

MARYLAND DIVISION OF LABOR AND INDUSTRY

MARYLAND FACE PROGRAM

CASE: 94MD063

DATE: September 2, 2005

TO: Project Officer, State FACE Project, Division of Safety Research, NIOSH, CDC

FROM: Maryland FACE Program, Division Labor & Industry

SUBJECT: Construction Foreman Crushed by Excavator--Maryland

SUMMARY

A 47-year-old male construction foreman (the victim) was crushed by the crawler treads of an excavator that was moving into position to dig a trench across a two lane road. The victim had given directions to the operator regarding placement of the excavator. After speaking with the operator, the victim walked around to the opposite corner of the excavator. The victim, facing away from the excavator, leaned over to move an orange safety cone. The west track of the excavator caught the victim's leg and he fell to the ground face first into the path of the excavator. A witness ran toward the operator shouting to stop the machine and move backward off the victim. Another member of the crew radioed the company to notify 911. Paramedics arrived within minutes of the call. The victim was flown by helicopter to the University of Maryland Shock Trauma Center where he died from his injuries approximately 45 minutes after the incident.

The Maryland FACE investigator suggests that to prevent similar incidents:

- *Employers should ensure that employees are instructed to stand clear of heavy equipment that is maneuvering in a work zone.
- *Employers should ensure that heavy equipment operators who must maneuver equipment with limited visibility in the direction of travel utilize an employee to signal the operator from a safe distance.
- *Employers should ensure that heavy equipment operators make every effort to establish a clear view in the direction of travel before maneuvering a piece of equipment.
- *Heavy equipment and other vehicles should be, when feasible, equipped with devices for visualizing or sensing the presence of humans or obstacles that are in the path of travel.

INTRODUCTION

On October 26, 1994 a 47-year-old male construction foreman was crushed by the crawler treads of a 75,000 pound excavator. Maryland Occupational Safety and Health (MOSH) officials notified the FACE investigator several hours after the event to conduct an investigation. On November 15, 1994 the employer was interviewed and a visit was made to the incident site. The Medical Examiner's report, the police report, the excavator manufacturer's product information, and the MOSH inspector's case file and photographs were reviewed during the investigation.

The employer was involved in heavy construction of roadways, bridges and utilities for over 50 years and employed more than 300 people. Twenty-three employees had the job title of foreman. Seven people were at the site when the incident occurred. The victim had been employed in the construction industry for most of his working life and had worked for this employer for 8 years. The company employed a full-time safety director and had a written safety policy. Special training on heavy equipment operation, that included heavy equipment backing, was provided annually for all foremen and heavy equipment operators. Toolbox meetings on pertinent subjects were held for all employees on a weekly basis. At the time of the incident, it had been three years since the company had experienced a fatality.

INVESTIGATION

The company was making additions to existent sewer lines for new home construction. The excavator was being used to dig a trench across a two lane road. During the excavation traffic was to be routed around the work zone under flagman control. On the south side of the road was an unimproved shoulder. A light pole was positioned 13 feet from the south edge of the pavement and 5 feet from the plane defined by the closest edge of the trench. The operator was to position the excavator close to the light pole to begin digging the trench.

The operator moved the excavator from an overnight parking place to the location of the day's planned work. The operator exited the cab to join the foreman on the ground. The foreman gave the operator directions regarding placement of the machine. The operator returned to the operator's station and turned the undercarriage so the direction of travel would be north to south, leaving the upper structure and the operator's station facing east. The operator began to walk the excavator south, toward the shoulder of the road.

Meanwhile, the foreman had walked around the south end of the excavator and was moving a cone near the path of the west crawler track. The victim was witnessed leaning over to move a cone

with his back to the machine. As he did this his left leg came off the ground to help him balance. His left foot was caught by the track, knocking him to the ground. As the excavator moved forward it rolled over the body of the victim crushing him from the feet to the level of his chest.

A truck driver for the company witnessed the event. He ran immediately toward the machine to alert the operator that the victim had been struck and to back the machine off of the victim. The flagman at the south end of the incident site also witnessed the victim stepping into the path of the excavator. Witnesses reported that the excavator moved only a few feet before it struck the victim.

According to the witnesses, the excavator was equipped with an omni-directional alarm that was audible when the incident occurred. The machine was new, having logged fewer than 100 hours of operation. All of the controls were reportedly functional and the windows of the operator's station were free of cracks or other impediments to the operator's vision. The upper structure was equipped with parabolic mirrors on the cab (right) and the frame (left). The position and configuration of the upper-structure and the position of the boom probably obstructed the operator's view of the track that struck the victim.

One of the witnesses went to the victim and attempted to comfort him. Other crew members drove a company vehicle to the top of a nearby rise to get better radio reception in order to notify the office and call 911 to request emergency medical services. A county paramedic unit and a state police helicopter responded to the scene within minutes of receiving the call. The victim was flown by helicopter to the Shock Trauma Center where he died from his injuries approximately one hour after the injury occurred.

CAUSE OF DEATH

The Office of the Chief Medical Examiner determined the cause of death to be multiple injuries.

RECOMMENDATIONS/DISCUSSION

Recommendation #1:Employers should ensure that employees are instructed to stand clear of heavy equipment that is maneuvering in a work zone.

Discussion: The individuals on the job site where the incident occurred were familiar with the safe operating procedures for heavy equipment. In this case the victim may have misjudged the distance between he and the excavator and inadvertently stepped into the path of the machine.

Recommendation #2:Employers should ensure that heavy equipment

operators who must maneuver equipment with limited visibility in the direction of travel utilize an employee to signal the operator from a safe distance.

Discussion: In this case, the machine's anticipated path of travel was a short distance. Other than a readily visible light post, no hazards or obstacles had been identified in the intended path of the machine. Given these facts, designating an employee to signal the operator may have seemed to be a redundant measure. This incident illustrates the potential utility of redundant safety measures being employed to provide an additional layer of safeguards.

Recommendation #3:Employers should ensure that heavy equipment operators make every effort to establish an unobstructed view in the direction of travel before maneuvering a piece of equipment.

Discussion: The operator had maneuvered the excavator to a position near the point where the excavation was to be performed. The operator then spun the undercarriage before walking the machine south several feet to the first position to begin excavating. The upper-structure remained in position facing east. To maneuver the excavator so the direction of travel would be clearly visualized may have required several extra moves and additional time.

Recommendation #4:Heavy equipment and other vehicles should be, when feasible, equipped with mirrors or other technology for visualizing or sensing the presence of humans or obstacles that are in the path of travel.

The excavator involved in this incident had an upper structure that could revolve 360 degrees. The configuration of the upper structure may have resulted in obstructed views from the cab. Although the upper structure was equipped with two mirrors the operator's view was probably limited by blind spots in the direction of travel. Devices such as strategically placed parabolic mirrors could provide views of the blind spots present when the upper-structure is in different positions.

A system utilizing an electronic sensing device with an alarm in the cab may be able to provide a warning to the operator of obstacles in the path of the machine. Or, closed circuit television systems are available which might be adapted to heavy equipment to provide a view in the direction of travel. These measures would need to be evaluated for their ability to withstand the stresses imposed by the work of the heavy equipment.