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FACE

Fatality Assessment and Control Evaluation Program

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Fourteen-Year-Old Youth Pulled Into Operating Wood Chipper–Florida

SUMMARY

On July 6, 2000, a 14-year-old youth (the victim) working as part of a tree-trimming crew was fatally injured while feeding a limb into a drum-type wood chipper. The youth, accompanying his father to work, had been dragging limbs and branches to the wood chipper to be processed by older workers. Although not assigned to do so, he picked up the butt-end of a 4- to 5-inch-diameter limb, laid it on the chipper's feed tray and began to push it into the chipper knives. The rotating knives caught the limb and it began feeding through the chipper. As the limb fed quickly into the chipper knives, a branch that projected perpendicularly from the limb struck the victim in the back. As the limb continued to feed into the chipper, it pulled him toward the rotating chipper knives. The victim may have attempted to "push off" from the machine but was unable to free himself from contact with the branch, and the limb pulled him into the chipper. The chipper drum jammed and came to a stop after the victim's torso had been fed into the machine. A coworker who witnessed the incident notified 911. The victim was pronounced dead at the scene.

Photo 1. *Wood Chipper–Feed Chute*

NIOSH investigators concluded that to help prevent similar occurrences employers should

- ***ensure that supervision beyond that normally provided for experienced adult workers is available when youths are present on job sites***

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 notified by participating states (North Carolina, Pennsylvania, South Carolina, Tennessee, and Virginia); by the Wage and Hour Division, Department of Labor; or when a request for technical assistance is received from NIOSH-funded state-level FACE programs in Alaska, California, Iowa, Kentucky, Massachusetts, Minnesota, Missouri, Nebraska, New Jersey, Ohio, Oklahoma, Texas, Washington, West Virginia, and Wisconsin. The goal of these evaluations is to prevent fatal work injuries in the future by studying the work 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. The FACE program does not seek to determine fault or place blame on companies or individual workers. For further information visit the FACE website at **www.cdc.gov/niosh/face/faceweb.html** or call toll free 1-800-35NIOSH.

- ***ensure that workers involved in tree trimming operations are trained to recognize and avoid the hazard of being fed through an operating wood chipper***
- ***prohibit workers less than 18 years old from operating or tending wood chippers***
- ***consider using self-feeding wood chippers that incorporate devices to quickly shut off or reverse material feed***

INTRODUCTION

On July 6, 2000, a 14-year-old youth (the victim) working as part of a tree-trimming crew was fatally injured after he was pulled into an operating wood chipper while feeding a limb into the machine. On July 6, 2000, the U.S. Department of Labor, Wage and Hour Division, notified NIOSH's Division of Safety Research (DSR) of the occurrence. On August 7, 2000, a DSR safety engineer met with the county sheriff detective assigned to investigate the case and reviewed the sheriff report and photographs. On August 8, 2000, the safety engineer interviewed the employer and observed a typical job site. The case was also discussed with the Occupational Safety and Health Administration (OSHA) compliance safety and health officer assigned to investigate the case. While at the work site, photographs and measurements of the wood chipper were collected.

The employer was a small tree trimming service normally employing a four-person crew. The company, in business since 1989, owned one wood chipper and one chip truck and was primarily engaged in tree trimming and removal service to residential customers. The wood chipper had been purchased in 1992 from a large multi-state tree service. Training was conducted on the job with safety talks incorporated during site-specific work planning. Operations were normally conducted from 7 a.m. to 3 p.m. 5 days a week depending on demand for services. The victim had been accompanying his father, the crew leader, on the job during the school vacation and had been instructed to assist other crew members in dragging cut limbs and branches from trimmed trees to the wood chipper. The youth's father had specifically instructed him not to feed material into the machine. The company owner was a certified arborist and the crew leader had been certified at one time. This was the first fatality that had occurred during the company's history.

