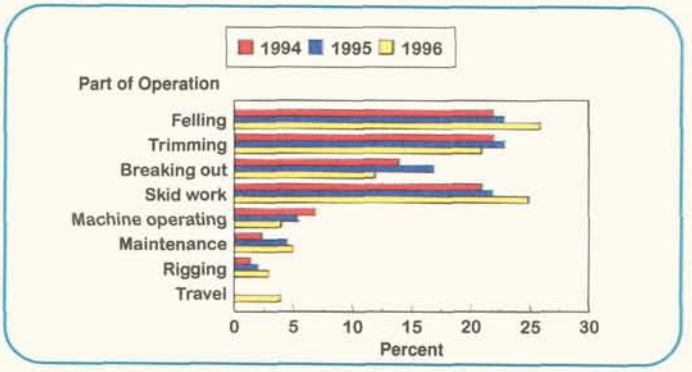

Figure 4 - Lost time injuries by part of operation

There was a large increase in the average severity of breaking out injuries in 1996 compared with earlier years (Figure 5). Two severe injuries involving being hit by the carriage contributed to this high average severity. Two severe (60 days lost) felling injuries, "hit by tree", in 1996 resulted in an increase in the average severity of injury since 1995. One severe (60 days lost) machine operator injury, "hit by stem winched into cab" inflated the 1996 figures. Four serious injuries occurred while travelling to or from work.

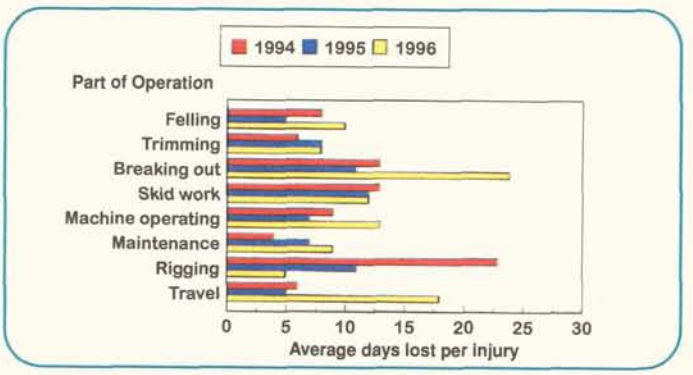

Figure 5 - Average number of days lost per injury by part of operation

Felling

The 53 felling injuries resulted in a total of 539 days lost. These were:

- hauler, 14 injuries, total of 215 days lost
- skidder, 16 injuries, total of 81 days lost

- tractor, 16 injuries, total of 211 days lost
- unknown, seven injuries, total of 32 days lost.

The most common reasons given for injury during felling were:

- hit by material falling from trees, 16 injuries, total of 157 days lost
- slipping and tripping over, 11 injuries, total of 49 days lost
- too close and hit by butt of tree, nine injuries, total of 155 days lost.

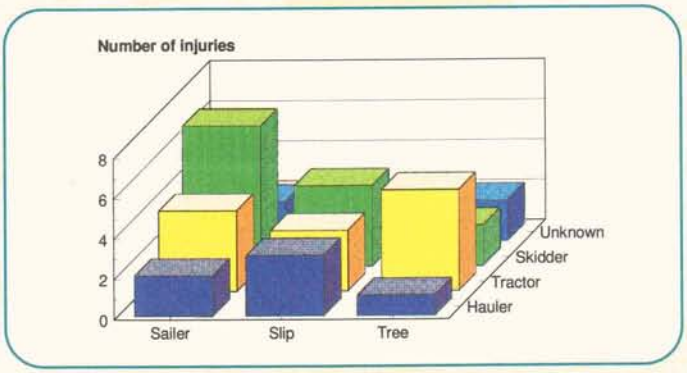

Figure 6 - Cause of felling injuries by extraction method - 1996

Focus

Sailers in skidder operations continue to be a major cause of injury. However tractor operations account for 21% of all injuries and 63% of all "hit by tree" injuries are sustained in tractor operations:

- too close to butt, fallen tree bounced on limbs and hit leg, fractured ankle - 30 days lost
- felled tree flicked up and shifted sideways, hit leg, fractured lower leg - 30 days lost
- caught by vine attached to falling tree, fell on branch, broke three ribs - 15 days lost
- felling too close together, tree felled over spur went sideways and hit him, head injuries - seven days lost
- too close, butt flicked around and hit him after felling, bruised knee - four days lost

Possible reasons provided by industry are: fallers in tractor operations work on steeper country like fallers for hauler operations. However the greater number of injuries due to falling and shifting trees in tractor operations could be because fallers stay close to the falling tree because they must subsequently delimb the tree.

