TREE WORKER SAFETY[1]

by W.R. O'Connor

Abstract. Safety devices, protective equipment, and work methods, as developed by an electrical utility for in-house, tree worker safety, are discussed. A successful attempt to reduce worker exposure to noise is described.

Résumé. Les mesures de sécurité, les équipements de protection et les méthods de travail, tels que développés par une compagnie d'electricité pour la sécurité de ses employés, sont présentés. Une tentative réussie visant la réduction de l'exposition des travailleurs au bruit est aussi décrite.

We talk a lot about safety and banter the word about freely, but what is safety? Webster's New World Dictionary defines *safety* as: a) the quality or condition of being safe; freedom from danger, injury or damage, b) any of certain devices for preventing an accident.

There are many more aspects to safety, when doing tree work, than working in the tree itself. Much of the equipment we use, for instance, introduces certain hazards to the job that were not present before the equipment was developed. While constantly striving for safer work environment and increased productivity, we tend to produce things that, we hope, will make the job easier, safer and faster. What we do many times in accomplishing these objectives is introduce *change.* When this is done the indirect results are sometimes undesirable. As an example, following World War II, the tree care industry began to be mechanized. New equipment was developed to make work easier and people more productive. Many of us have seen this through the introduction of brush chippers, chain saws, brush sprayers, air operated pruning tools, etc. All of these introduced noise to a relatively quiet trade. No one was overly concerned about noise then because it was part of the *modern* environment. Today noise is a completely different story. We protect the worker against hearing loss by providing ear protection, we strive to reduce noise production and we enact legislation to ensure that these things are done.

Although I work for an electrical utility and this presentation is based on what is required in Ontario and how we do things within Ontario Hydro Forestry, the methods and devices described could be applied by any tree care company.

Responsibilities

Who is responsible for the job safety?

- The employer is responsible for providing a safe work environment and supervision. This should involve safe work procedures, safety rules, equipment and to some extent, safety devices required for worker protection. Training is necessary to ensure the employee knows how to do the job and work safely.
- The employee is responsible for working in a safe manner to prevent personal injury or injury to co-workers. This responsibility includes following all procedures and rules provided by the employer as well as utilizing the equipment and safety devices provided.
- The federal, state and provincial governments enact legislation to enforce safety in the workplace. Both the employer and employee are required to observe the requirements of these Acts.

All of the above have a stake in job safety.

Ontario Hydro has always had a good safety program and has tried to keep the risk of accidents as low as reasonably achievable. We have a Forestry trades staff of approximately 500 full time personnel. We do have accidents. However, the serious or lost time accident rate is fortunately low.

Chain Saws

In Ontario, tree work is legislated by the Ontario Occupational Health and Safety Act and associated Regulations. This legislation requires anyone using a chain saw in an industrial or construction environment to wear leg and hand protection to guard against cuts by the chain saw. In addition, eye, head and foot protection are mandatory. Chain saw legislation can be seen as a

1. Presented at the annual conference of the International Society of Arboriculture in Vancouver, B.C. in August 1988.

direct result of *change* introduced by chain saw development. The slow running gear driven chain of the early, heavy chain saw did not produce the violent *kickback* that is possible with the fast running, light weight saws used today. When the accident rate rose to the point where Workers' Compensation payments were becoming excessive, legislation was enacted to protect the worker. This law went into effect in 1977 and we had this protection in place by 1978. Prior to 1978 we did not experience a lot of chain saw accidents, however, there were some. The number of cuts to the legs types of accidents were reduced after leg protection was put in place.

In order to derive some meaning from the number of leg injuries caused by chain saws, the accidents were grouped at 3-year intervals. From 1975 to 1977 there were 10 leg injuries. Leg protection was provided early in 1978. During the period 1978 to 1980 there were 6; 1981 to 1983 there were 3; and 1984 to 1986 there were 5. We know that leg protection played a part in preventing some leg injuries or helped to prevent more serious injuries because of reported incidents, safety meeting discussions, damaged leg protection and complaints about leg protection not providing complete protection. Examination of the 24 accident reports indicates that 7 were true kickback-caused accidents while the other 17 were the result of various other causes such as slips, stumbles and poor work practices.

Fall Protection

Tree climbing. In 1984, an apprentice fell out of a tree while climbing with spurs. We were ordered to put a system into place that would prevent tree workers from falling when climbing above ten feet. Our desire was to develop a simple fall prevention system that would require little training and additional equipment, but have "user friendly" characteristics. To this end we adopted a mountain climbing technique using a karabiner and the climbing rope.