INVESTIGATION

The machine involved in this incident was a drum-type non-self-feeding wood chipper. Limbs and branches are fed into the machine's feed chute by hand until the drum-mounted rotating chipper knives catch the material. The material is pulled into the chipper knives by the action of the knives passing a cutting anvil as the wood is cut into chips. The chips are propelled through a discharge chute and into a chip-receiving truck for removal from the job site. Feeding with this type of wood chipper is not always positive in that, if the wood being fed into the chipper knives approaches the chipper drum at certain angles or if the material is large, the cutting action may not be sufficient to maintain the material feed. When this happens, the material must be refed by hand into the machine. Best results are obtained when material is fed into the machine by thrusting it into the rotating chipper knives.

Photo 2. *Wood Chipper–Side View*

On July 6, 2000, the tree-trimming crew started the work day at about 7 a.m. The crew began this day with the removal of several trees from the yard of a single-family residence. The youth had been allowed to accompany his father, the crew leader, to work on several occasions and had been helping out the older workers by dragging limbs and branches to the wood chipper. According to the employer, the boy's father had instructed him to drag limbs and branches to the chipper so that adult crew members could feed them into the machine. He was not to attempt to feed material into the wood chipper.

On the day of the incident, the victim had been dragging material to the chipper where other workers were engaged in feeding it into the machine. At one point, the victim had been observed feeding a limb into the machine by his father, who had immediately instructed him that he was not to feed material into the wood chipper. However, shortly after 9 a.m., the victim dragged a long limb, roughly 4 to 5 inches in diameter at the butt-end toward the wood chipper. While the coworker was turned away from the machine, the victim apparently lifted the butt end of the limb up onto the chipper's feed tray and began to feed it into the rotating chipper knives. The lower branches on this particular limb projected at right angles to the main stem. When the victim placed the butt end onto the wood chipper feed tray, he was standing on the ground, positioned between the wood chipper and the lower branches of the limb. When the rotating chipper knives caught and began feeding the limb through the chipper, the lower branches struck the victim in the back and pulled him toward the feed chute. The victim may have attempted to escape by pushing off from the feed chute but was unable to do so as the limb continued pulling him toward and into the chipper knives. A coworker turned toward the chipper just in time to observe the victim being fed into the rotating knives along with the tree limb. The machine began to lose momentum and stalled; however, by this time the victim's torso had been fed into the knives. Unable to intervene, the coworker immediately began yelling for help and went to the victim's father to prevent him from coming near the machine. A second coworker, who had been near the machine and also facing away, turned toward the machine

when he heard the cries for help. Although the machine had stalled out, he went to the front of the chipper and switched off the ignition. He then went to the residence, and along with the homeowner, called 911. The tree trimmer, who had been up in a tree cutting limbs, descended and assisted in preventing the father from observing the scene until emergency personnel arrived within a few minutes of notification and took control of the scene. County sheriff personnel and staff from the county medical examiner's office arrived, and the victim was pronounced dead at the scene.

CAUSE OF DEATH

The county medical examiner established the official cause of death as fragmentation by wood chipper.

RECOMMENDATIONS

Recommendation #1: Employers should ensure that job-site supervision beyond that normally provided for experienced adult workers is available when youths are present in the work environment.

Discussion: The victim had been repeatedly instructed to drag limbs to the chipping area to be processed by experienced adult workers and not to feed material into the chipper. At the time of the incident, the chipper was operating and being tended by older, experienced workers who were located only a few feet away. These workers may have had the necessary knowledge and experience to recognize the hazards involved with feeding material into a wood chipper. And, had they been able to observe the victim placing the limb on the feed tray, they may have intervened to prohibit him from feeding the limb. However, the older crew members were themselves occupied with gathering and feeding material into the chipper. This activity required them to repeatedly direct their visual attention away from the machine as they picked up material to feed into the wood chipper. One crew member witnessed part of the incident but did not see the victim feed material into the machine until it was too late to intervene. When youths are present on job sites, additional and constant supervision by persons whose only duty is to monitor the actions of youthful workers may be necessary to completely protect them from hazard.

Recommendation #2: Employers should ensure that workers involved in tree-trimming operations are trained to recognize and avoid the hazard of being fed through an operating wood chipper.

