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PUBLIC HEALTH SERVICE/CDC/NIOSH/DSR
FACE 98-06

TO: **Director, National Institute for Occupational Safety and Health**

FROM: **Division of Safety Research, NIOSH**

SUBJECT: **Construction Laborer Dies After Being Run Over by Asphalt Roller at Highway Construction Site -- Virginia**

SUMMARY

On October 23, 1997, a 37-year-old male construction laborer (the victim) died after being run over by an asphalt roller during a highway paving operation. A seven-person crew was engaged in paving the westbound lanes of a four-lane U.S. highway. At the time of the incident, the crew was paving the right lane and traffic was moving in the left lane. The victim was assigned to walk back and forth along the highway, checking the traffic cones positioned along the dotted lines at the center of the highway to ensure they were standing upright, and ensuring that the construction-zone warning signs remained standing. As the foreman of the crew operated the paving machine, the asphalt roller followed behind to smooth the newly laid asphalt. The roller operator was transporting another employee, who was standing at the front of the machine, leaning against the roll bar and looking backward. The operator made a forward pass with the roller, stopped the machine, then put it in reverse gear. The machine had traveled approximately 10 feet when the operator sensed that something was wrong; at the same time, the rider alerted the operator to stop the roller. The victim was discovered lying face down with his arms at his sides, his head crushed by the roller. The foreman radioed emergency personnel. A local fire department responded within 15 minutes, followed by a rescue squad and the state police. The victim was pronounced dead at the scene. NIOSH investigators concluded that, in order to prevent similar incidents, employers should:

- *ensure that equipment operators are trained to check work areas for the presence of pedestrians in the machine's path before changing the direction of travel*

- *ensure that passengers are not permitted to ride on rollers or similar mobile equipment.*

Additionally, manufacturers should:

- *consider equipping machines such as rollers, that must change direction frequently, with sensors to detect the presence of persons in the machine's path.*

INTRODUCTION

On October 23, 1997, a 37-year-old male construction laborer (the victim) died after being run over by an asphalt roller during a highway paving operation. On October 28, 1997, officials of the Virginia Occupational Safety and Health Administration (VOSH) notified the Division of Safety Research (DSR) of the incident and requested technical assistance. On November 17, 1997, DSR investigators reviewed the incident with the VOSH compliance officer assigned to the case. The following day, they visited the incident site and company offices and interviewed the crew foreman. Photographs and measurements of the roller were taken.

The employer was a construction contractor specializing in asphalt manufacturing and paving. In business since 1986, the company employed 50 to 60 workers year round, adding approximately 75 more workers during the peak summer months. The employer communicated safety information via weekly toolbox meetings, instructional videos, and formal and on-the-job training provided through the Virginia Road Builders' Association. Workers assigned to traffic control and flagging duties received additional training through the Virginia Department of Transportation (VDOT).

Company crews worked a single 10-hour shift, 5 days a week. The fatality occurred on Thursday of the victim's second week of work. He had no previous experience doing construction work, but the company had planned to send him to VDOT training for traffic control personnel. This was the company's first fatality.

INVESTIGATION

The employer had been contracted to pave an 8-mile westbound stretch of four-lane U.S. highway. At the time of the incident, the crew was paving the right lane as traffic moved in the left lane. The seven-person crew, consisting of a paver operator (the foreman), a roller operator, two screed operators, a distributor operator, and two traffic control workers (one of whom was the victim) began work late on the day of the incident because of cold weather. This was the victim's second day of work with this particular crew. The roller operator had 27 years of experience operating this type of equipment, and had worked for this employer for the past 2 years.

The machine involved in the incident was a 1996 Model DD-110 Ingersoll Rand swivel-seat bi-directional roller purchased new by the company in March, 1997. The roller was 18½-feet long and 6½-feet wide. The operator's seat was approximately 8 feet above the ground, and the distance from the operator's seat to the front of the roller was 13 feet. The roller was equipped with a rollover protective structure (ROPS) at the front, and had triangular orange slow-moving-vehicle signs affixed to the metal plates at the front and back. The two roller drums were 4½ feet in diameter.

At approximately 10 a.m., the state project inspector informed the foreman that work could begin. The foreman radioed the asphalt plant, located at the company offices about 15 miles away, to request that the first truckload of asphalt be transported. The truck arrived about 10:30 a.m. The crew laid the first and second loads of asphalt, and as they were waiting for the third load, the foreman observed the victim traveling eastbound in the company truck checking on the signs and traffic cones.

