Investigation # 98WV002-01
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Bulldozer Operator/Logger Crushed When Struck by Falling Tree in West Virginia

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SUMMARY

On December 12, 1997, a 33-year-old self-employed male crawler bulldozer operator/logger (the victim) died of injuries sustained when he was struck by a tree while operating a bulldozer. The bulldozer was not equipped with rollover protective structures (ROPS), falling object protective structures (FOPS), or seat belts. Prior to the incident, the victim had connected a steel winch-cable between the bulldozer and a small standing tree located approximately 20 feet above on the sloped (50-60% slope) hillside. The standing tree, which had been used as an anchor on the steep hillside, uprooted and fell, hitting the victim in the back of the head. Immediately following the incident, three men working at the site ran to the victim, cut the tree in two with a chain saw, and removed it from the victim. They attempted CPR without success and called the local fire department and emergency medical services (EMS) from a business located approximately one-eighth mile downhill of the incident scene. The fire department and EMS arrived within five minutes and found the victim unresponsive with crush injuries to the skull that had been immediately fatal. The sheriff's department directed the EMS to transport the victim to the funeral home where he was officially pronounced dead by a medical examiner. The WV FACE Investigator concluded that to reduce the likelihood of similar occurrences, employers, including the self-employed, should:

- ***Follow all required state licensing, certification, notification, and best management practices when performing logging operations in West Virginia;***
- ***Equip all crawler bulldozers used for logging operations with roll-over protective structures (ROPS), falling object protection structures (FOPS), and seat belts;***
- ***Develop, implement, and enforce a written safety program which includes, but is not limited to, training in hazard identification, avoidance, and abatement.***
- ***Ensure that those employees engaged in logging operations use appropriate personal protective equipment for the work being performed.***

INTRODUCTION

On January 8, 1998, a newspaper clipping service notified the West Virginia FACE Program Coordinator/Investigator of a fatal logging incident that had occurred in West Virginia on December 12, 1997. On January 22, 1998, the FACE Investigator and the Principal Investigator traveled to the county where the incident occurred and met with the police officer who had made the initial onsite investigation. Photographs taken the day of the incident were reviewed. Accompanied by the police officer and a forester from the Division of Forestry, the investigators traveled to the incident scene to conduct an investigation. The police report and photographs, death certificate, and medical examiner's report were obtained during the course of the FACE investigation.

The victim was self-employed. He had obtained Certified Logger status in West Virginia and a Timber Operator License in 1995. Both were expired at the time of the incident. (Note: The Logging Sediment Control Act [1992, c.6] requires that each timbering operation in West Virginia be performed under a Timber License, be supervised by a certified logger, and notification of the operation be sent to the Division of Forestry. To become a certified logger, and individual is required to successfully complete training and pass a test for best management practices (a soil erosion prevention plan), complete training in chain saw safety, and complete training and posses a current first-aid card [1].) No other company-specific information or past employment information was obtained.

INVESTIGATION

On the afternoon of December 12, 1997, the victim was using a crawler bulldozer to skid felled trees from a steep hillside (50-60% slope) to a landing at the base of the hill. Ten fresh stumps and nine remaining fallen trees that had not yet been moved from the hillside to the landing indicated that work may have been in progress for about one week prior to the incident. Work may have been slowed by rain which had fallen earlier in the week. It was not raining the day of the incident although it was cloudy and the temperature was in the 20s (degrees F). The hillsides and the skid trails were muddy. The logging site was approximately one acre. The mature trees were located on two steep hillsides with a valley in-between. The landing was located at the base of the hill approximately 75 feet from a paved road. The land was owned by the operator of a business located at the base of the hill, and the trees to be harvested were mature beech, yellow poplar, and scarlet oak. One main skid trail had been made to skid trees to the landing. The victim was wearing work clothes but was not wearing personal protective equipment (appropriate personal protective equipment depends upon the job performed and may include hand, leg, eye, face, and foot protection).

The victim drove the bulldozer up a steep slope and followed the contour of the hill to a location about 20 feet from the ridge top when the incident occurred. The skid trail used was not a constructed road and offered no flat surface from which to operate. Although the last part of the trail where the incident occurred was only a 10% uphill climb, it traveled around the contour of the steep hillside (50-60%). Because there was no constructed road around this steep hillside, the bulldozer would have a tendency to slip down the hill sideways or roll over (bulldozer cleats are designed to grip the land going uphill or down, but not sideways). Although his intent was unknown, it is likely that the victim was trying to travel around the contour of the hill in order to reach a felled yellow poplar tree located approximately 100 yards ahead. Because he may have feared that the bulldozer would slip sideways or roll over, he attached a five-eighths inch steel winch-cable between the bulldozer and a 56 foot sassafras tree (the steel winch-cable marks were about one foot up from the base of the tree). The sassafras tree uprooted, fell, and struck the victim in the back of the head. Three loggers at the site immediately went to help the victim and using a chain saw, cut the tree away and lifted it off him. The section of the tree trunk that hit the victim was seven inches in diameter. The tree diameter at breast height was nine inches. The tree measured 21 feet from the crown to the section that struck the victim. The remainder of the tree measured 35 feet. The roots remaining on the uprooted tree were shallow and brittle, leading investigators to believe that the tree may have been unhealthy, increasing its likelihood of uprooting under force. The loggers attempted CPR on the victim but were not successful due to the severity of head injuries. They ran down the hill about one-eighth mile and called the local emergency medical services. Fire department and EMS personnel arrived on the site within five minutes and determined that the injuries had been immediately fatal. When the sheriff's department arrived, EMS personnel were

directed to transport the victim to the local funeral home where he was officially pronounced dead by the medical examiner.