This method requires the climbing rope to first be placed through a suitable crotch and secured to the climber's saddle. A ground assistant takes up slack in the rope as the climber ascends.

The karabiner is securely tied to the base of the tree. A low friction sliding hitch used in mountain climbing, called a *munter hitch,* is formed in the fall line of the climbing rope and is placed in the karabiner (Figure 1). The munter hitch allows the fall line to be easily and quickly pulled through the karabiner. it will lock when pressure is applied to the load side of the karabiner provided the assistant holds onto the tail of the fall line. As the climber ascends the tree, the assistant consistently takes up slack keeping the climbing rope taut (Figure 2) by pulling the fall line, hand over hand through the karabiner.

This technique is known as "Belaying." If the climber should slip, the ground assistant will prevent the climber from falling simply by holding the tail of the fall line. The munter hitch allows the rope to be taken up easily and quickly but allows the ground assistant to prevent a fall by the climber with very little effort.

If the climber must ascend beyond where the belaying rope is crotched he will secure himself with a lanyard attached to his body belt, then position the climbing rope to a higher crotch. The belaying technique will continue until the desired position in the tree is reached.

Another fall prevention device currently in the development stage is the Posibelt III. This device is meant to be used while climbing a tree with spurs. It is an adaptation of the lineman's pole strap. Two moveable, sharpened wheels, similar to a pizza cutter, are located on the pole strap. These are on the back side of the tree stem, while a nylon cross strap is fastened to each end of the pole strap between the climber and the tree.

If the climber slips or the spurs cutout, the sharp wheels cut into the back of the tree and the cross strap tightens against the climber's side of the tree preventing the pole strap from sliding down the stem. The Posibelt is always in position while the tree is being climbed and is moved up the stem by the climber as he ascends. In the lines trade, use of this Posibelt device has been shown to reduce accidents.

Aerial devices. During aerial device work, Ontario Hydro operators are required to wear a full body harness to prevent falls from the bucket. A shock absorbing lanyard connects the harness "D" ring, located at the back and between the shoulder blades, to the lanyard anchor on the aerial device. This fall arrest system limits the fall

arresting force to less than 1800 lbs. Harnesses are pretested at our Research Center for arresting abilities prior to field issue.

The arresting forces are mainly absorbed by the lanyard. The shock load on the body is taken up by the harness stretch and the thighs and pelvis. If the lanyard and harness have been used in a fall arresting situation they will not be used again and shall be destroyed. The shock absorbing feature of the lanyard self destructs when stopping a fall. The harness will not be reused because it is impossible to determine how much stress has been applied to the stitching.

We require this type of fall protection because research has shown that falling into a waist belt can cause severe internal injuries and possible death.

Chip dump boxes. Prevention of falling accidents is a high priority item within Ontario Hydro because a lot of our work is done somewhere other than at ground level. The top of a chip dump box is a convenient location to do some aerial device inspection and maintenance, especially the daily boom cleaning and inspection by the operator. A safety committee identified the dump box as being close to the height where legislation requires fall protection while work is being performed. After examining all other possibilities a folding hitching post was devised, installed and strength tested. The post when raised, allows a worker who is wearing a full body harness and has a shock absorbing lanyard fastened to the post, to work on the dump box while being protected from falling more than five feet. This device is an option available to any of the work locations wishing to install it.

Drum type feed chute. Each forestry aerial device truck is equipped with a hydraulic powered, drum-type chipper. The feed chute folds into the rear of the truck and is necessarily smaller than the trailer chippers. We found that it was difficult but possible for a worker to contact the knives with his hand if he reached into the feed chute from over the side. We designed a top flap that would position itself automatically when the fold-up chute was opened thus preventing anyone from reaching in from the side. The Ontario Ministry of Labour approved this design.

Disc type feed chute. In 1987 we completed our first aerial device truck with a 40 inch disc chipper built into it. The smaller discs were not available when this project was started. While this unit was under construction an Ontario Ministry of Labour Inspector placed a "Stop Work" order on one of the trailer-mounted, disc chippers because the infeed chute was not large enough to prevent an operator from easily reaching the infeed rollers. We subsequently requested the same inspector to inspect the truck-mounted unit and provide some guidelines for a fold-up chute. With the Labour inspector's approval, a folding chute was designed and installed complete with a hydraulic interlock that prevents the feed rollers from turning until the last plate of the chute is in place. We consider the disc chipper to be safer to feed than the drum type, particularly during winter months when deciduous brush is devoid of leaves.

