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LOGGING WORK INJURIES IN APPALACHIA



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ABSTRACT

Logging accidents are costly. They may bring pain to injured workers, hardship to their families, and higher insurance premiums and lower productivity to their employers. Our analysis of 1,172 injuries in central Appalachia reveals that nearly half of all time lost—and almost all fatalities—resulted from accidents during felling and unloading. The largest proportion of serious injuries, fatalities, and costs were among young or new workers and during the late spring and early summer, when logging is at its peak. Safety programs should concentrate on these high-hazard areas. Statistical summaries are provided to aid in the development of such programs.

HAZARDS AND HIGH COSTS

LOGGING is one of the most hazardous of all American industries. In 1974, about 28 out of every 100 loggers suffered job-related injuries. Over half of these injuries resulted in lost workdays, and some of them in death.

Among 240 industries reported on by the Bureau of Labor Statistics, logging ranked first in incidence and second in severity of injuries causing lost workdays. The incidence—15.6 per 100 full-time workers—was 3 1/2 times greater than that for manufacturing, and far over other industries in the lumber and wood products group. Only water transportation had a higher number of workdays lost per full-time worker (U.S. Department of Labor 1976).

There are several reasons why logging has higher injury rates than other industries. The work is often strenuous, and is done out-of-doors where there is no control over weather and terrain. Work sites change frequently and present new hazards to which workers must adjust. The work force is scattered over a wide area. And, certain characteristics of the industry are conducive to high injury rates—seasonal work, high employee turnover, and piece-rate payment which may encourage haste and carelessness.

A measure of the economic burden of work injuries is the cost of workmen's compensation insurance. During 1976, manual or base rates for workmen's compensation on logging operations in the eastern United States ranged from a low of \$12 per \$100 of payroll in Alabama to a high of \$50.48 in Kentucky. Nearly one-third of the states had rates of more than \$25 per \$100 of payroll.

Still, workmen's compensation represents only about one-fourth to one-half of the total cost of work injuries. Uninsured costs that must be borne by private employers include wages paid to both the injured man and other workers who stop work to give assistance, damage to materials and equipment, lost production, and the cost of recruiting and training replacements. High injury rates also create a poor image of the logging industry, which

makes it more difficult for employers to recruit labor and borrow capital.

In light of the high cost of work injuries, it is important that the logging industry make a special effort to reduce these injuries by emphasizing safety practices and regulations. Injury statistics can be a valuable tool for the industry because they reflect the past experience of many companies and individuals. Statistical summaries of large numbers of accidents can provide clues about the kinds of hazards to be controlled, and situations to be avoided, and suggest the safety measures to be taken to reduce costs and prevent human suffering. Such summaries are especially valuable for developing and monitoring accident prevention programs.

THE STUDY

This study was made to provide information on when, where, and how workers are injured in Appalachian logging operations. It provides statistical summaries needed to set priorities in safety programs and it recommends general guidelines for avoiding logging accidents.

The investigation was limited to logging operations in West Virginia, Kentucky, Tennessee, and Virginia that produced pulpwood, saw logs, mine props, and various other roundwood products. All timber harvesting activities from the stump to the point of delivery are represented.

The study was based on loggers' reports of injuries in the above states during 1971 and 1974. The "Employer's First Report of Injury"—a one-page form—must be submitted to state workmen's compensation agencies. The reports varied slightly by state, but always gave a description of the injury and some general information about the injured worker. Data from such reports have been found to identify the characteristics of injuries correctly over 90 percent of the time, and thus are sufficiently accurate for general research and analysis (Mazor 1976).

The reports covered 1,172 injuries. The data were analyzed by chi-square tests of independence which indicated no significant differences in key variables—sources of injury, type of accident,

part of body injured, and nature of injury—between injuries reported in 1971 and in 1974. However, in 1974 a slightly higher proportion of workers were injured while limbing and a lower proportion while bucking and loading.

