

SUBJECT: A concrete saw operator was killed when he was pinned between the boom and the rear of a backhoe.

SUMMARY

A 56-year old concrete saw operator died on December 31, 2003, from asphyxiation and compression injuries received when he was pinned between the boom and the rear end of a backhoe. The decedent was working alone at a roadway construction site. He was working in the late evening and early morning hours to finish saw cutting newly poured concrete. The decedent was using a rubber-tired front-end loader and backhoe for lighting and to transport the concrete saws to the maintenance building. The backhoe, which did not have a boom swing lock pin installed, was left running to maintain a charged battery. After completing the work, the victim laid a handheld portable concrete saw on the floor of the backhoe through the opening in the rear. The saw was placed on the right boom swing pedal, causing the boom to swing to the side, pinning the victim between the boom arm and the rear of the backhoe. The decedent was found later that morning by the superintendent and pronounced dead at a local hospital.

Oklahoma Fatality Assessment and Control Evaluation (OKFACE) investigators concluded that to prevent similar occurrences, employers should:

- Ensure that machine guarding is in place, and that any additional safeguards needed to eliminate hazards are utilized prior to equipment operation.
- Ensure that all employees receive documented training on existing and potential hazards on or around mobile and stationary equipment.
- Ensure that special work procedures are in place for all employees working alone, including training on any unique hazards that exist.
- Review modifications or additions to equipment with the manufacturer and obtain authorization from the manufacturer prior to alteration.

INTRODUCTION

A 56-year old concrete saw operator employed by a construction contracting company died on December 31, 2003, from asphyxiation and compression injuries received when he was pinned between the boom arm and the rear end of a backhoe (Figure 1). OKFACE investigators reviewed the death certificate and reports from the Occupational Safety and Health Administration (OSHA), the Medical Examiner, the investigating police officer, and emergency medical services (EMS). An incident site visit and an interview with a company official at the home office were conducted on March 17, 2004.



Figure 1. Backhoe model involved in incident

The contracting company that employed the decedent had been in business for 18 years and, at the time of the incident, employed 65 people. The decedent had worked for the company for five years and had five years of experience as a concrete saw operator. However, he had not been trained on the backhoe's operator's manual or on safe operating procedures, since it was not a part of his normal work duties. When the incident occurred, the victim had worked all day and into the early morning hours in order to complete saw cuts in concrete poured that afternoon.

The company had a management safety and health committee and a written comprehensive safety and health program in place. Also, there were machine-specific safe operating instructions for all equipment used. Training for specific tasks was completed through on-the-job training and equipment manufacturer and company videos. Employees were required to attend weekly safety meetings. Machinery operators were required to be tested for proficiency before they were allowed to operate company equipment.

INVESTIGATION

At the time of the incident, the ground was dry and the temperature was approximately 34 degrees Fahrenheit. The decedent was working into the early morning hours on a level surface of concrete that had been poured the previous afternoon. The decedent was assigned the task of sawing the concrete road surface and was allowed to use a rubber-tired front-end loader and backhoe for lighting and transport of two concrete saws. The backhoe, which was left running to maintain a charged battery, was missing the operator's manual, the boom lock pin, and the swing lock pin. With the engine running, the hydraulic system remained active to the boom and could not be disabled. Installation of the boom swing lock pin and boom lock pin were necessary to prevent movement of the boom. The decedent, who was last seen alive around 2:30 a.m. by a co-worker leaving the site, continued working alone.

Sometime between 2:30 a.m. and 6:30 a.m., the decedent finished sawing the concrete and began to load the backhoe with his tools. From the rear of the backhoe, he proceeded to lay the handheld portable concrete saw on the floor of the cab. The saw was placed on top of the right boom swing foot pedal. With the engine running and the boom swing lock pin not installed, the boom was activated and free to move. The boom swung to the right and crushed the victim between it and the rear of the backhoe. With no witnesses to the incident, the decedent was pinned for an undetermined amount of time. The superintendent, who arrived to work around 6:30 a.m., found the victim.

The decedent was found in a standing position pinned between the boom arm and the back of the vehicle. The superintendent contacted the police, and three officers responded immediately. CPR was initiated and administered until EMS personnel arrived. The victim was transported to a local hospital where he was pronounced dead 35 minutes after being found.

During the investigation, it was determined that the backhoe's factory equipped foot pedal controls had been modified to accommodate an additional set of hand lever controls. When this process was performed, the foot controls were still present and operable; however, the original foot controls became easier to press down than before the installation. With nothing to keep an employee from placing equipment into the operator compartment through the

openings on either side of the boom, it remained very easy to actuate the foot pedals with the weight of the equipment or materials.

CAUSE OF DEATH

The Medical Examiner listed the cause of death as asphyxiation due to a compression injury.

RECOMMENDATIONS

Recommendation #1: Employers should ensure that machine guarding is in place, and that any additional safeguards needed to eliminate hazards are utilized prior to equipment operation.

Discussion: The equipment in use at the time of the incident was not equipped with the required lock pins, which would have kept the boom arm from swinging. The model-specific operator's manual specifies to install boom and swing lock pins when use of the backhoe boom is complete. Furthermore, removal, installation, and storage procedures for the pins are outlined in the manual.

Recommendation #2: Employers should ensure that all employees receive documented training on existing and potential hazards on or around mobile and stationary equipment.

Discussion: Utilization of manufacturer's specification manuals and operator's manuals can help to identify hazards that exist around equipment. Also a competent person, defined by OSHA as knowledgeable and experienced in the use of the equipment and the hazards that can be produced, could evaluate the equipment, site, or processes to determine the need for additional hazard controls. Employees should be properly trained on all equipment they operate, and all training should be documented and kept on file with the company.

Recommendation #3: Employers should ensure that special work procedures are in place for all employees working alone, including training on any unique hazards that exist.

Discussion: It is the company's responsibility to provide procedures and training on any specific hazards to which the employee might be exposed. This training might include special procedures for use of equipment when working alone, or when working at a time or place when very few other individuals will be present or in the general vicinity.

Recommendation #4: Employers should review modifications or additions to equipment with the manufacturer and obtain authorization from the manufacturer prior to alteration.

Discussion: It is important to consult with manufacturers prior to making equipment modifications in order to anticipate potential hazards and possible additional safeguards. Some hazards, such as the foot pedals becoming easier to depress with hand lever installation, are known and can be controlled prior to use. All upgrades or alterations should be authorized by the manufacturer and should meet all mandatory safety guidelines established for the upgrading or alteration.

REFERENCES

- 29 CFR 1926.602 *Earthmoving Equipment*, Occupational Safety and Health Administration
- Association of Equipment Manufacturer's Safety Manual, *Backhoe/Loader*, 1989.1
- Equipment specific operator's manual.
- *Operating Techniques for the Tractor, Loader, & Backhoe*, Ober Publishing, Northridge, California.
- 29 CFR 1910.211-.219 *Machine(ry) Guarding*, Occupational Safety and Health Administration

The Oklahoma Fatality Assessment and Control Evaluation (OKFACE) is an occupational fatality surveillance project to determine the epidemiology of all fatal work-related injuries and identify and recommend prevention strategies. FACE is a research program of the National Institute for Occupational Safety and Health (NIOSH), Division of Safety Research.

These fatality investigations serve to prevent fatal work-related 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 injury, and the role of management in controlling how these factors interact.

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