

# FROM ACCIDENT RESEARCH LESSONS LEARNED

By John Ball, Sam Kezar and Shane Vosberg

As arborists we have a fatal accident rate that is roughly 10 times the average for all industries. And, if this is not risky enough for you, try logging. Loggers have a fatal accident rate that is 30 times higher than the all-industry average and they, along with us, are engaged in what is probably one of single most high risk activities you can perform in the United States – felling a tree.

We also share another sobering accident statistic with loggers. While our fatalities are much higher than most other occupations, our serious non-fatal injury rate, defined as several days of hospitalization, is not. Why? We do not survive our accidents, they are that serious.

Obviously, we suffer very high non-fatal injuries that are treated on site or only require an emergency room visit such as punctures, lacerations and cuts from chain saws, branch stubs, falling branches, truck doors and a host of others. The point here, however, is that our fatal and serious non-fatal accidents have similar causes; and what does not kill us, often seriously injures us instead.

There is another group of individuals who work in this high-risk environment of trees – homeowners. And they shouldn't. Not only is much of their “pruning” not healthy for the tree, their work is not beneficial to their health either. Homeowners have about five times the accidents that professionals do, at least measured against emergency room visits. Chain saws are responsible for many of their trips. If there is someone who shouldn't be out there running a chain saw, it is the homeowner. Interestingly, many of their saw accidents



*Captain Ron Lauth, left, and Fire Medic Troy Schurter, both of West Palm Beach Fire Rescue, rescue Pedro Graves from a tree after he had been electrocuted. The landscape worker had climbed the tree and was cutting branches when he reached for one that was touching nearby powerlines. Although very weak, he managed to cling to a branch until fire rescue had him secured in a “hasty harness” made of webbing and carried him down the ladder. He was in critical condition. He survived. © Jennifer Podis/The Palm Beach Post.*

have a similar scenario to ones professionals can have – i.e. kickback – but theirs have a more serious consequence since homeowners typically do not use any personal protection. We have all seen homeowners out trimming or felling trees wearing flip-flops, shorts, a T-shirt and a ball cap and swinging their saw as if they were Luke Skywalker with a light saber.

### Who is the tree care industry?

Statistically, we are older than most would think but our entire work force is aging as well. While we do attract young workers, there are fewer to attract and many of those who do enter the profession leave the field within six months. This does not surprise anyone. Tree work can be physically taxing, is conducted in high-risk

environments, and there are easier ways to make a living. Most tree workers are white, followed by Hispanics, then African Americans, Asians and Native Americans, though regionally the racial/ethnic make-up of the workforce changes and there are crews out there that resemble the United Nations, with Cambodians, Russians and Guatemalans working together. The vast majority of the workers are males, not a surprise, though the number of female arborists is increasing but is still under 10 percent.

According to OSHA there were more than 120 tree and landscape fatalities in 2004. That is probably less than one-third the actual number of fatalities as OSHA has a hard time tracking accidents that occur in small companies and sole proprietors. Some of these 120 individuals worked for tree companies, others landscape companies, but they were all performing tree work at the time of their accident.

As far as what can be gleaned from the OSHA accident investigation reports and those from a sampling of fire, police and rescue calls throughout the country, more than 90 percent of the fatal accidents occurred to males, and they tend to follow the same proportion as the composition of the tree worker population regarding gender and race. For example, whites have more accidents than other groups as they represent more of the workforce.

The greatest disparity is in regard to age; the older the worker, the more likely a serious accident. It is not that they are less agile or complacent, though these can be factors. One factor may be that the arborist has a lifetime of exposure to an increasingly higher risk environment. This is not meant to imply that the oldest worker has the most accidents – many accidents occur to the new person, one with less than one year of employment with the company. The “newbie” will have the most non-fatal injuries (cuts and nicks), and they sometimes make the mistake that results in the veteran’s death. The point here is for the older arborist never to assume that their longevity is assured and that they can let their guard down.

### Contact fatalities and non-fatal serious accidents

Contact with an object still accounts for the majority of accidents. The most common object arborists have fatal contact with is a falling branch or the entire tree. A mature tree can have a weight of 10 tons or more and its impact can easily crush a car; a worker is even more vulnerable.

