

Construction Laborer Dies After Being Struck in the Head by Backhoe Bucket- North Carolina

SUMMARY

On July 17, 2000, a 32-year-old construction laborer (the victim) died after being struck in the head by a backhoe bucket and pinned against the side of a residence. The victim was part of a two-man crew clearing earth away from the foundation footer of the residence to install a french drain around the perimeter of the house. The french drain was to rest on the 6 to 8 inches of footer protruding from underneath the cement block foundation of the residence. The backhoe operator began digging an approximately 2-foot-wide by 2-foot-deep excavation around the perimeter of the foundation while the victim was



Backhoe used the day of the incident

using a hand shovel to remove any extra earth from the foundation footer after the backhoe passed through. Earth had been removed to a point approximately 9½ feet from the right of the steps when the victim realized that the amount of footer protruding was decreasing and would not be sufficient for the french drain to rest on. He motioned for the backhoe operator to look at the amount of footer that was protruding so they could determine the amount of extra earth to be removed. The operator lowered the backhoe's bucket to rest on a pile of earth approximately 8 feet from the victim, placed both the machine's transmission controls in neutral, set the parking brake, and dismounted the backhoe using the steps on the right side of the machine. After the correct amount of earth to be removed had been determined, the operator returned to the machine and climbed the

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 1-800-35-NIOSH.



left rear tire to access the cab. The operator adjusted the seat toward him and stepped over the top of the tire to sit down. While doing so, he inadvertently contacted the machine control that activated the boom swing toward the victim standing in the ditch. The boom struck the victim, pinning him against the house. The operator swung the boom away from the victim, dismounted the vehicle, and yelled to a nearby resident to call 911. He then removed the victim from the ditch and initiated cardiopulmonary resuscitation (CPR). When the emergency medical service (EMS) arrived, the operator moved the backhoe away from the residence to give the EMS personnel more room. EMS summoned personnel from the Medical Examiner's office who pronounced the victim dead at the scene. NIOSH investigators concluded that, to help prevent similar occurrences, employers should

- *provide all workers with training in the recognition and avoidance of unsafe conditions and in required safe work practices that apply to their work environments*
- *ensure that equipment operators have been trained in the proper use of the equipment they are assigned to operate at the job site in accordance with manufacturers' specifications and recommendations*
- *ensure that all machine controls are properly identified and that manufacturers' safety features are operable*
- *ensure that required personal protective equipment is provided and used*

INTRODUCTION

On July 17, 2000, a 32-year-old construction laborer died after being struck in the head by a backhoe bucket and pinned against the side of a residence that had recently been moved to a new location. On July 26, 2000, officials of the North Carolina Occupational Safety and Health Administration (NCOSHA) notified the National Institute for Occupational Safety and Health (NIOSH), Division of Safety Research (DSR), of the fatality. On September 21, 2000, a DSR occupational safety and health specialist conducted an investigation of the incident. The incident was reviewed with the NCOSHA compliance officer assigned to the case and the investigating officer of the police department. The company owner and his wife were interviewed, and the incident site and piece of machinery involved in the incident were examined. Photographs taken immediately after the incident and the death certificate were reviewed.

The employer was a 3-person company, including the owner, that had been in operation for 13 years. The company performed light grading and excavation work. The company had no written safety program or standard operating procedures. The owner stated that the backhoe operator had received basic instruction in the safe operation of the used backhoe when it had been purchased by the company owner 8 years earlier. The training consisted of identifying the location of the machine's controls and awareness of operator surroundings, particularly workers on foot. The owner's wife was said to have provided refresher training in safe operation of the machinery and general safety twice a year to both employees. No documentation of operator training or refresher training was kept. The employer did not require or provide any personal protective equipment to the employees, e.g., protective helmet, safety glasses. The victim was wearing a baseball cap at the time of the incident. This was the first fatality experienced by the company.

