OR-FACE
OREGON FATALITY ASSESSMENT AND CONTROL EVALUATION
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Center for Research on Occupational & Environmental Toxicology
OHSU OREGON HEALTH & SCIENCE UNIVERSITY
Fatality Investigation Report
OR 2007-17-1

Highway worker crushed by swinging backhoe boom

SUMMARY

On July 1, 2007, a 47-year-old road construction worker was killed while working on the ground alongside a backhoe. The worker was a journeyman equipment operator working together with an apprentice, who operated the backhoe. The two road workers were preparing to pull pins from concrete barricades along the roadside, so they could be moved. The journeyman had been on the job with this company only 2 days, and the two workers had never worked together before. The journeyman retrieved two heavy steel pin pullers and a chain from the front loader bucket and walked to the rear of the backhoe, where he tossed one of the pin pullers into the cab. The pin puller fell on a foot pedal that controlled the backhoe boom swing, and the boom instantly swung sideways and crushed the journeyman operator against the raised rear stabilizer. The apprentice operator heard the journeyman yell and swiveled to the rear, where he saw the heavy pin on top of the foot-pedal control. He swung the boom back to its neutral position to free the journeyman and called for emergency help. The victim was pronounced dead at the scene.

The construction worker was crushed at the pinch point on the backhoe between the rear boom arm and the raised stabilizer.

CAUSE OF DEATH: Crushing chest trauma

RECOMMENDATIONS

- **Workers on the ground near an operating backhoe must never stand in the pinch point of the backhoe boom.**
- **Foot-pedal controls on a backhoe should have a guard or other disabling mechanism to prevent accidental activation of the boom when not in use.**
- **Employers must regularly reinforce safety training, even with experienced workers, and make sure safety materials and equipment operator instructions are reviewed for each specific machine used by a worker.**

INTRODUCTION

On July 1, 2007, a 47-year-old journeyman road equipment operator, working on the ground beside a backhoe, was killed when the boom arm of the backhoe swung and crushed him against the raised rear stabilizer. OR FACE was notified of the incident on July 2, 2007. An OR-FACE investigator interviewed the employer on August 15, 2007. This report is based on information from OR-FACE interviews, investigation reports by the state police and Oregon OSHA, the medical examiner, report, and news media.

The employer was a highway paving contractor that worked on projects throughout the Pacific Northwest. The firm employed 60 Oregon union workers, with 20 at the jobsite where this incident occurred. The firm hired apprentice and journeyman workers, and relied on the union to qualify and provide training for equipment operators.

The employer had a comprehensive generic safety and health policy, which included job descriptions with job safety analyses. The job information instructed that no one should be allowed in hazard areas, but did not specify the pinch point between the backhoe's boom and the stabilizer as a hazard area. A warning label was visible on the back of the backhoe, however, bearing a graphic image and the message: STAY CLEAR OF THIS AREA WHEN MACHINE IS OPERATING. YOU CAN BE CRUSHED BY SWINGING BOOM.

The firm had a safety committee and held regular meetings. New employees received a safety vest and hard hat, a tour of the jobsite, showing the locations of first-aid kits and fire extinguishers, and a review of job responsibilities.

The journeyman equipment operator, hired through the local union hall, had worked only two days with the paving contractor prior to the incident. Safety training and certification was conducted through the union. The operator was exempted from the union training program, because he had 3 years of experience as a journeyman excavation equipment operator with his previous employer.

INVESTIGATION

The two construction workers were part of a night crew preparing to repave the road, and were assigned to move temporary concrete road barriers using a backhoe. The journeyman had worked on the highway job for two nights with a different equipment operator moving barriers, and was back at work after the weekend. The two workers had never worked together before, and were on the first half hour of their night-time shift, starting about 9:00 p.m. It was just dark and the backhoe lights were illuminated. Weather was clear, with mild temperatures and no rain.

The journeyman equipment operator worked on the ground outside the backhoe, while the apprentice operated the backhoe inside the cab. The first task involved removing the coupling pins that secured the barricades, using heavy steel pin pullers (18 in. long, 35 lbs.) attached by a

chain to the backhoe arm. The journeyman retrieved two heavy steel pin pullers and a chain from the backhoe's front loader bucket, and walked toward the rear arm to attach the assembly for use. He told the apprentice backhoe operator he could lower the loader bucket to the ground, and the operator faced the forward controls to lower the bucket.

