**ADMINISTRATIVE REPORT** **DATE: June 16, 1998**
**PUBLIC HEALTH SERVICE/CDC/NIOSH/DSR**
**FACE 98-09**

**TO:** **Director, National Institute for Occupational Safety and Health**

**FROM:** **Division of Safety Research, NIOSH**

**SUBJECT:** **Tree Feller Killed When Struck by Chain Saw -- West Virginia**

## SUMMARY

A 52-year-old male tree feller (the victim) was fatally injured after being struck in the right thigh with a chain saw. Prior to the incident, the victim and his son had been harvesting hardwood trees for saw timber, over a period of approximately 5 months, on a 49-acre site. At the time of the incident, the victim's son was away from the cutting area, skidding logs to the landing. No one witnessed the incident, but evidence suggests the following scenario: The victim cut a forked hickory tree that fell and lodged in a yellow poplar. He then positioned himself between the lodged tree and a sycamore tree and notched the sycamore to fall into the lodged hickory. Before he had time to cut the sycamore, the top of the poplar snapped, freeing the hickory. The trunk or branch of the hickory struck the victim on the back of the head. The blow caused him to fall and stumble forward with his hand gripped around the handle of the running chain saw. The chain saw struck the inside of the victim's unprotected right thigh, causing fatal injury. When the son returned to skid more logs he found the victim lying on the ground, unresponsive. He checked for vital signs, found none, and went to the land- owner's home to call for help. He and the landowner returned to the site, checked the victim for vital signs and found none. Fire department emergency service personnel arrived on the scene within 10 to 12 minutes after hearing the call on the scanner, checked the victim, and ran an electrocardiogram which showed no activity. They communicated their findings to the county coroner who authorized transport of the victim by ambulance to his office, where the victim was officially pronounced dead. NIOSH investigators concluded that, in order to prevent similar occurrences, employers, including the self-employed, should:

- *develop, implement, and enforce a written safety program which includes, but is not limited to, worker training in hazard identification, avoidance, and abatement*

- *ensure that tree fellers properly evaluate the area around timber to be felled, so that potential hazards can be identified and appropriate control measures implemented*

- *ensure that tree fellers dislodge trees according to safe methods specified in the OSHA logging standard*

- *ensure that tree fellers follow safe operating procedures for the use of chain saws*

- *provide and enforce the use of personal protective equipment*

- *provide first aid equipment at jobsites and pertinent training in the use of first aid equipment.*

**INTRODUCTION**

On March 24, 1998, a 52-year-old male tree feller (the victim) died after being struck in the right thigh by a chain saw. On March 25, 1998, a forester from the West Virginia Division of Forestry (WVDOF) reported this fatality to the WV FACE program. On April 20, 1998, the WV FACE program notified the Division of Safety Research (DSR) of this fatality, and requested technical assistance. On April 23, 1998, a safety specialist from DSR and the West Virginia FACE program field investigator conducted an investigation of this incident. The investigators reviewed the incident with the WVDOF forester who had been to the site, the local county coroner, the land owner, and the victim's son. The death certificate and the coroner's report were obtained during the investigation. The incident site was visited and photographed and a chain saw safety manual written for the model involved in the incident was obtained from an equipment dealer.

The employer in this incident was the self-employed victim who had owned the logging company for the past 5 years. He and his son worked together. The victim held a current West Virginia Timbering License and held Certified Logger status in West Virginia. The West Virginia Logging Sediment Control Act of 1992 requires that each timbering operation in West Virginia be supervised by a certified logger. The victim was the certified logger for this

logging operation. To become a certified logger, an individual is required to successfully complete training and pass a test for best management practices (a soil erosion prevention plan), and chain saw safety, and maintain current first aid and CPR training. The employer did not have a written safety program or established safe work procedures at the time of the incident. The victim had approximately 36 years experience working in the logging industry. This incident was the first fatality the company had experienced.

**INVESTIGATION**

The employer had purchased the timber rights to a 49-acre tract on privately owned land (under a shared profit agreement) and had been selectively cutting hardwood timber which was to be sold as saw-timber to a sawmill in the region. The employer had been working at the logging site for about 5 months prior to the incident. The victim and his son divided logging tasks, with the victim responsible for all cutting operations, and the son for skidding the logs to the landing. The cutting site where the victim was working at the time of the incident was sloped 20 degrees, the ground was dry, and light underbrush and vines were present.