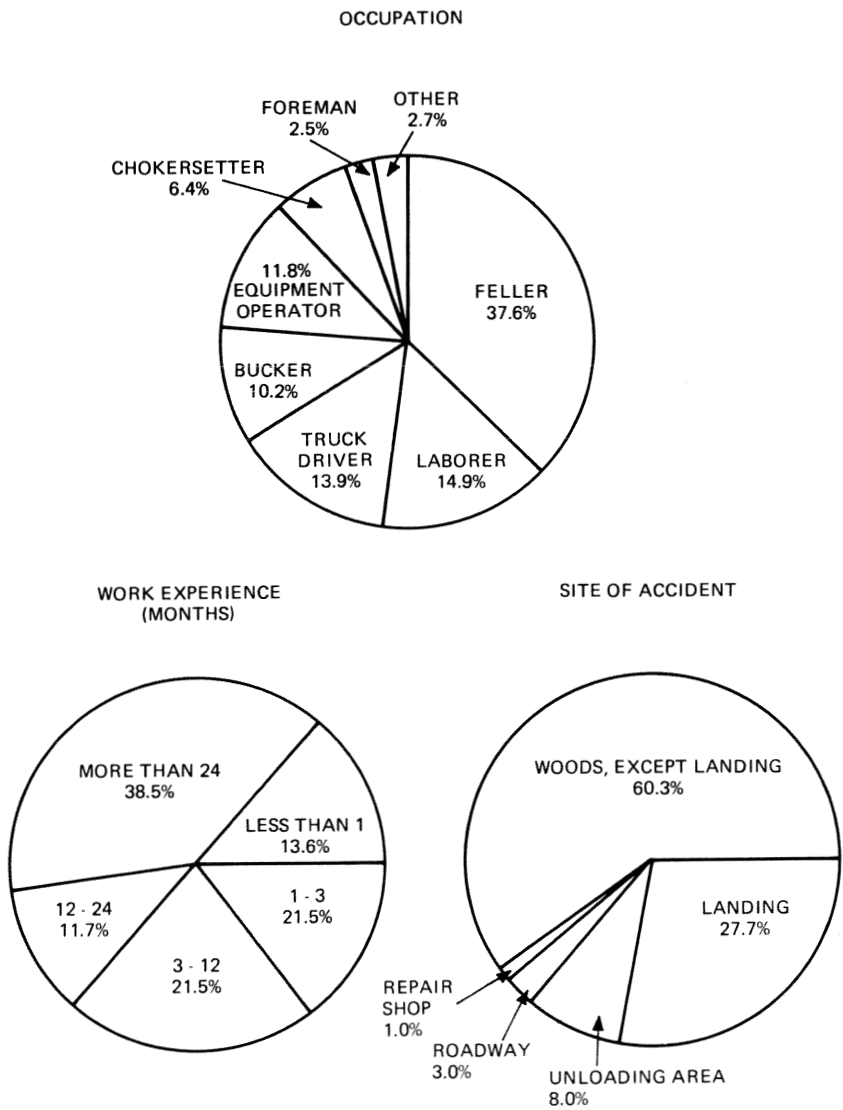
Injuries ranged in severity from relatively minor cuts and bruises to fatalities. All injuries required either some form of medical treatment or restricted the job assignment of the worker. The sample included 18 fatalities, 713 disabling or time-lost injuries, 212 nondisabling injuries, and 229 cases where the severity of the injury was not reported.

**THE INJURED: WHO,
WHEN, WHERE**

Many of the injuries reported by loggers in Appalachia were related to youth and inexperience. In the sample, 36 percent of those who were injured were under the age of 30; however, nationwide, this age group represents only 29.9 percent of the logging labor force (U.S. Dep. Commer. 1973). The median age of those injured was 35, which is 3 years below the median for all loggers.

Many of the injured had been employed only a short time before their accident (Fig. 1). One-half

Figure 1.—Work injuries in logging by occupation, work experience, and site of accident.



had less than a year's work experience with their employer and one-third had less than 4 months. Nearly 14 percent had been on the job less than a month—which suggests that employers need to provide more intensive safety training to new employees.

Two-thirds of those injured were fellers, truck-drivers, and general laborers. A greater number of workers are exposed to the hazards of felling work, and fellers suffered more injuries than any other logging group. Again, newly-hired workers had proportionately more injuries while setting chokers and limbing trees. They were more likely to be struck by falling trees and caught under or between logs than experienced workers.

The number of injuries varied by season of the year, day of the week, and time of day. Injuries were most common during June, July, and August when logging is at its peak. Employers will find it profitable to emphasize safety training during this period when many new workers are hired and regular employees return after winter layoffs.

Accidents that caused injuries occurred more often during the first part of the week and reached a peak on Wednesdays. Only about 4 percent of all injuries were incurred on weekends. The peak