At the rear, the backhoe excavator arm was fully retracted and the stabilizer arms were not yet lowered into place. As the journeyman walked along the left side of the backhoe, he tossed one of the pin pullers and a large lag bolt onto the floor of the cab. The pin landed on the foot pedal that controlled the boom swing, and the boom instantly swung sideways and crushed the journeyman operator against the raised rear stabilizer.

The foot-pedal control for the backhoe boom was unguarded.

The apprentice operator felt a bump and heard the journeyman yell, and swiveled to the rear, where he saw the heavy pin on top of the foot-pedal control. He swung the boom back to its neutral position to free the journeyman and called for emergency help with the assistance of a truck driver who stopped. The victim was pronounced dead at the scene.

RECOMMENDATIONS/DISCUSSION

Recommendation #1. Workers on the ground near an operating backhoe must never stand in the pinch point of the backhoe boom.

Stay away from an operating backhoe. A swinging backhoe boom is a common source of injury (see references for other state FACE reports of similar incidents). To avoid the hazard, the operator must always shut down the machine and secure the attachments before exiting the cab. Never put the machine in idle to exit. Workers on the ground must not approach within reach of a backhoe excavator or loader until they signal the operator to shut down the machine and receive acknowledgment from the operator. Backhoe operators must ensure that no one is on the ground within the working area of the machine.

Recommendation #2. Foot-pedal controls on a backhoe should have a guard or other disabling mechanism to prevent accidental activation of the boom when not in use.

Unintentional activation of the boom foot pedal on a backhoe is a serious risk, either by the operator stepping on the pedal, or as in this instance by a person outside the machine reaching in or placing a heavy object in the cab that inadvertently depresses the foot pedal. This incident emphasizes the general rule that a backhoe cab should never be used for storing equipment, even temporarily.

In 2004, one heavy equipment manufacturer recognized the hazard posed by the foot-pedal control on older backhoe models and issued a safety notice to product owners, announcing that guards must be installed over the foot pedals, and that a dealer would install the guard without charge. At least 23 substantially similar incidents of injury or death due to activation of the backhoe boom-swing foot pedal, nearly all since 2000, were documented in many different states for this one manufacturer (the memo is archived in the Oregon OSHA investigation file for this incident).

Only specific backhoe models are equipped with foot-pedal controls, and since 2000, those models are switching to a joystick or other hand control for the boom to avoid the risk of unintentional activation of the equipment by the foot pedal. The foot pedal, however, remains an option on new backhoes.

Occupational safety regulations for foot-pedal controls on mechanical power presses and other specific industrial machines require a guard – e.g., "The pedal mechanism shall be protected to prevent unintended operation from falling or moving objects or by accidental stepping onto the pedal" (1910.217(b)(4)(i)). Yet no similar rule applies to foot-pedal controls on a backhoe, and no standard guard or retrofit guard kit is available for backhoes. In view of the manufacturer's initiative noted above, the design of a suitable guard is feasible.

Manufacturers and government regulators should consider requiring the use of foot-pedal guards or some other method to disable the foot-pedal control on the backhoe boom when not in use. A boom-swing lock pin is currently available to secure the boom during travel, but the pin is not a useful alternative to a guard, because it is not intended to be used during work activities. In this incident, for example, the boom was part of the operation and was unlocked in preparation for use. This incident emphasizes the need to develop a guard or disabling mechanism for backhoe foot pedals, in addition to the locking pin. Similar to foot controls in other industrial machines, occupational safety regulations could require a guard or other disabling mechanism on all backhoe foot-pedal controls.

Recommendation #3. Employers must regularly reinforce safety training, even with experienced workers, and make sure safety materials and equipment operator instructions are reviewed for each specific machine used by a worker.

Employers are responsible for safety training, even for employees dispatched from a union or other agency that provides separate training. This incident highlights the need to extend refresher training even to experienced workers. An employer should not assume that workers dispatched from a union are adequately trained in safety procedures for a specific worksite. In particular, all workers must be trained on the controls and hazards associated with each specific machine they use.

Information on pinch point and boom swing hazards around heavy equipment should be included in written safety policies and in worker orientation training. Also, workers should review the manufacturer's operating manual prior to using a new machine. As this incident demonstrates, even experienced workers can benefit from a careful review of safety materials before working in a new location or with a specific new machine.

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