Discussion: As evidenced by this incident, workers feeding material into an operating wood chipper while positioned at the edge of the feed table and in line with the feed chute are at risk of being pulled into and through the chipper knives. This can occur if the worker loses balance and falls forward into the feed chute, reaches too far into the feed chute while feeding material, or becomes entangled by long branches and limbs that are being pulled into the machine. The risk of entanglement can be minimized if workers are trained to feed material into the chipper while positioned at the side of the feed chute. Workers should walk away once the machine has grabbed the material and it is feeding through the chipper knives. Workers who are not assigned to operate or feed material into the wood chipper may not need to know the proper feeding technique, but should be trained to understand the risk of being caught and the need to stay clear of the wood chipper and any materials that are feeding into it.

Recommendation #3: Employers should implement policies that prohibit workers less than 18 years old from operating or tending wood chippers.

Discussion: The Fair Labor Standards Act (FLSA) includes provisions to protect youths by prohibiting their employment under conditions that would be detrimental to their health or well-being. These provisions address appropriate occupations for specific age groups. Youths 14 and 15 years old are prohibited from occupations requiring the operation or tending of any power-driven machinery. Additionally, because the operation of powered wood processing machines, such as wood chippers, has been found to be particularly hazardous, a minimum age of 18 has been established for workers who operate these machines. These employment standards are listed and explained in bulletin WH-1330, U.S. Department of Labor, Employment Standards Administration, Wage and Hour Division.[1] Had the employer and crew members been able to restrict the victim's activity to dragging limbs only, this incident would not have occurred. However, despite having been repeatedly instructed to only drag limbs to the chipping area and not to feed materials into the operating chipper, the victim still did so. The victim's motivation for doing this could not be determined; however, while present on the job site, he would have had opportunity to observe adult workers feeding material into the machine. This may have influenced him to attempt similar activity. Further, as mentioned in the preceding discussion, constant supervision may be necessary to protect youthful workers from job-site hazards. This may not be economically feasible for small employers lacking the financial means to include the additional crew members to monitor youthful workers. For these circumstances, prohibition of workers less than 18 years old from job sites where hazardous activities are being conducted may be the only real protection available to youthful workers.

Recommendation #4: Employers should consider using self-feeding wood chippers that incorporate devices to quickly shut off or reverse material feed.

Discussion: Drum-type wood chippers like the one involved in this incident depend on the cutting action of the chipper knives to maintain material feed into and through the machine. Smaller branches and limbs are quickly fed through the machine by this action. A flywheel is connected to the chipper drum to help conserve angular momentum when processing larger limbs or when being fed heavy loads. Because of this, when the machine is shut down, it takes approximately 45 seconds before the chipper drum comes to a complete stop. Shutting down the machine to protect workers from injury after being caught by feeding material is not possible. Another type of chipper, known as a self-feeding type, is often used for tree-trimming operations. Self-feeding wood chippers employ hydraulically driven feed wheels situated between the end of the feed chute and the rotating chipper knives, either drum- or disc-mounted. These feed wheels grab material that is fed into the feed hopper by hand and then mechanically feed the material into the chipper knives at a more or less constant rate. Once the material is feeding, it is not necessary to start it feeding again. Additionally, because the power for the feed wheels is independent of the power driving the chipper knives, the feed wheels can be stopped or reversed almost instantaneously. Self-feeding wood chippers are normally equipped with a feed-control bar that surrounds the feed chute and can be used to instantly reverse or stop the feed wheels. This type of machine is a little more complex and costly than the drum-type chipper used in the incident. Similar fatalities have occurred with self-feeding wood

chippers because a worker whose hands have become caught is not able to operate the safety bar. However, the presence of the feed control could allow nearby coworkers to quickly interrupt the feed, minimizing the risk of injury.

REFERENCES

1. DOL [1991]. Child labor requirements in nonagricultural occupations under the Fair Labor Standards Act. Washington, DC: U. S. Department of Labor, Employment Standards Administration, Wage and Hour Division, WH-1330.

2. NIOSH [1999]. Injury associated with working near or operating wood chippers. U.S. Department of Health and Human Services, DHHS (NIOSH) Publication No. 99-145.

INVESTIGATOR INFORMATION

This investigation was conducted by Paul H. Moore, Safety Engineer, NIOSH, Division of Safety Research, Surveillance and Field Investigation Branch, Fatality Assessment and Control Evaluation Team.

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