Trimming

Forty-six lost time injuries occurred while trimming on the cutover and accounted for a total of 366 days lost. These were:

- hauler, five injuries, total of 85 days lost
- skidder, 25 injuries, total of 159 days lost
- tractor, six injuries, total of 68 days lost
- unknown, 10 injuries, total of 54 days lost.

The main causes of injury were:

- slipping over, 12 injuries, total of 67 days lost - six were chainsaw lacerations
- hit by tension wood or saw hit by tension wood, eight injuries, total of 151 days lost - six were chainsaw lacerations
- hit by sailers, four injuries, 57 days lost
- cut by chainsaw (no other information given), 11 injuries, 66 days lost.

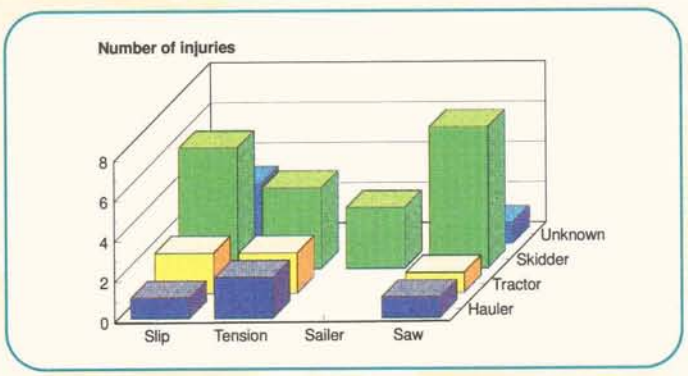

Figure 7 - Cause of trimming injuries by extraction method - 1996

Focus

Chainsaw injuries to the feet are the most frequent trimming injury. Some of the chainsaw injuries to the feet during trimming were:

- tension wood pushed saw into left foot - 30 days lost
- tension wood pushed saw across left foot -30 days lost
- slipped and cut left toe - 28 days lost
- lost concentration, cut tendon in left foot - 20 days lost
- trimming from ground, tip rode over branch into left foot - 20 days lost
- beside stem, overbalanced and put saw into left foot - 15 days lost
- cutting double leader which caused saw to jump back and run across left boot - 15 days lost
- loaded branch pushed saw into left foot behind toecap - 10 days lost

- cut left big toe while trimming on log eight days lost
- cut tension limb, saw across left foot eight days lost

Extreme care must be taken when delimbing with the chainsaw. When cutting tensioned limbs read the tension in the wood and keep your feet well out of the way of the chainsaw cutter-bar. In the Hawkes Bay region, the wearing of chainsaw cut resistant boots has resulted in a 340% decrease in foot lacerations annually.

Breaking out

There were 26 breaking out injuries resulting in a total of 621 days lost. These were:

hauler 19 injuries, total of 518 days lost

skidder six injuries, total of 43 days lost

tractor one injury, 60 days lost.

The main causes of injury were:

slipping over, seven injuries, total of 80 days lost

hit by the drag, three injuries, total of 128 days lost

hit by dislodged material, five injuries, total of 132 days lost

hit by ropes or carriage, seven injuries, total of 252 days lost.

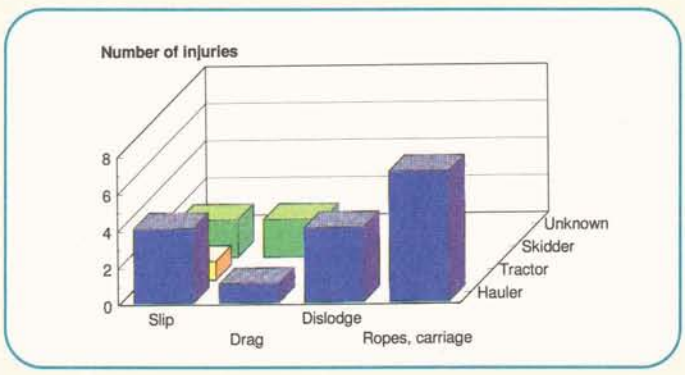

Figure 8 - Cause of breaking out injuries by extraction method - 1996

Focus

A severe new type of injury to emerge in breaking out in 1996 was being hit by the carriage:

- hit by strops which fell from motorised carriage, signal error, multiple injuries - 80 days lost
- carriage fell on him, broken pelvis - 60 days lost
- hit by strop which caught on stump while shot-gunning, fracture lower leg - 40 days lost
- hit by tail rope, multiple injuries - 30 days lost
- hit by siwashed tailrope when jammed drag being backpulled, multiple injuries - 30 days lost
- skyline caught on stump, formed bight, walked into it, tightened, multiple injuries - 10 days lost
- butt rigging dropped rapidly, breaker out too close, hit by flying strop, bruised arm - two days lost

Keep well out of the way of the rigging when it is moving. Wait until the rigging has stopped before moving in to hook-up. In long spans, bounce in the skyline can result in unexpected carriage movement which could crush anyone underneath. Ensure the signals sent to the operator are clear and correct. Operators, do not predict the next move in advance, respond only to the signals given.