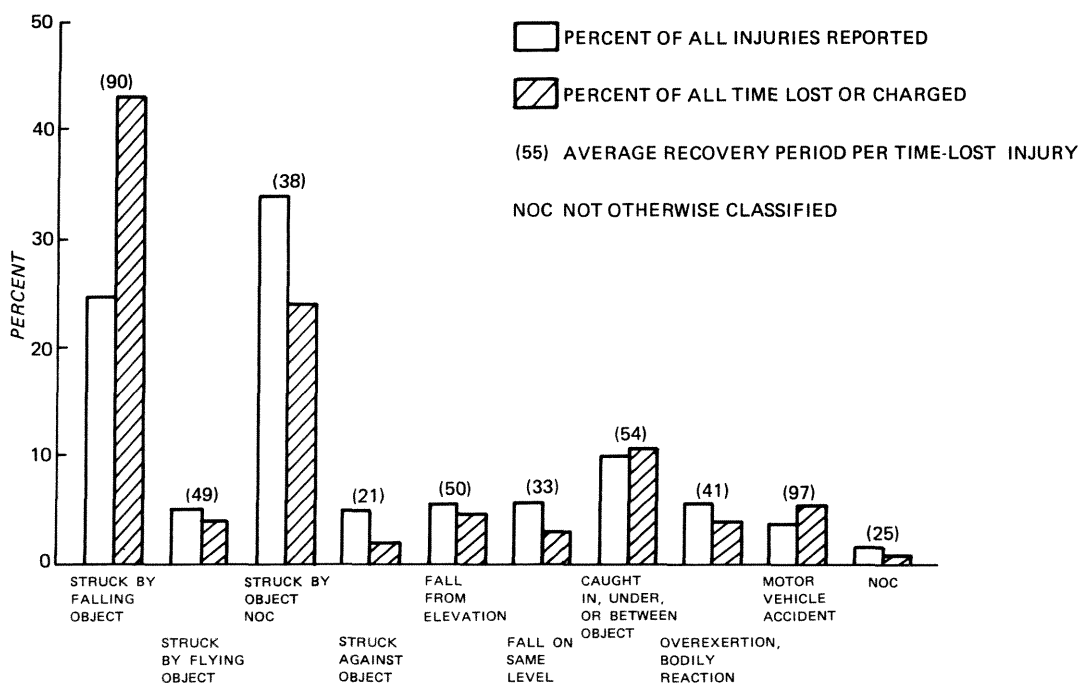
hours when injuries were incurred were between 10 and 11 o'clock in the morning and 2 and 3 o'clock in the afternoon. The number of injuries sustained on Monday mornings and Friday afternoons was not unusually high or low.

Accidents in wooded areas other than landings accounted for 60 percent of all injuries. Twenty-seven percent of the injuries were incurred at landings, while the remainder were incurred along roadways, in repair shops, and at unloading points.

INJURY PATTERNS

To obtain more specific information about logging injuries, we classified each injury by (1) what the worker was doing when injured; (2) the nature of his injury (i.e., laceration, fracture); (3) the part of his body that was injured; (4) the object or substance that inflicted the injury; and (5) how the accident took place (i.e., fall from an elevation, struck by a flying object). These analytical categories were crosstabulated by the number of nonfatal injuries reported and the number of days lost. Time lost for permanent impairments such as amputations and loss of sight is

Figure 2.—Percentage of nonfatal logging injuries by accident type, Central Appalachian area, 1971 and 1974



charged at a standard rate recommended by the American National Standards Institute (1974). For all other injuries, time lost is the actual number of consecutive calendar days that the injured person is unable to work. The day of the injury and the day the worker returns to his job are not counted.

Type of accident

The most serious accidents occurred when loggers were struck by falling objects. Falling trees, limbs, logs, and various other objects accounted for 24.7 percent of all injuries and 42.7 percent of all time lost (Fig. 2). Workers disabled by accidents of this type required an average of 90 days to recover from their injuries. This compares to an average recovery period of 55 days for all time-lost injuries. Even more important, this type of accident resulted in 17 of the 18 logging fatalities.

In contrast, there were relatively few cases of workers injured by flying objects. Of those reported, about half involved flying wood chips, sawdust, bark, and other small particles.

The remaining cases where a worker was struck by an object comprised one-third of all logging injuries and one-fourth of all time lost. Most of these accidents were caused by kickbacks from power saws (57 percent), rolling logs (9.3 percent), and the whipping movement of branches and saplings (16.7 percent).

Falls accounted for slightly more than one-tenth of the total injuries. Half of these were from an elevation, while the others were on the same level. Workers who fell from elevated surfaces were usually loading trucks (41.4 percent) or getting on or off skidders, loaders, and other equipment (22.4 percent). Some of those accidents could have been avoided if the workers had been more cautious when dismounting from their equipment, and if exitways had been better designed.

Falls on the same level usually happened when loggers stepped in holes; tripped over branches, logs, and stumps; or slipped on leaves, bark, and loose rocks. Many of these accidents were uncontrollable because of the nature of the work locations. However, several falls occurred as fellers were running to get away from falling trees. If better escape routes had been planned, some of those accidents could have been avoided.

Workers were frequently caught in, under, or between objects—usually logs, equipment, chains, and cables—which caused nonimpact injuries such

as pinched or crushed hands, fingers, feet, or other body parts. These accidents commonly occurred when workers were loading and unloading trucks, setting chokers, or bucking logs.

There were 41 motor vehicle accidents—31 truckdrivers and 10 operators of skidders, dozers, or other vehicles were injured. In addition to the often serious injuries to the drivers, many of these accidents resulted in substantial property damage.

Other types of accidents that were not recorded separately included those related to temperature extremes (burns, heat exhaustion, frostbite); electric current; poison ivy; and bites or stings from snakes and bees.

Source of injury

Chain saws were the direct source of the greatest number of injuries (24.2 percent), followed by logs (20.9 percent), and limbs and saplings (16 percent).