Why were workers killed or seriously injured by falling branches or trees? They come down to a few different scenarios: failure to establish a work zone, failure to use a communication system and improper felling techniques. There is still the common practice of limiting communication to the ubiquitous term “headache” before cutting a limb or felling. Improper felling was another common cause of accidents. Just because you put a rope on it, or cut a notch two-thirds of the way through the trunk does not mean the tree is necessarily going to fall where you want.

The other major contact involves chip-pers. Despite the increasing safety of these units, workers are still finding ways to



### Crushed

*A Mr. White was trapped in this tree while cutting the top away. The top, estimated to weight 2-tons, was removed by a crane and the worker lowered on an aerial lift. Karen Pulfer Focht photo, courtesy of Commerical Appeal, Memphis.*

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become entangled in them. The two most common scenarios is the worker either uses a foot to clear a jam or feeds small twigs in with gloved hands. If the chipper does not kill the worker, the outcome is usually an amputation of either the hands or the feet. Some readers may wonder how anyone could do either of these, particularly with the way newer chippers are designed, but every month workers manage to be fed into the chipper along with the brush.

**Fall fatalities and non-fatal serious accidents**

Almost three-quarters of serious fall accidents are from a tree, followed by falls from an aerial lift or more precisely falling with the aerial lift.

The most common reason to fall from a tree is that the climber disconnects his or her fall protection to reposition or cuts through their fall protection with a saw. Falls over about 40 feet are generally not survivable. If you do survive the fall, the injuries are typically head or neck injuries along with backs. Minor injuries include knees, ankles and wrists.

Falls in aerial lifts happen when the aerial lift fails, usually for one of two reasons, each of which involves misuse of the equipment. A common one is the operator uses the lift as a crane. The lift may not fail the day it is used as a crane; it could fail the next time it leaves the yard. We have had accidents when a lift was occasionally used as a crane for more than 10 years but the failure, at the knuckle, happened when the operator had the booms extended at its maximum reach and cut a branch roped to the boom. The branch had an estimated weight of 70 pounds and swung through a 5 foot arc, at which time the failure occurred.

Another source of failure stems from the multiple ways we abuse the equipment. Operators can stress the boom by using the bucket as an outrigger. Have you ever seen an operator push the bucket into the ground so hard it lifts the truck a little bit? That's using it as an outrigger. Buckets aren't designed for those types of stresses. We have seen reports where buckets actually have detached from the booms, which does not sound like a pleasant experience, and a reason for always attaching the fall protection to the boom, not the bucket. If the bucket detaches and you're attached to the bucket rather than the boom, all you did was create a smaller debris field.

People often ask what aerial lift has the most failures. It is not the manufacturer but the age, work history and maintenance of the equipment that matters. If the lift is more than 15 years old, had multiple owners who sold the lift rather than spend the money to maintain it and it has been abused regularly – watch out. Aerial lifts seem to be tremendously forgiving. They tolerate tremendous amounts of abuse, but we should never forget that they are also complex equipment in which the failure of only a few critical parts can lead to the catastrophic failure of the entire unit.

**Electrical contact fatalities**

Electrical contact is the third leading category of fatalities and serious non-fatal accidents but it is the single greatest source of accidents.

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One of the most common reasons arborists are killed by electrical contact is that they did not know the power line was in the work zone. We often consider the work zone as a two dimensional area beneath the tree but it is really three dimensions and includes the aerial environment surrounding and within the tree's canopy. A critical part of every pre-climb inspection should be checking for electrical conductors. Always assume there is a conductor and look until you cannot find it, then look again; that is much different than assuming there is not one because you did not see it. Many accident reports have the sad commentary that the crew did not realize a distribution line was in the vicinity until contact was made. The workers should not have been there in the first place as they were not a qualified line-clearance arborists. Checking for conductors and observing the minimal approach distances would reduce our fatalities and serious non-fatal injuries.

*We need to do a lot more training for arborists who are not supposed to be working around power lines, just to help them understand the hazards of this environment.*

Almost all of our electrical contact fatalities and serious non-fatal injuries happen when an arborist touches the power line with either the back, shoulders or hand (direct contact), or cuts a branch that contacts the line while the arborist is still holding the branch (indirect contact) and suffers electrical shock and burns. A few are due to a fall that results from muscle contractions that occur with electrical contact.

We need to do a lot more training for arborists who are not supposed to be working around power lines, just to help them understand the hazards of this environment. There may be dangers. Qualified line-clearance tree trimmers aren't the people being injured or killed; it is the people who don't normally do this work.