Noise reduction. Certain initiatives were also undertaken on disc chippers in an attempt to reduce noise levels. The average noise level of the hydraulic drive drum chipper is 113dBA when chipping. The average noise level of the hydraulic

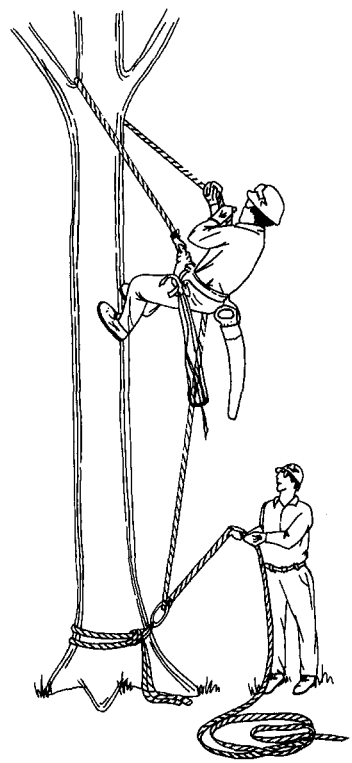

Figure 2

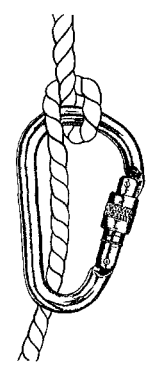

Figure 1

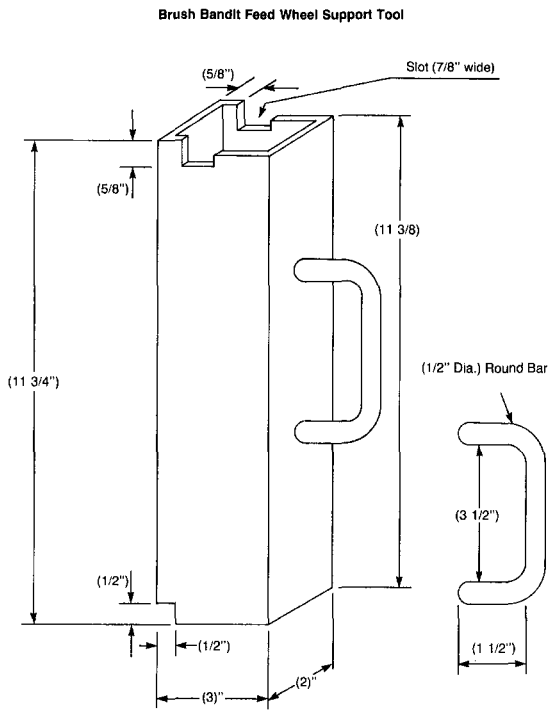

Figure 3

drive 40 inch disc chipper is 101dBA when chipping. This is a reduction of 76% in the noise pressure level over the hydraulic drive drum chipper. While the disc chipper by itself is somewhat less noisy (ie., 106dBA), the lowest sound level was attained by applying vibration dampening material to the exhaust chute located inside the dump box. The same material was also applied to the disc housing but did not produce any further noise reduction. Assembly of three more similar units using 30 inch disc chippers is now underway.

Disc chipper feed roller support. We did not like the disc chipper manufacturer's recommended method of supporting the top feed roller while a worker measures the knife to anvil clearances. To do this the person must lie in the feed chute and reach under the suspended roller. Even while using the longest feeler gauge available, part of the body must be situated under the top roller. A support tool was designed and built (Figure 3). The top feed roller is raised twelve inches, the support tool is inserted under the upper feed roller bearing on the outside of the roller housing, the bottom of the support tool rests on the top of the spring anchor plate and the feed roller assembly then lowered. One support may be placed on each side, if desired. This provides a maximum, safe opening to measure the knife to anvil clearance. The material used for the support is two inch by three inch heavy wall tubing. It's strength is such that it will begin to deform at 10,000 lbs pressure. The measured force required to lift one top feedwheel assembly 12 inches, with the 2 springs in place, was 1100 lbs.

Conclusion

When you critically examine what people in the tree care industry do, the varied tasks that are involved and the equipment that is used, the opportunities for injury to take place become quite evident. The safety related items that I have described are but a few and are mainly barriers to prevent injury. The accidents that are very difficult to prevent are those resulting from carelessness or lack of forethought. Mr. Bob Felix of the National Arborist Association had an article published in the May 1988 issue of Arbor Age Magazine. In it Bob describes a number of such accidents very clearly. To quote Bob, "Accidents are caused when people do things that they don't know how to do or when they are careless or just plain ignorant." I highly recommend that you take a close look at your own operation, identify the hazards, identify the poor work practices and do something about them. The U.S.A. has an excellent safety standard for tree care operations, ANSI Z133.1. Please use it.

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