Accidents caused by chain saws occurred in various ways, although, most resulted from saw kickbacks:

Saw kicked back	156
Saw thrown or pushed against worker	30
Worker fell while using or carrying saw	26
Worker struck hand or other part of body against saw	11
Chain broke or slipped off saw	4
Worker injured while starting saw	3
Worker injured while repairing saw	2
Not known	38
Total cases	270

The percentage of workers injured by chain saws while limbing was 50.6 percent; while bucking, 27.7 percent; and while felling, 9.5 percent. Most injuries were on the legs and ankles (47.8 percent), arms and wrists (14.3 percent), hands (10.7 percent), and fingers (11 percent). Although chain saws caused nearly a fourth of all injuries, they accounted for only 11.6 percent of the time lost—workers required an average recovery period of 24 days. This indicates that most of these injuries were less serious than those caused by falling objects.

Log-related accidents accounted for 1 out of every 3 lost days. The most serious of these accidents were caused when logs fell on workers who were loading and unloading trucks. Accidents occurred in the following ways:

Struck by falling log	70
Struck by rolling log	35
Struck against log	3
Fall from elevation onto log	6
Fall from same level onto log	9
Caught in, under, or between log(s)	74
Overexertion from lifting, pushing, or pulling logs	36
Total cases	233

Injuries inflicted by limbs and saplings accounted for one-fifth of the time lost. Accidents most often happened when dead and broken limbs fell from standing timber and when branches broke away from cut trees as they fell to the ground. During limbing and bucking, other injuries were caused when branches and saplings under tension were released and sprung back, striking workers.

Part of body injured

Legs, ankles, feet, and toes were the most likely to be injured in logging accidents. The lower body extremities incurred 38.5 percent of all injuries. The upper extremities—arms, wrists, hands, and fingers—received 21.2 percent of all injuries. The remaining injuries were to the trunk (20.2 percent); the head, face, and neck (14.1 percent); and more than one major body part (6 percent).

Legs and ankles were especially vulnerable, and were injured in 29.2 percent of the cases. These injuries represented 41.5 percent of the time lost—far more than from injuries to any other part of the body. The most common leg and ankle injuries were cuts and lacerations (49.1 percent), fractures (19.6 percent), and bruises (18.6 percent). More than four out of every five cuts and lacerations were caused by chain saws; fractures and bruises were most often caused by rolling or falling logs.

Back injuries can be especially troublesome. In almost 9 percent of the accidents, workers suffered back injuries—the majority of which were strains and sprains. Most of these injuries were caused when workers loaded trucks by hand. In the future, the number of back injuries should be reduced by the increased use of mechanical loading equipment.

Eye injuries are also important to guard against since they can easily result in impairment or loss of sight. Of the 42 cases reported, two resulted in partial or complete blindness. Branches or small saplings, whipping across the face, and flying particles of sawdust, bark, and dust were the major causes of eye injuries.

Nature of injury

Cuts, lacerations, and punctures were the most common nonfatal injuries (37.5 percent); followed by bruises, contusions, and concussions (21.6 percent). Two-thirds of the cuts, lacerations, and punctures were caused by chain saws; about half of the injuries were on the legs and ankles. Branches and small saplings caused the next greatest number of cuts and lacerations, many of which were on the head, face, and hands.

Fractures and amputations were the most serious nonfatal logging injuries. Although less than 1 percent of all injuries resulted in amputations, they accounted for nearly a fifth of the total time lost charged to work injuries. Of the six cases reported, two workers had their legs crushed when logs rolled off trucks that they were unloading. The other four lost fingers either in chain saw accidents or during the loading of logs and equipment.

Fractures comprised 16.1 percent of all injuries but accounted for slightly more than one-third of the time lost because of work injuries. Workers who suffered fractured bones were away from their jobs an average of 15 weeks. Bones were fractured most often when loggers were struck by falling or rolling logs, trees, and branches. The 159 fractures that were reported were distributed as follows:

Leg, ankle	57
Foot, toe	30
Hand, finger	16
Trunk, except back	16
Head, face, neck	14
Arm, wrist	10
Back	8
Multiple parts	8
Total cases	159

ACTIVITY WHEN INJURED

The five logging activities that accounted for the most injuries were limbing (18 percent), felling (17.5 percent), loading trucks (14.6 percent), bucking (11.9 percent), and setting chokers (7.3 percent). When these activities were ranked by the proportion of time lost, unloading trucks was first, with 24.7 percent, followed by felling (21.1 percent), limbing (11.2 percent), loading (10.6 percent), and bucking (10.1 percent). Felling and unloading were the two most dangerous logging activities (Fig. 3). Injuries to workers engaged in these activities accounted for almost half of the time lost and more than three-fourths of the fatalities.