Arborists do survive electrical contact with distribution lines, though as with falls from heights above 40 feet, the usual outcome from electrical contact is death. If the arborist is not immediately killed by electrical shock they can suffer from internal injuries, severe burns, spinal cord damage and broken bones. Some of the injuries may take days or even months for symptoms too appear and untreated can result in kidney failure and death.

If an arborist survives a contact with an electrical conductor more than 500 volts he should be taken to the emergency room,

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and you should alert the EMTs coming to the site, or the hospital if you are driving the victim, that the injury is due to conduct with an electrical conductor so the emergency personnel are aware of the cause. Even if the shocked arborist says he is fine, he still needs to go have a medical evaluation, since some injuries may take several months or even a year to become apparent. Kidney failure from internal injury may occur months later.

### Other sources of serious injury and deaths

In smaller numbers arborists have died or been seriously injured from:

- ▶ Bee or wasp stings. Every year we lose at least one arborist due to an allergic reaction to a sting. Most of us only find the experience unpleasant. One worker suffered more than 80 stings and survived, but some have experienced a sting, come down out of the tree and died within minutes.
- ▶ People. Everyone has experienced the “nutty neighbor” – the neighbor who questions everything you are doing in the yard and screams that there will be trouble if you cut a branch overlying their yard, or drop brush in their yard or a long list of other complaints. In the old days we often ignored their threats but now-a-days these nutty neighbors are armed. We have had arborists shot at while in the tree or when dragging brush. If anyone ever threatens to kill you, believe them.

*Everyone knows the joke about what it takes to be an arborist – a pickup truck and a chain saw. What does it take to be an arborist trainer? Nothing. We have people out there training others who shouldn't be trainers. We have people out there who don't know the facts or don't know how to convey the material.*

- ▶ Transportation and equipment. Each year arborists are struck while working alongside of the road. One worker was stuck by a car that was speeding past another car, overcorrected their swing back into the lane and struck the worker. If not struck by passing traffic, workers are run over by their own trucks. Arborists have been backed over while they are fueling a saw behind a truck.

Our industry surveys indicate that only a small number of tree care companies provide training for their employees. While all managers who responded to the surveys thought having trained workers was important, apparently many believed that hiring trained workers, rather than providing the training, is the way to go. The training that was being provided typically consisted of First-Aid, some equipment training – such as aerial lift, chipper and saw operation – and some that covered work operations such as rigging. The most common trainer cited was one of the company's employees rather than using an outside trainer. About half of the companies surveyed have procedures established to do aerial rescues, and about one-third practice every year.

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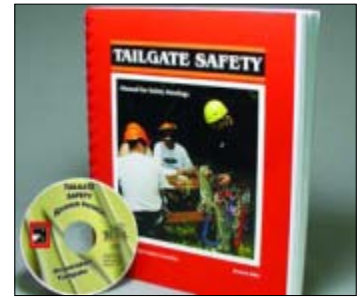
surveys: among companies that responded to surveys, companies that have training programs reported more accidents than companies that did not train. Why? There are several reasons, including the fact that conscientious companies with training programs also tend to do a better job tracking injury data. Companies that have a series of accidents also tend to start training programs in response to these events. But, there is one other important factor – the training itself.

Everyone knows the joke about what it takes to be an arborist – a pickup truck and a chain saw. What does it take to be an arborist trainer? Nothing. We have people out there training others who shouldn't be trainers. We have people out there who don't know the facts or don't know how to convey the material. If you hear a trainer who says, "Let me show you how not to tie this knot," be leery. People often remember what they see better than what they hear. They will remember the knot, but not that

they should not tie it that way.

In an effort to save money some companies send one person out to receive training who then comes back to train the entire crew. If that person did not clearly understand the material presented or cannot explain it properly, then problems may occur. There have been instances where trainers have had workers killed while they are conducting the training. We need to look at who is training us to improve safety in the industry.

*Dr. John Ball is a professor of forestry with South Dakota State University and has worked on accidents in the tree care industry for a number of years with the work supported in part from grants from the Forest Service and the TREE Fund. He has been assisted in this work by two graduate students, Shane Vosberg, now with Swingle in Denver, Colo., and Sam Kezar, now the owner of Kezar Tree Service, Crookston, Minn.*



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