The victim began working with his son about 10 a.m. on the day of the incident. The weather was warm, sunny and dry. The skid roads were slightly muddy from previous rains but felling and skidding operations were on schedule. Although there were no eyewitnesses to the incident, evidence suggests the following sequence of events: At mid-afternoon the victim's son left a cutting site about 100 yards from where the victim was cutting timber, to skid logs that had been cut on a previous day to a landing located approximately one-half mile away (45 minutes round trip). In the meantime, the victim continued to cut timber. He cut a 70-foot-high forked hickory tree which measured 16 inches diameter at breast height (dbh). It fell and lodged high in a live poplar which was approximately 24-feet high and measured eight-inches dbh. The live poplar was located about 12 feet downslope from the hickory. A sycamore, 16-inch dbh, was also located 12 feet downslope and 7 feet to the right of the poplar. The victim walked downhill and positioned himself between the leaning trunk of the lodged hickory tree and the trunk of the sycamore tree (there was approximately 6 feet between the trees, and there were vines on the ground). Using a chain saw with a 24-inch bar and equipped with a reduced kickback bar, the victim cut a felling notch in the sycamore, perpendicular to the lodged hickory (it appeared to be notched to fall toward the hickory). The top of the poplar broke

off, dislodging the hickory. As the hickory fell, the hickory trunk, or a branch from the hickory, grazed the back of the victim's head and threw him forward. He may have been knocked unconscious or he may have stumbled on the vines in the area, causing him to lose control of the chain saw.

The chain saw, which was running, struck the victim on the inside of the unprotected right upper thigh, severing the femoral artery. The victim was wearing work clothes, a hard hat, steel toe work boots and gloves, but no eye, face, or leg protection at the time. The chain saw was found near the base of the sycamore, on the side of the tree opposite the notch, and his eye glasses were lying under the hickory tree (Figure 1). The victim had collapsed against some brush approximately 5 feet downhill from where he had dropped the chain saw. When the victim's son returned from skidding logs, he ran to the victim and checked for vital signs. Finding none, he ran to the landowner's home, about one-eighth mile away, to call for emergency medical services. No first aid equipment was at the cutting site. He and the landowner returned to the site, checked the victim for vital signs and found none. Fire department personnel arrived within 8 to 10 minutes, checked the victim, then ran an electrocardiogram and found no signs of activity. They communicated their findings to the county coroner who authorized transport of the victim by ambulance to the county coroner's office. The county coroner officially pronounced the victim dead and estimated the time between injury and death as 3 minutes.

**CAUSE OF DEATH**

The coroner's report listed the cause of death as hemorrhagic shock due to or as a consequence of severed femoral artery.

**RECOMMENDATIONS/DISCUSSION**

***Recommendation #1: Employers, including the self-employed, should develop, implement, and enforce a written safety program which includes, but is not limited to, worker training in hazard identification, avoidance, and abatement.***

Discussion: Employers should evaluate tasks performed by workers; identify all potential hazards; and then develop, implement, and enforce a written safety program addressing these issues. The safety program should include, at a minimum, worker training in

hazard identification, and the avoidance and abatement of these hazards.

***Recommendation #2: Employers, including the self employed, should ensure that tree fellers properly evaluate the area around timber to be felled, so that potential hazards can be identified and appropriate control measures implemented.***

Discussion: According to the OSHA logging industry standard 29 CFR 1910.266 (h)(2)(ii), before each tree is felled, conditions such as, but not limited to, snow and ice accumulation, the wind, the lean of the tree, dead limbs, and the location of other trees, shall be evaluated by the feller and precautions taken so that a hazard is not created for an employee. Had the victim in this incident recognized the location of the yellow poplar tree (located downhill and near the fall line of the hickory tree he was felling) as a hazard, and had he removed it prior to felling the hickory tree, this incident may have been prevented.