Felling to bucking

The greatest hazard in felling timber is being struck by falling trees and limbs. Accidents of this type were responsible for over 70 percent of all felling injuries and 5 of the 18 fatalities. While information about these accidents is limited, there were several patterns of events that were common among them. In 14 cases, the tree that was being felled kicked back off the stump, striking the cutter. Several more accidents occurred when a fall-

ing tree hit standing trees that changed the direction of the fall, and the tree struck the cutter. In some cases, a chain reaction started when a falling tree hit a second tree or dead snag that fell, striking the cutter. Other accidents happened when the feller attempted to cut a tree in which a second tree was lodged.

Several serious felling accidents were described in the accident reports:

- Feller cut a tree with a grapevine in it that broke off a limb in a second tree. The limb fell and struck the feller in the back of the head, which resulted in his death.
- Feller cut a tree that knocked over a snag as it fell. The snag struck the worker and killed him.
- A falling tree hit a second tree that changed the direction of its fall. It grazed the feller's hip, knocked him down, and fractured his leg. The feller was off work for 31 weeks.
- A cut tree struck the ground, bounced back toward the stump, and hit the feller. The feller was unable to return to work for 13 weeks because of a dislocated hip.
- A broken limb dropped from a tree that was being cut, and fractured the feller's collarbone. The feller recovered from the injury and re-

Figure 3.—Percentage of nonfatal logging injuries by activity of worker, Central Appalachian area, 1971 and 1974

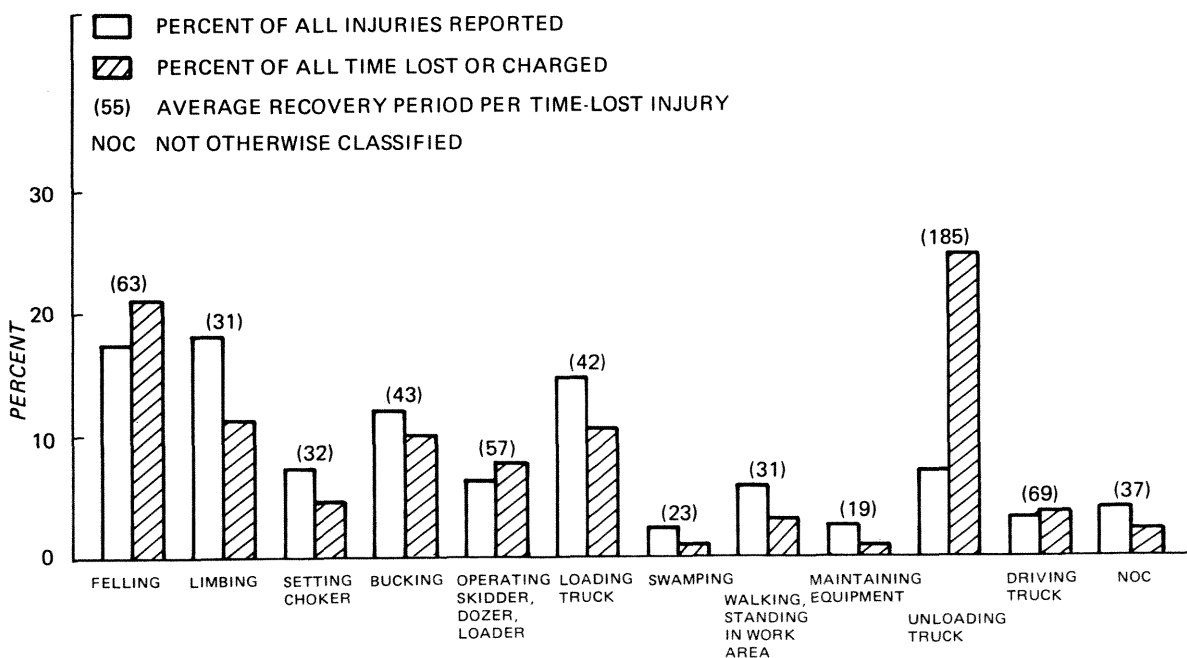


Figure 4.—Loading large saw logs is a hazardous activity requiring good footing, balance, and communication.



turned to work after being off the job for 11 weeks.

More injuries were the result of limbing and topping operations than of other timber harvesting activities. However, the injuries were generally less serious than those incurred from other major activities. About 1 month was lost per time-lost injury, which is far less than the average for all logging injuries. Two-thirds of the injuries were caused by chain saws. Injuries were also commonly caused when branches and saplings were cut, then sprang upward and struck the worker. Nearly half of all injuries incurred while limbing and topping were on the legs and ankles.

Several different types of accidents befell choker setters. Some of the more common ones were:

- Workers were struck by rolling logs when hooking and unhooking chokers. There were also several cases where workers were struck by rolling stones that had been dislodged by skidders.
 - Workers were struck by saplings and dead trees that were knocked down by skidders or the logs they were pulling.
 - Workers jammed wire into their hands while pulling frayed cables.
 - Workers fell or tripped because of poor footing.
- Some of the less common accidents resulted in the more serious injuries. For example, in two cases, chokersetters were walking alongside skidders when they slipped and were run over. In a few other cases, workers were seriously injured when broken limbs fell on them while they were setting chokers.