INVESTIGATION

A one-story residential structure had been moved from a previous site to the incident site 3 weeks prior to the incident. The prime contractor had subcontracted the employer to install a french drain around the perimeter of the residence. The employer sent a two-man crew, a backhoe operator and a laborer (the victim), to the site with a backhoe to perform the work.

The men arrived at the site at 9 a.m. and walked around the residence to visually inspect the site to determine the best way to install the drain. It was decided that a ditch approximately 2 feet wide by 2 feet deep would be sufficient to expose the foundation footer. The drain could then be installed on top of the 6 to 8 inches of footer protruding from the foundation.

Facing the front of the house, the men began digging the ditch on the left side of the front steps and continued around the house in a clockwise direction. The backhoe operator dug the ditch while the victim cleared any extra earth away from the protruding footer. At 12:30 p.m. the crew left the site for lunch, then returned at 1:30 p.m.

When the operator finished excavating the ditch on the right side of the house, he repositioned the backhoe to begin the excavation at the right side of the front steps. Approximately 9½ feet from the edge of the steps, the victim noticed that the amount of footer protruding from the foundation was becoming less and had reached a point where the french drain pipes would not be able to rest entirely on it. The victim motioned for the operator to come to him, and the operator lowered the bucket to a point where it rested on a pile of dirt approximately 8 feet from the house. He then set both transmission controls in neutral, set the parking brake, climbed down the steps on the right side of the machine, and went to the victim. After the men had decided how much wider the ditch needed to be to accommodate the drain pipe, the operator returned to the machine. Instead of climbing the steps to the cab of the machine, the operator climbed the left rear tire to access the cab.

As the operator stepped over the fender and into the cab, he bent over to adjust the seat that had turned to the right as he had exited the cab. As the operator was adjusting the seat, he inadvertently contacted the far left control on the control panel (Photo1), which controlled the swing of the boom. The boom swung toward the house and struck the victim, still standing in the ditch, and pinned him

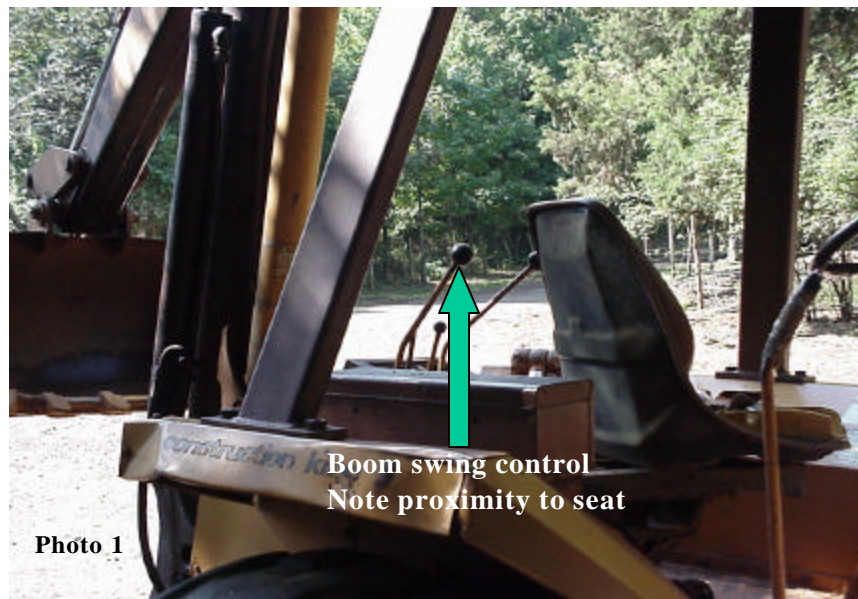


Photo 1

Photo 1: Boom swing control location on Backhoe

against the front wall of the house (Photo 2). The operator immediately swung the boom away from the victim and ran to his aid while yelling to a resident across the street to call 911. The operator removed the victim from the ditch. He could not detect any vital signs and initiated cardiopulmonary resuscitation (CPR). When the Emergency Medical Service arrived, the operator moved the machine to the other side



Photo 2: Location of the victim

of the street to give the EMS personnel sufficient room to assist the victim. EMS personnel summoned personnel from the Medical Examiner's office who pronounced the victim dead at the scene.

