FACE-92-15
DATE: July 8, 1992

TO: Director, National Institute for Occupational Safety and Health

FROM: Division of Safety Research, NIOSH

SUBJECT: Tree Faller Crushed by Dislodged Tree - Alaska

SUMMARY

A 47-year-old male tree faller (the victim) was felling trees on a mountainside with a 50 percent slope. The victim was opening a cutting strip approximately 150 feet above a logging road when he felled a hemlock tree that became lodged against another hemlock. The victim decided to clear the lodged tree by cutting and felling the supporting tree. There were no witnesses to the incident, but evidence suggests that when the victim cut the supporting tree, it carried the lodged tree into his intended escape path. Presumably, during his attempt to move away from the falling support tree, the victim tripped in a small hole and fell to the ground. The lodged tree fell on him, striking him on the head and shoulder, fatally crushing him. NIOSH investigators concluded that, in order to prevent future similar occurrences, employers should:

- *ensure that tree fallers dislodge trees according to safe methods specified in logging industry standards*
- *ensure that tree fallers receive adequate training in safe work procedures*
- *designate a company safety manager to conduct regular safety inspections*
- *designate a person to check on the safety of lone or isolated fallers and buckers at regular intervals*
- *ensure that worker safety has been addressed in the planning process of logging operations.*

INTRODUCTION

On August 23, 1991, a 47-year-old male tree faller (the victim) was fatally crushed by a falling tree which he had dislodged by felling the tree which it had lodged against. On September 16, 1991, officials of the Alaska Department of Occupational Safety and Health (AKOSH) notified the National Institute for Occupational Safety and Health (NIOSH), Division of Safety Research (DSR), Alaska Activity of the death. On October 29, 1991, a safety specialist from the DSR Alaska Activity traveled to the incident site and conducted an investigation. The safety specialist reviewed the incident with company representatives, co-workers of the victim, and the AKOSH compliance officer assigned to this case. Photographs of the incident site were obtained during the investigation.

The employer in this incident was a logging company that had been in operation for 24 years. The employer had 183 employees (15 of whom were fallers), and a fully integrated logging operation consisting mainly of fallers, buckers, limbers, choke setters, heavy equipment operators, truck drivers, chasers, hook tenders, mechanics, sort yard workers, and siderods. (All of these employees are collectively referred to within the logging industry as "loggers.") The employer had a safety policy, safety program, and basic safe work procedures at the time of the incident. There was no full-time safety manager. One of the company managers was responsible for the safety program as a collateral duty. Safety meetings were conducted weekly to discuss a variety of safety issues pertaining to logging operations. Although the victim had only been employed by the company for 1 month before the incident, he had 27 years of logging experience (of which most was working as a faller). The fallers (including the victim) were paid according to the number of trees they fell (piecework).

INVESTIGATION

Six months prior to the incident, the employer (the logging company) had attempted to conduct logging operations on a mountainous island in southeast Alaska, but was enjoined against these operations by a court order. The injunction, issued over environmental concerns, caused the company to suspend operations for 2 months, and resulted in a reduction in the anticipated harvest for the March 15 through December 15 logging season. Approximately 1 month before the incident, the environmental injunction was removed, and the company resumed full operation at the logging site. An accelerated logging operation was undertaken to offset the shortened season; as a result, a number of logging phases, which would have normally taken place in sequence, were being conducted concurrently. This complicated the individual logging phases considerably, and produced some confusion among the tree fallers. For example, since the logging road was being constructed while trees were being felled in the same area, many fallers were unsure of a safe direction for felling trees. Their usual practice (standard operating procedure) of felling trees toward cleared areas along the logging roads might endanger road construction workers. On the other hand, felling trees toward uncleared areas might result in felled trees "hanging up" or lodging on standing trees, thus endangering the fallers themselves.

The victim had been assigned to clearcut a strip (a wooded area allotted to a faller) with a 50 percent slope. The lower border of the strip was about 150 feet above a logging road. The victim was cutting trees (mostly hemlock) with a 4-horsepower, 32-inch-bar chain saw. Although there were no eyewitnesses to the incident, evidence suggests the following sequence of events (Figure):

The victim began cutting and falling trees at about 7:00 a.m. on the day of the incident. The twelfth consecutive tree to be cut by the victim was a hemlock that was 80 feet tall and 19 inches in diameter at the base. When the tree fell, it lodged against another hemlock, 36 feet away, that was 135 feet tall and 36 inches in diameter at the base (the support tree); it came to rest at about a 45-degree angle (as noted by tree-to-tree impact marks).

The victim presumably decided to clear the lodged tree by cutting and falling the support tree. The victim cleared some brush from an intended escape path with his saw in a direction directly up-slope from the support tree. However, this path was not entirely clear of the support tree's

planned direction of fall, as indicated by the orientation of the undercut in the support tree. This undercut was made so that the support tree would fall up-slope at a 45-degree angle to the contour of the slope; the victim apparently planned that the lodged tree would fall to the ground on the left side of the support tree. However, when the support tree fell (about 9:00 a.m. according to the AKOSH investigative report), it carried the lodged tree with it across the victim's intended escape path. When the victim had moved about 5 feet away from the stump of the support tree (along his intended escape path), he tripped in a 6-inch-diameter root hole, and fell to the ground, face down. (The toe of the victim's right boot was embedded in the root hole.) After he fell, the lodged tree fell on top of him, crushing his head and shoulder, and causing instant death (according to the medical examiner's report).

The nearest worker, another faller (co-worker), was felling trees about 300 yards west of the victim. Over the next 6 hours, the co-worker thought he had heard the victim's chain saw operating periodically as usual.