Injuries received while bucking were similar to those received while limbing and topping. Slightly more than half the injuries were inflicted by chain saws, usually on the legs and ankles. Injuries were frequently caused when logs rolled against or dropped on workers' feet and hands.

Skidding to unloading

Operators of skidders, dozers, loaders, and similar equipment were especially susceptible to eye injuries. In one-fifth of the cases involving equipment operators, the worker suffered an injury to his eyes. Most were cuts and lacerations caused by branches and saplings that whipped into the open cab. Equipment operators were also liable to sprain and sometimes fracture an ankle when they dismounted from their vehicles. Several very serious accidents occurred when tractors overturned and drivers were thrown from their machines. However, most of the injury reports did not give adequate information on the circumstances surrounding these accidents.

Loggers who were loading trucks were subject to four major types of injuries. The most frequent was overexertion caused by lifting, pushing, or pulling logs. The others, in the order of frequency, were: struck by a falling log; caught in, under, or between logs; and falling from an elevation.

Workers were injured when they were struck by logs that rolled off the truck they were loading, and when their hands or feet were caught between or under logs that were being positioned on the truck. Falls often occurred when the worker was standing on the truck and lost his balance (Fig. 4). In several cases, a cant hook that the worker was using pulled loose from the log he was trying to move, causing him to lose his balance and fall.

Unloading trucks is another dangerous activity, especially when saw logs and tree-length timber is being harvested. Nearly one-fourth of all time lost and 10 of the 18 fatalities resulted from injuries received during unloading. These injuries were more serious than others because in half of the cases, truckdrivers were struck by falling logs as they released their loads. Other types of unloading accidents that were serious but less severe occurred when drivers were caught under or between objects, usually logs (20 percent); fell, jumped, or tripped (13.8 percent); or overexerted themselves when unloading logs by hand (10 percent).

Truckdrivers were also injured in accidents caused by tire blowouts, brake failure, shifting

loads, and excessive speed on wet roads. In three cases, drivers suffered either sprained or fractured hands when the front wheels of the truck they were driving hit stumps or ruts in the road and forced the steering wheel to spin out of control.

Accidents commonly occurred when equipment was repaired or serviced. Workers moved or lifted fuel drums, skidder tires, dozer blades, and other heavy parts without adequate help, which often resulted in back injuries. Other workers were injured when they slipped and fell from equipment that was being serviced, or while they were sharpening and repairing chain saws, or when overinflated tires exploded.

SAFETY GUIDELINES

This study showed that nearly half of all time lost and almost all fatalities were the result of felling and unloading accidents. The more serious felling accidents happened when trees and limbs dropped on fellers. Unloading accidents occurred less often than those in felling, but tended to be more severe in time lost and number of fatalities. The greatest danger to the driver during unloading was to be struck by a log that rolled off the truck as he released the binders and trip stakes.

Many, perhaps most, of the accidents that happened during felling, unloading, and other logging activities could have been avoided if the workers had followed commonly accepted safety practices. These practices have been incorporated into consensus safety standards developed by representatives from the logging and insurance industries, organized labor, and government agencies (Am. Natl. Stand. Inst. 1971). While the standards do not cover every conceivable hazard in logging, they do establish safety guidelines that will lead to fewer and less costly injuries.

To both save lives and reduce work injury costs, safety programs in the Appalachian region should (1) encourage more intensive safety training, particularly for the young and the inexperienced employees; (2) place renewed emphasis on safety during the late spring and early summer when logging is at its peak; and (3) focus on safety measures for felling and unloading operations.

Felling guides

There are several safety measures that are applicable to felling which could have helped to prevent the injuries reported in this study. These include:

- Plan a retreat path and clear the path before the cut is started. The path should extend diagonally to the rear of the felling area.
- Check the tree to be cut for dead limbs, the lean of the tree, wind conditions, the location of other trees, and other hazards. Exercise proper precautions before starting the cut.
- Make undercuts about one-third the diameter of the tree to guide it and reduce the possibility of its splitting.
- Stop the back cut soon enough to allow for hinge wood to guide the tree and prevent it from prematurely slipping or twisting from the stump.
- Shut off the saw before starting to retreat.
- Fell from the uphill side on terrain where trees are likely to slide or roll, and arrange to keep uphill from previously felled trees.

In addition to these precautionary measures, lodged trees should be pulled to the ground at first opportunity with a skidder or other mechanical equipment. And no one should approach a feller closer than twice the height of trees being felled until the feller has acknowledged the signal of approach.