***Recommendation #3: Employers, including the self-employed, should ensure that tree fellers dislodge trees according to safe methods specified in the OSHA logging standard.***

Discussion: The victim positioned himself between the lodged hickory and a nearby sycamore which he notched to fall into the hickory. Before he moved out of this hazardous location, the top of the poplar tree, which was holding the hickory tree, snapped, freeing the hickory. When the hickory tree dislodged, it fell, striking the victim and throwing him off balance with a running chain saw in hand. According to the OSHA logging industry safety standard, 29 CFR 1910.266(h)(1)(vi), each danger tree (including lodged trees) should be removed by mechanical means or other techniques that minimize worker exposure. Using mechanical means to dislodge the hickory tree should have eliminated the hazard.

***Recommendation #4: Employers, including the self employed, should ensure that tree fellers follow safe operating procedures for the use of chain saws.***

Discussion: Safe operating procedures for chain saws require that they be used according to manufacturer's directions. The manufacturer's recommended operating procedures include, among other topics, the following instructions on cutting and proper working conditions:

"Cutting instructions: Grip: Always hold the saw firmly with both hands when the engine is running. Place your left hand on front handle bar and your right hand on rear handle and throttle trigger. Wrap your fingers tightly around the handles, keeping the handles cradled between your thumb and forefinger. With your hands in this position, you can best absorb the push, pull, and kickback forces of your saw without losing control. Working conditions: Avoid stumbling on obstacles such as stumps, roots or rocks and watch out for holes or ditches. Be extremely cautious when working on slopes or uneven ground."

According to OSHA standard 29 CFR 1910.266 (e)(2), (viii),(ix), and (xii) respectively, the thumbs and fingers of both hands should encircle the chainsaw handles during operation (Figure 2) and the chain saw operator must be certain of footing before starting to cut. The chain saw should not be used in a position or at a distance that could cause the operator to become off balance, to have insecure footing, or to relinquish a firm grip on the saw. The chain brake should be engaged if the terrain, underbrush or slippery surfaces create a hazard for employees.

***Recommendation #5: Employers, including the self employed, should provide and enforce the use of personal protective equipment.***

Discussion: Considering the hazards to personal safety that tree felling operations may create, employers should provide and enforce the use of hand, leg, eye, face and foot protection. In this incident, the victim was wearing head protection, foot protection and hand protection, but not face or leg protection. OSHA standard 29 CFR 1910.266(d)(1)(iv) requires that chain saw operators wear ballistic nylon leg protection or another type of leg protection that provides equivalent protection. The leg protection should cover the full length of the thigh to the top of the boot on each leg, to protect against contact by a moving chain saw. Wearing appropriate leg protection may have prevented this fatality. It is important to stress the availability and use of appropriate, required personal protective equipment for all felling operations as lives have been saved and severity of injury reduced because of its use.

***Recommendation #6: Employers, including the self employed, should provide first aid equipment at jobsites and pertinent training in***

***the use of first aid equipment.***

Discussion: Employers should provide first aid equipment at jobsites and provide training in its use as required by OSHA standard 29 CFR 1910.266(d)(2)(i). In this incident the victim was the only first aid trained person on the site and first aid equipment was not available. Given the circumstances and the severity of the injury in this incident, it is uncertain whether the lack of first aid equipment at the jobsite contributed to the fatal injury outcome; however, the lack of such equipment and pertinent training may result in detrimental consequences in the event of any job-related injury and therefore first aid equipment should be available and all workers trained in its use.