The bulldozer used at the site was approximately 40 years old and had no ROPS, FOPS, or seat belts. There were no manufacturer's markings on it, and therefore, make and model could not be determined. At the time of the WV FACE investigation, the machine had been moved from the incident site to an area near the bottom of the hill. The blade was down, and the battery had been removed. With no battery in place, the machine could not be started and evaluated for function. Given the lack of blade marks on the trail, investigators believe the bulldozer blade may not have been fully functional the day of the incident and may have contributed to the victim's decision to skid logs without first constructing a proper road from which to work.

CAUSE OF DEATH

The medical examiner's report listed the immediate cause of death as medullary failure; a consequence of intracranial hemorrhage due to blunt trauma to the head.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: ***Employers, including the self-employed, should follow all required state licensing, certification, notification, and best management practices when performing logging operations in West Virginia.***

Discussion: West Virginia's Logging Sediment Control Act [(1)], in part, requires that logging companies conducting business in West Virginia obtain a timbering license; that each operation be supervised by a "certified logger;" that a "Timbering Operation Notification Form" be sent to the WV Division of Forestry within three days of start-up, and that logging operations follow Best Management Practices for controlling erosion and soil movement into streams. In this instance, the victim had been licensed and certified in the past but did not hold a current timbering license or logger certification. The victim did not comply with Best Management Practices which requires that skid roads not exceed a 15-20% grade (an alternative method can be submitted to the WV Division of Forestry). The victim had not constructed a proper skid road. He drove a bulldozer up and around the contour of a steep hillside without the benefit of a level surface from which to operate. Had a proper skid road been constructed, the victim would have had a level operating surface, and this fatal incident may have been prevented. The Timbering Operation Notification Form, which was not sent in as required, allows the Division of Forestry to locate logging operations and evaluate the practices used. Had the Division of Forestry been aware of this logging operation, an investigation would have been performed and work stopped until corrections had been made.

Recommendation #2: ***Employers, including the self-employed, should equip all crawler bulldozers used for logging operations with ROPS, FOPS, and seat belts.***

Discussion: The current OSHA logging standard requires that tractors (including crawler bulldozers), skidders, swing yarders, log stackers, and mechanical felling devices placed in initial service after February 9, 1995 be equipped with ROPS/FOPS and seat belts to protect the operator. Employers must replace FOPS or ROPS on logging machines manufactured prior to this date that once had these structures but had them removed [(2)]. Because the victim was self-employed and had no other employees, he was exempt from OSHA regulations. Additionally, OSHA regulations requiring these protective structures do not include older models which never had these structures installed. However, to prevent injuries, all employers should equip logging machines with ROPS, FOPS, and seat belts and maintain the machines in serviceable condition. The machine used in this incident should be taken out of service. It should not be returned to service until the machine and all accessories function properly and until it has been retrofit by the manufacturer with ROPS, FOPS, and seat belts. Had the crawler bulldozer been equipped with these protective structures, this fatal incident may have been prevented.

Recommendation #3: ***Employers, including the self-employed, should develop, implement, and enforce a written safety program which includes, but is not limited to, training in hazard identification, avoidance, and abatement.***

Discussion: The evaluation of tasks to be performed at the worksite forms the basis for the development, implementation, and enforcement of a safety program. The key elements of the program should include, at a minimum, training in hazard identification and the avoidance and abatement of these hazards. In this incident, the victim was killed when he used a tree to anchor his bulldozer which was located 20 feet below the tree on a steep slope. Hazards created by using a tree as anchor, using a bulldozer with no ROPS, FOPS, or seat belts, and hazards associated with using improperly constructed skid roads went unrecognized and contributed to this fatal incident. It should be noted that in addition to hazards identified on this logging site that lead directly to the fatal incident, other major safety hazards existed that should have been identified and avoided or abated. Among these were failure to use proper hinge techniques when felling trees, failure to recognize hazards created by weather and land conditions, and possible failure to ensure that machines and accessories used for logging are maintained in serviceable condition.

Recommendation #4: ***Employers, including the self-employed, should ensure that employees engaged in logging operations use appropriate personal protective equipment for the work being performed.***

Discussion: Considering the hazards to personal safety that logging operations may create, employees, including the self-employed, working on the site should wear appropriate personal protective equipment (head, hand, leg, eye, face and foot protection). In this incident, the victim wore no personal protective equipment. It is important to stress the availability and use of personal protective equipment for logging operations as lives have been saved and severity of injury reduced because of its use. [Note: OSHA requires the use of appropriate personal protective equipment in logging where employees are present {29CFR 1910.166(d)(1)(i-vii)}].

REFERENCES

1. Logging Sediment Control Act, 1992.
2. Office of the Federal Register: Federal Register, Vol.59, No.196, 29 CFR 1910.266, p. 51746, Wednesday, October 12, 1994.

FATALITY ASSESSMENT AND CONTROL EVALUATION PROGRAM

The WVU Center for Rural Emergency Medicine, through a contract with the West Virginia Department of Health and Human Resources, conducts investigations on the causes of work-related fatalities within the state. The goal of this program is to prevent future fatal work-place injuries. West Virginia FACE intends to achieve this goal by identifying and studying the risk factors that contribute to workplace fatalities, by recommending intervention strategies, and by disseminating prevention information to employers, employees, trade associations, unions, equipment manufacturers, students, teachers, and others with an interest in workplace safety.

Please use information listed on the Contact Sheet on the NIOSH FACE website to contact In-house FACE program personnel regarding In-house FACE reports and to gain assistance when State-FACE program personnel cannot be reached.