Unloading guides

Safety during unloading requires the attention and cooperation of both the logger and the purchaser. Unloading trucks carrying saw logs, veneer logs, and tree-length roundwood was generally more hazardous than unloading smaller roundwood. Some safety measures that would help to prevent the more severe unloading accidents reported in this study include:

- Release binders only after the load has been secured by a forklift or similar equipment.
- Release binders only from the side which the unloader operates, except when release is by remote control or when the person releasing the binder is protected by racks, stanchions, or the equivalent.
- Equip trucks used to haul saw logs with a tripping mechanism that releases the bunk stakes from the opposite side, away from where the logs will be dumped.

Publications with more detailed safety guidelines for felling, unloading, and other logging activities can be obtained by request from the American National Standards Institute (1971), the American Pulpwood Association (1971), and A. R. Bentley (1975), which are listed in the Literature Cited.

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**Table 1.—Number of injuries in logging by occupation and age of worker,
Appalachian area, 1971 and 1974**

Occupation	Age										Percent
	<20	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	>59	
Feller	15	62	43	44	53	48	35	39	30	16	37.6
Laborer	16	24	23	13	19	17	13	10	9	9	14.9
Truckdriver	4	17	23	27	25	21	10	11	1	3	13.9
Bucker	6	17	17	9	16	14	9	6	5	5	10.2
Skidder & dozer operator	8	16	18	12	14	6	7	10	3	4	9.6
Chokersetter	14	18	4	7	9	5	4	0	1	4	6.4
Loader operator	0	4	3	4	7	1	2	1	1	0	2.2
Foreman	0	3	5	4	3	1	2	2	4	2	2.5
Other ^a	2	4	3	2	5	2	2	3	0	4	2.6

^a Not otherwise classified.

**Table 2.—Number of injuries in logging by day and hour that accident occurred,
Appalachian area, 1971 and 1974**

Day	Hour										Total
	Before 8 a.m.	8-9	9-10	10-11	11-12	12-1	1-2	2-3	3-4	After 4 p.m.	
Monday	8	15	22	31	21	8	24	26	13	21	189
Tuesday	3	12	24	33	28	11	18	26	21	13	189
Wednesday	8	8	23	30	27	12	26	34	23	8	199
Thursday	4	10	27	28	17	8	29	29	15	11	178
Friday	3	25	20	27	22	5	17	24	15	14	172
Saturday	0	4	6	7	3	1	3	3	5	1	33
Sunday	2	0	2	0	1	0	1	0	0	1	7

Table 3.—Nonfatal injuries in logging by type of accident and source of injury, Appalachian area, 1971 and 1974

Source	Type				Percent
	Struck by or against	Caught in, under, or between	Fall from elevation or same level	Overexertion	
Power saw	263	0	7	0	24.2
Limb, sapling	174	2	2	0	16.0
Log	108	74	15	36	20.9
Tree	108	1	1	1	10.0
Particles	28	0	0	0	2.5
Hand tools	25	2	2	0	2.6
Chain, cable	21	10	2	1	3.0
Hook, tong	16	1	1	0	1.6
Operating motor vehicles	9	61 ^a	5	0	6.7
Ground, rock	4	0	83	0	7.8
Other ^b	7	3	2	23	4.7
Total	763	154	120	61	100.0

^a Includes 41 injuries such as collision and other operator-related accidents.

^b Percent total includes 17 injuries not classified by type or source.

Table 4.—Percentage of days lost as a result of nonfatal injuries in logging by type of accident and source of injury, Appalachian area, 1971 and 1974 (N = 39,080 days)

Source	Type				Total ^a
	Struck by or against	Caught in, under, or between	Fall from elevation or same level	Overexertion	
Log	22.9	7.5	0.6	2.6	33.4
Limb, sapling	20.0	.2	.2	.0	20.2
Tree	12.3	*	.0	.0	12.3
Power saw	10.9	.0	.6	.0	11.6
Particles	2.6	.0	.0	.0	2.6
Hook, tong	1.0	.0	.0	.0	1.0
Hand tools	.7	*	.0	.0	.7
Operating motor vehicles	.3	6.8 ^b	.2	.0	7.3
Chain, cable	.3	.4	.1	.0	.7
Ground, rock	.2	.0	6.3	.0	6.6
Other ^c	.6	.8	*	1.2	3.4

* Less than 0.1 percent.

^a Totals may not equal data summed due to rounding.

^b Includes 5.4 percent days lost due to collisions and other operator-related accidents.

^c Percent total includes 0.8 percent injuries not classified by type or source.

Table 5.—Nonfatal injuries in logging by type of injury and part of body affected, Appalachian area, 1971 and 1974

Type	Part affected										Percent
	Head, neck	Eye	Back	Trunk	Arm, wrist	Hand	Finger	Leg, ankle	Foot	Toe	Multiple parts
Amputation	0	0	0	0	0	0	4	2	0	0	0
Bruise, contusion, concussion	13	11	14	47	13	6	13	54	16	3	24
Cut, laceration, puncture	49	14	1	9	44	38	43	143	11	8	12
Fracture	14	0	8	16	10	4	12	57	14	16	8
Hernia, rupture	0	0	0	10	0	0	0	0	0	0	0
Strain, sprain, dislocation	1	0	59	18	6	0	2	26	6	0	2
Irritation from foreign body	0	17	0	0	0	1	0	0	0	0	0
Multiple injuries	14	0	3	2	3	2	5	8	10	1	35
Other ^a	2	0	0	0	0	0	1	1	0	0	5
Total	93	42	85	102	76	51	80	291	57	28	86
											100.0

^a Not otherwise classified.