**REFERENCES**

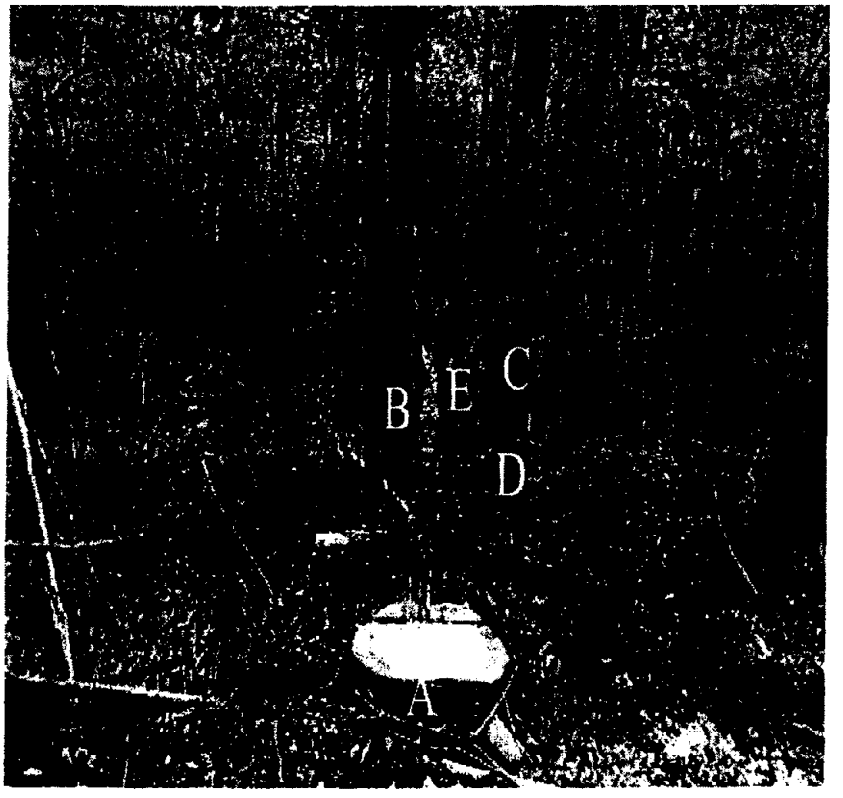
Office of the Federal Register: Code of Federal Regulations, Labor 29 Part 1910.266, Logging Operations, February 3, 1997

West Virginia Logging Sediment Control Act, 1992

Stihl Chain Saw Safety Manual copyright 1996 Andreas Stihl, Waiblingen 0457-184 3021. M50. C6. T. Printed in Germany

NIOSH. Preventing Injuries and Deaths of Loggers (Alert). Cincinnati; OH: Author: 1995. (DHSS[NIOSH]Publication No. 95-101)

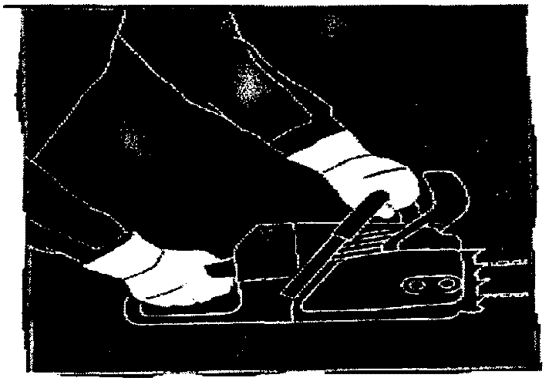
Figure 1 The Incident Site, photographed on April 23, 1998




The section of felled hickory that struck the victim was removed before the photograph was taken.

The hickory-tree stump(A) is pictured in the foreground. Both the poplar tree(B) and the sycamore tree(C) were located 12 feet downhill of the hickory and stood 6 feet apart. Evidence collected suggests the following scenario: The hickory fell and lodged against the poplar. The worker positioned himself between the hickory, which had lodged against the poplar, and the sycamore. When the hickory fell, it struck the victim in the back of the head while he was holding a running chain saw. The chain saw was found on the uphill side of the sycamore(D). The chain saw struck the victim in the right thigh as he stumbled forward. The victim's body was located approximately 5 feet downhill of the sycamore, leaning against brush(E).

Figure 2: Proper Hand Positioning on Chain Saw



Note: OSHA standard 29 CFR 1910.266 (e)(2) (viii) and the manufacturer's safety manual require two-hand operation of chain saws as shown in the picture. In this fatal incident the victim lost control over the running chain saw; when he stumbled forward the chain saw struck him in the right inner thigh causing fatal injury.

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Fatality Assessment and Control Evaluation (FACE) Project

The National Institute for Occupational Safety and Health (NIOSH), Division of Safety Research (DSR), performs Fatality Assessment and Control Evaluation (FACE) investigations when a participating State reports an occupational fatality and requests technical assistance. The goal of these evaluations is to prevent fatal work injuries in the future by studying the working environment, the worker, the task the worker was performing, the tools the worker was using, the energy exchange resulting in fatal injury, and the role of management in controlling how these factors interact.

States participating in this study: North Carolina, Pennsylvania, South Carolina, Tennessee, and Virginia.

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