Skid work

There were 55 lost time injuries in skid work resulting in a total of 681 days lost. These were:

- hauler 16 injuries, total of 516 days lost
- skidder 17 injuries, total of 43 days lost
- tractor 12 injuries, total of 60 days lost.

The main causes of injury were:

- rolling log 13 injuries, 307 days lost
- hit by machine or by material moved by machine, 13 injuries, 180 days lost
- cut by chainsaw (no other information given), seven injuries, 71 days lost
- slipping and tripping over, 11 injuries, 66 days lost.

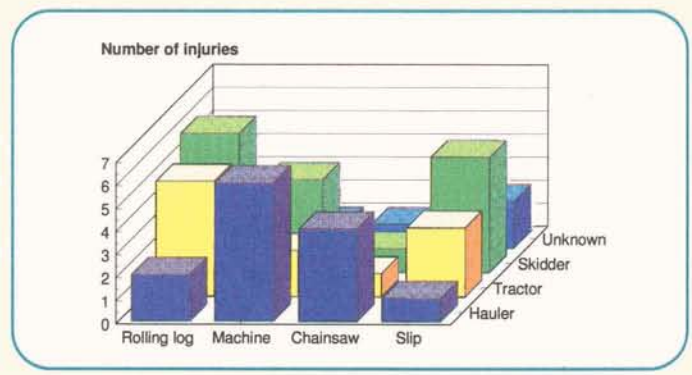

Figure 9 - Cause of skid work injuries by extraction method - 1996

Focus

Skid worker hit by machine or material moved by machine

Hauler

- hit by excavator, stumbled into co-workers chainsaw, cut arm - 30 days lost
- not seen, hit by Bell and jockey wheel, ran over feet, fractured feet - 20 days lost
- hit in face and lower lip with strop as skyline tightened, multiple head injuries - 10 days lost
- standing on bearer cutting log, loader picked up bearer with logs, thrown into air, multiple injuries - 10 days lost
- hit by short pulp in drag which swung around, cut lower leg - two days lost
- hit by drag, standing in wrong place, crushed lower torso - unknown days lost

Skidder

- hit by leader as log was rolled by loader, fractured head - 60 days lost
- skidder tyre hit log which shot forward and rolled onto his foot, bruised foot - seven days lost
- stepped back to avoid drag, fell on branch stub from previous drag, bruised lower torso - five days lost
- loader backed into skid worker, not seen, bruised lower torso - two days lost

Tractor

- tractor hit log which spun around and hit him - inexperienced, not in safe zone, fractured lower leg - 30 days lost
- hit by drag pulled by loader on boggy skid, bruised neck - one day lost

Skid workers and machine operators must be able to operate without interferring with each other's work. Skid workers must have a safe area on the landing in which machines or logs cannot enter. If possible, the operation should be dephased so machines are not operating on the same landing as skid workers. Two-staging operations is often a practical alternative.

Other operations

Machine operating - nine injuries and 115 days lost:

- climbing out of machine - three injuries, total of 35 days lost
- material entered cab - four injuries, total of 64 days lost.

During maintenance - 11 injuries and 99 days lost:

- putting pin in grapple ram, ram extended too far and crushed hand, 30 days lost
- distracted while working on running motor, put fingers into fan blade, 20 days lost
- hooking trailer tank up to van, van backing up, crushed thumb, 15 days lost
- helping lift loader tyre off back of ute, strained back, 10 days lost.

Rigging operations - six injuries and 30 days lost:

- moving block - three injuries, total of 11 days lost
- shifting strawline, somersaulted four wheeler on steep slope, no roll bars, upper torso fracture, 17 days lost.

Travel - eight injuries and 143 days lost:

- rolled vehicle travelling to/from work - five injuries and 58 days lost (reasons given were: falling to sleep, putting cassette tape in and ran off road, icy conditions, wet brakes after crossing river, loose gravel)
- tyre blew out, hit stump pushed wheel through floor, fractured left foot, 30 days lost
- hit horse which wandered onto road, flipped ute, lacerated hand, 50 days lost
- travelling too fast, crossed centre line, hit truck, multiple head injuries, five days lost.