However, what the co-worker actually heard was the chain saw of another logger (a hook tender) working nearby. Because of this, the co-worker did not suspect anything unusual until about 3:00 p.m. when the victim failed to show up on the logging road for the 30-mile ride back to camp. At this time, several company loggers began to search for the victim; the bullbuck (supervisor of falling and bucking operations) found him about 15 minutes later, under the branches of the previously lodged tree.

The victim was unresponsive, without a pulse, and attempts to revive him with cardiopulmonary resuscitation (CPR) were unsuccessful. A state police officer and the coroner arrived at the site about 1 hour after the victim was found, and the coroner pronounced the victim dead at the scene.

CAUSE OF DEATH

The medical examiner listed the cause of death as blunt force trauma to the head.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Employers should ensure that tree fallers dislodge trees according to safe methods specified in logging industry standards.

Discussion: The victim attempted to clear the lodged tree by cutting and felling the support tree. When the support tree fell, it carried the lodged tree across his intended escape path, and crushed him. According to the Alaska Department of Labor, Occupational Safety and Health Standards for Logging (Alaska Logging Safety Code), Section 07.128 (e), "Danger trees (trees which, because of position, deterioration or physical damage, endanger workers) which are unsafe to cut must be blown down with explosives, or felled by other safer methods." The Fallers' and Buckers' Handbook (page 67) makes this recommendation to fallers: "If you are on steep ground, and the hang-ups are on the uphill side of the supporting tree, fell the tree by blasting or another safe alternative method." The Handbook (page 41) also suggests that some danger trees

can be safely taken down by using a line from a crawler tractor, rubber-tired skidder or yarding equipment.

Recommendation #2: Employers should ensure that tree fallers receive adequate training in safe work procedures.

Discussion: The Alaska Logging Safety Code, Section 07.115 (d) states, "Each employer shall conduct periodic safety meetings, to be attended by all employees, to inform the employees of the employers' safety policies and the pertinent provisions of the State of Alaska Occupational Safety and Health Standards." Although the employer conducted weekly safety meetings, logging employees were not informed of the pertinent provisions of the Logging Safety Code. The Alaska Department of Labor has a voluntary compliance program which offers safety training to employers and employees on a request basis. Effective periodic safety training in the logging industry will raise the employees' awareness of the hazards which confront them.

Recommendation #3: Employers should designate a company safety manager to conduct regular safety inspections.

Discussion: Conducting regular safety inspections of all logging tasks (among other safety-related responsibilities) by qualified individuals will help ensure that established company safety procedures are being followed. Additionally, scheduled and unscheduled safety inspections of tree faller work sites clearly demonstrate that the employer is committed to the safety program and to the prevention of occupational injury.

Recommendation #4: Employers should designate a person to check on the safety of lone or isolated fallers and buckers at regular intervals.

Discussion: In this incident, the victim was working alone in an isolated area without visual or voice contact for a period of approximately 7 to 8 hours before other logging employees attempted to locate him. Section 07.115 (e) and (f) of the Alaska Logging Safety Coded states, "Each employer shall institute a system for employees assigned to work alone in remote or isolated areas to report to someone periodically by radio or telephone or designate a person to check on lone employees" safety at reasonable intervals. All persons involved in working alone shall be advised of the reporting procedures to be followed. Each employer shall assign a minimum crew of two persons to work on potentially dangerous operations such as cutting, yarding and loading operations and they shall remain in visual or voice contact with one another.: The Fallers' and Buckers' Handbook also addresses this issue (pages 22-24), "The written work procedures must include provisions for checking the well-being of every faller and bucker at the operation throughout the work day. The "buddy" system is the most commonly used method. Fallers and buckers must be placed in their respective quarter or strip so they can communicate with their "buddy." Checks must be made at least every 20-30 minutes."

Recommendation #5: Employers should ensure that worker safety has been addressed in the planning process of all logging operations.

Discussion: In this incident, a number of logging phases (which would normally take place in sequence) were being conducted concurrently as a result of a shortened harvest season caused by the environmental injunction. This resulted in a compressed logging operation which complicated the individual logging phases considerably, and produced some confusion among the tree fallers. For example, since the logging road was being constructed while trees were being felled in the same area, many fallers were unsure of a safe direction for felling trees. Their usual practice (standard operating procedure) of felling trees toward cleared areas along the logging roads might endanger road construction workers. On the other hand, felling trees toward uncleared areas might result in felled trees "hanging up" or lodging on standing trees, thus endangering the fallers themselves. According to the Fallers' and Buckers' Handbook (page 29), employers and employees should have a thorough knowledge of the area and of the work procedures used at the logging operation site before starting to fell timber. Employers must know logging site positions in relation to roads in use and to other equipment and workers in the area. Better organization in the logging planning process in this incident would have facilitated the implementation of safer felling procedures.

REFERENCES

Workers' Compensation Board of British Columbia. Fallers' and Buckers' Handbook. Vancouver, Canada: 1990, pp.22-24, 29, 41, 67.

Alaska Department of Labor, Division of Labor Standards and Safety. Occupational Safety and Health Standards for Logging, Section 07. August 1990.

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Fatal Accident Circumstances and Epidemiology (FACE) Project

The National Institute for Occupational Safety and Health (NIOSH), Division of Safety Research (DSR), performs Fatal Accident Circumstances and Epidemiology (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: Alaska, Georgia, Indiana, Kentucky, Maryland, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, Virginia, and West Virginia.

Additional information regarding this report is available from:

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