The distance between the left fender and the seat was approximately 10 inches. Anyone entering the cab from the left side would have their path obstructed by the parking brake and the boom swing control on the far left side of the control panel. The distance from the front of the seat to the boom swing control was approximately 11 inches. The seat moved freely right to left to right but had to be lifted to move it front to back. When operated by the owner, it was found that the boom swing control did not actuate the boom until the control had traveled approximately 1½ inches. It is possible that as the operator leaned over to adjust the seat, he leaned against the boom swing control sufficiently to actuate the boom, causing it to swing toward the house, allowing the bucket to strike the victim.

CAUSE OF DEATH

The Medical Examiner listed the cause of death as head and chest trauma.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Employers should provide all workers with training in the recognition and avoidance of unsafe conditions and in required safe work practices that apply to their work environments.

Discussion: According to 29 CFR 1926.21 (b)(2)¹, "the employer shall instruct each employee in the recognition and avoidance of unsafe conditions and the regulations applicable to their work environment to control or eliminate any hazards or other exposure to injury or illness." In this incident, the victim may have failed to recognize the hazards present while he stood in the ditch

within the swing radius of the backhoe's boom. Training in hazard recognition, control, and avoidance may have helped the crew recognize that hazard before they began work. They could then have established safe work distances outside the swing radius of the machine's boom and applied those distances during the duration of the job.

Recommendation #2: Employers should ensure that equipment operators have been trained in the proper use of the equipment they are assigned to operate at the job site in accordance with manufacturers' specifications and recommendations.

Discussion: The machine operator stated during OSHA interviews that, although he had received training in the operation of the machine's controls, he had never received training in the manufacturer's recommendations for safe operation of the machine. The owner's manual for the machine was not present at the incident site; however, the owner had a copy at the company maintenance shop. The manual contained a list of manufacturer recommendations for safe operation of the machine. The list included but was not limited to the following:

- Stop engine before dismounting
- Warn all personnel who may be servicing or in the path of the machine before starting
- When you enter or exit the machine, always face the machine and use the handrail and steps
- Before you move the backhoe boom to either side, make sure that all persons are out of the way

Employers should convey to workers that failure to observe these precautions could result in injury or death. Machine operators should always be trained to follow manufacturers' specifications and recommendations for the safe operation of machinery.

Recommendation #3: Employers should ensure that all machine controls are properly identified and that manufacturers' safety features are operable.

Discussion: The controls for the arm and bucket and swing were unmarked. Although not a factor in this incident, the seatbelt for the machine was also missing. The owner stated that the seatbelt was missing when he purchased the machine 8 years earlier. As stated in the owner's manual, all safety decals on controls should be replaced when missing and the seatbelt should be in operable condition. 29CFR. 1926.602 (a) (1) requires operator seatbelts for this type of machinery.²

Recommendation #4: Employers should ensure that required personal protective equipment is provided and used.



Discussion: The victim was working in an area adjacent to an operating backhoe where the danger of head injury by impact existed. 29 CFR 1926.100 (a) requires that a protective helmet be worn where there is possible danger of a head injury by impact.³ Although there was a side impact in this incident, a protective helmet may have lessened the impact when the backhoe bucket struck the victim.

REFERENCES

Code of Federal Regulations 29 CFR 1926.21(b)(2), 2000 edition. U.S. Government Printing Office, Office of the Federal Register, Washington, D.C.

Code of Federal Regulations 29 CFR. 1926.602 (a) (1) 2000 edition. U.S. Government Printing Office, Office of the Federal Register, Washington, D.C.

Code of Federal Regulations 29 CFR. 1926.100 (a) 2000 edition. U.S. Government Printing Office, Office of the Federal Register, Washington, D.C.

INVESTIGATOR INFORMATION

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