Table 6.—Percentage of days lost as a result of nonfatal injuries in logging by type of injury and part of body affected, Appalachian area, 1971 and 1974 (N = 35,253 days)

Type	Part affected										Total
	Head, neck	Eye	Back	Trunk	Arm, wrist	Hand	Finger	Leg, ankle	Foot	Toe	Multiple parts
Amputation	0.0	0.0	0.0	0.0	0.0	0.0	2.3	17.0	0.0	0.0	0.0
Bruise, contusion, concussion	.3	.7	.5	1.2	.1	.1	.3	2.4	.5	.0	.7
Cut, laceration, puncture	.8	8.0	.0	.3	1.2	1.2	1.6	5.6	1.0	.8	.4
Fracture	1.8	.0	3.0	2.3	3.2	.1	.8	14.6	3.6	.5	4.2
Hernia, rupture	.0	.0	.0	1.2	.0	.0	.0	.0	.0	.0	.0
Strain, sprain, dislocation	.0	.0	4.5	2.0	.1	.0	.1	1.2	.2	.0	.0
Irritation from foreign body	.0	*	.0	.0	.0	.0	.0	.0	.0	.0	.0
Multiple injuries	1.4	.0	.8	.1	.1	.2	.8	.5	1.7	*	3.1
Other ^a	.0	.0	.0	.0	.0	.0	.1	.2	.0	.0	.3
											.6

* Less than 0.1 percent.

^a Not otherwise classified.

Table 7.—Nonfatal injuries in logging by activity of worker and type of accident, Appalachian area, 1971 and 1974

Activity	Type					Percent
	Struck by or against	Caught in, under, or between	Fall from elevation or same level	Overexertion	Other ^a	
Limbing	173	6	4	1	0	18.0
Felling	170	0	5	2	2	17.5
Loading	65	24	29	29	2	14.6
Bucking	94	18	8	1	0	11.9
Operating motor vehicles	39	47 ^b	9	2	0	9.5
Setting choker	45	16	7	5	2	7.3
Unloading	34	17	11	9	0	7.0
Present in work area	18	7	31	0	1	5.6
Maintaining equipment	9	4	2	5	4	2.4
Swamping	20	1	1	0	1	2.3
Other ^a	22	5	6	4	3	3.9
Total	689	145	113	58	15	100.0

^a Includes 15 injuries not classified by type.

^b Includes 41 accidents such as collisions and other operator-related accidents.

Table 8.—Percentage of days lost as a result of nonfatal injuries in logging by activity of worker and type of accident, Appalachian area, 1971 and 1974 (N = 35,020 days)

Activity	Type					Total ^b
	Struck by or against	Caught in, under, or between	Fall from elevation or same level	Overexertion	Other ^a	
Unloading truck	21.3	1.0	1.8	0.6	0.0	24.7
Felling	20.1	.0	.8	.3	*	21.1
Limbing	10.8	.4	.2	.0	.0	11.2
Bucking	8.1	1.7	.1	.1	.0	10.1
Operating motor vehicles	4.1	6.2 ^c	.6	.2	.0	11.0
Loading truck	3.4	1.9	2.7	2.7	.0	10.6
Setting choker	1.7	2.4	.2	*	.2	4.4
Present in work area	.4	.8	1.5	.0	.2	2.9
Swamping	.8	.0	.0	.0	*	.9
Maintaining equipment	.3	.1	.1	.1	.2	.8
Other ^a	.5	1.1	.4	*	.2	2.2

*Less than 0.1 percent.

^a Includes 15 injuries not classified by type.

^b Totals may not equal data summed due to rounding.

^c Includes 6.1 percent lost days due to collisions and other operator-related accidents.

Headquarters of the Northeastern Forest Experiment Station are in Broomall, Pa. Field laboratories and research units are maintained at:

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 - **Berea, Kentucky, in cooperation with Berea College.**
 - **Burlington, Vermont, in cooperation with the University of Vermont.**
 - **Delaware, Ohio.**
 - **Durham, New Hampshire, in cooperation with the University of New Hampshire.**
 - **Hamden, Connecticut, in cooperation with Yale University.**
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 - **Morgantown, West Virginia, in cooperation with West Virginia University, Morgantown.**
 - **Orono, Maine, in cooperation with the University of Maine, Orono.**
 - **Parsons, West Virginia.**
 - **Pennington, New Jersey.**
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