Part of Body Injured

There has been a decrease in the proportion of injuries to the hands, arms, upper leg and lower leg (Figure 10). The proportion of lost time injuries to the upper torso and multiple injuries remains unchanged from 1995. However, the proportion of injuries to the head, eyes, lower torso and feet has increased.

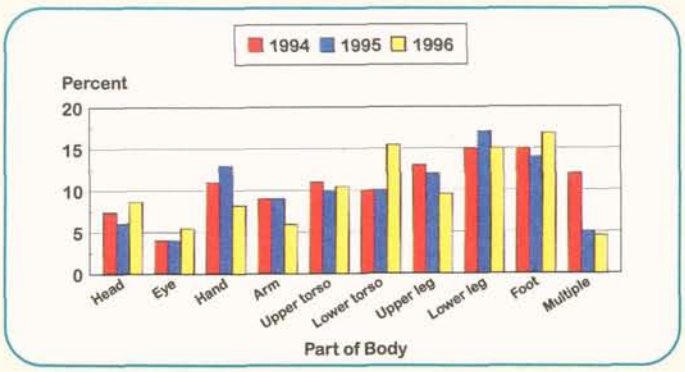

Figure 10 - Lost time injuries by part of body

There was a large increase in the proportion of injuries to the lower torso (Figure 10). The most frequent injury was a strained back (18 injuries) caused by slipping over (eight injuries) or carrying heavy loads such as fuel drums or blocks (four injuries) and pulling out jammed saws or strops (three injuries).

There has been an increase in the proportion of injuries to loggers' feet. Most (23 of 37 foot injuries) were chainsaw lacerations to the feet resulting in a total of 282 days lost. Only one chainsaw laceration was to the right foot "trimming on top of stem, reached behind with saw and cut foot" - unknown days lost. 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 caused by rolling logs (five injuries), being hit by machines (three injuries) and being injured by a machine during maintenance (two injuries).

Table 5 - Chainsaw inflicted injuries to the hands, arms, legs and feet - 1996

Part of body	Total number or injuries		Chainsaw inflicted injuries Number		Days lost	
	1995	1996	1995	1996	1995	1996
Hand	26	18	5	4	40	21
Arm	17	13	4	6	23	73
Upper Leg	24	21	4	5	27	9
Lower Leg	35	33	6	0	24	0
Feet	28	37	15	23	201	282*

**Two injuries did not state the number of days lost*

There has been a large decrease in the severity of chainsaw lacerations to the hands and legs (Table 5). **There were no chainsaw lacerations reported to the lower legs in 1996**. The elimination of lower leg chainsaw lacerations could be due to improved chainsaw cut resistant legwear being worn by loggers and the greater level of training in the workforce. However there has been an increase in the number and severity of chainsaw injuries to the arms and feet.

Discussion and Conclusion

The total number of work days lost in 1996 was significantly greater than in 1995. This was due to a small increase in the total number of injuries and a large increase in the average severity of injury. Fractures and multiple injuries, which result in a long time off work, occurred more frequently in 1996.

The major findings to come from the 1996 Logging ARS were:

- chainsaw lacerations to feet continue to be the single most common injury resulting in 23 injuries and 282 days lost
- felling, trimming, breaking out and skidwork accounted for 26, 21, 12 and 25 % of all lost time injuries
- there were **no chainsaw lacerations** to the lower legs in 1996
- there was an 80 % increase in the number of fractures since 1995
- there was a 280 % increase in the number of multiple injuries since 1995
- the most frequent cause(s) of injury in:
  - -felling - being hit by material falling from above
  - -trimming - tensioned limbs resulting in chainsaw lacerations
  - -breaking out - being hit by ropes and rigging
  - -skid work - being hit by rolling logs and/or a machine.

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. A Liro report detailing near miss incidents and minor injuries is currently being prepared.

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

References

Kirk, P.M. (1996) : "Reducing the Impacts of Fatigue on Forest Workers". LIRO Report Vol. 21 No. 3.

Kirk, P.M., Sullman, M.J.M., Parker, R.J. (1996) : "Fatigue levels in motor-manual tree felling and delimbing operations". LIRO Report Vol. 21 No. 18.

Paterson, T.; Kirk, P.M. (1997): "Fluid and Energy for Forest Workers". Liro Report Vol. 22 No. 8.