At the time of the incident, 11:30 a.m., the roller operator was smoothing out minor impressions in the newly paved right lane. The operator's seat was positioned at the right of the machine, facing the center. Another crew member, a traffic control worker, was standing on the roller, leaning against the ROPS and looking toward the back of the machine. The roller was positioned at approximately a 30-degree angle to the traffic lane, with the front of the machine angled to the left. The operator completed a forward pass, stopped the machine, then reversed the machine. He had traveled about 10 feet when he felt a bump; at the same time, the rider yelled for him to stop. The victim was discovered face down with his arms to his sides, in line with the orientation of the roller. The foreman radioed emergency personnel. A local fire department responded within 15 minutes, followed by a rescue squad and the state police. The victim was pronounced dead at the scene.

A passing motorist who witnessed a portion of the incident told state police she saw the victim's right shoe get caught by the left side of the metal plate that ran across the back of the machine. She stated that he was on his back, then raised himself to a sitting position. She last observed him pushing against the metal plate.

CAUSE OF DEATH

The autopsy report indicated that the cause of death was a crushed skull.

RECOMMENDATIONS

Recommendation #1: Employers should ensure that equipment operators are trained to check work areas for the presence of pedestrians in the machine's path before changing the direction of travel.

Discussion: ANSI A10.17-1997 3.3.3 states that operators of bi-directional, self-propelled vehicles should ensure that the travel area is free of foreign material, personnel, and vehicles before moving or changing direction. This machine offered the operator an unobstructed view in both directions and was equipped with an operable horn as specified in 29 CFR 1926.602(a)(9)(i), which applies to bidirectional machines, including rollers. Had the presence of the victim been detected, the operator could have sounded the horn as a warning and may have been able to stop the machine in time to prevent the incident.

Recommendation #2: Employers should ensure that passengers are not permitted to ride on rollers or similar mobile equipment.

Discussion: The crew foreman stated that company policy prohibited riders on the roller during compacting, but that occasionally a rider was allowed when the crew was moving to a different area of the jobsite. In this incident, the standing passenger did not obstruct the roller operator's view to the rear of the machine, but he would have blocked the operator's view to the left front. Further, his presence on the roller was a potential distraction for the operator. The situation placed the passenger at risk of falling from the machine since he had to ride in a standing position and was not restrained. Given the location of the victim, it is unlikely the passenger directly prevented the operator from seeing the victim, but the possibility that his presence diverted the operator's attention cannot be dismissed. No OSHA construction industry standard addresses this issue, but there is an OSHA logging standard that states that no employee other than the operator is permitted to ride on a mobile machine unless seating, seat belts, and other protections equivalent to those afforded the operator are provided for the rider [29 CFR 1910.266(f)(2)(viii)].

Recommendation #3: Manufacturers should consider equipping machines such as rollers, that must change direction frequently, with sensors to detect the presence of persons in the machine's path.

Discussion: Earthmoving or compacting equipment which has an obstructed view to the rear is required by 29 CFR 1926.602(a)(9)(ii) to be equipped with a back-up alarm. However, this regulation did not apply to the roller involved in this

incident since the view was not obstructed. For this situation, motion sensors or object detectors may more effectively prevent runover injuries. This machine was operated in forward and reverse gear with equal frequency, and the machine changed direction so often that workers in the vicinity would likely become desensitized to a back-up alarm. Further, backup alarms alert pedestrians only when the machine is in reverse gear, and depend on pedestrians' ability to remove themselves from danger.

Motion sensors in the front and rear of a machine would warn the operator when a pedestrian or object is within a certain distance in either direction, and are not dependent on the pedestrian seeing the machine. The warning sound generated by the sensors should be audible to both the machine operator and to pedestrians; the operator could also receive a visual warning on the control panel. The motion sensors would be triggered only when a pedestrian was in the machine's path, so it is less likely that the audible warning would be perceived as nuisance background noise with the potential to be ignored by machine operators and pedestrians.

In this incident, it appears that the victim may have been trying to remove himself from the roller's path. Had the machine been equipped with motion sensors, the machine operator may have been able to stop the roller before it struck the victim.

References

1. American National Standards Institute (ANSI). *American National Standard for Construction and Demolition Operation — Safe Operating Practices for Hot Mix Asphalt (HMA) Construction* (ANSI A10.17-1997).

2. Code of Federal Regulations 29 CFR 1926. Washington, DC: U.S. Government Printing Office, Office of the Federal Register.

3. Code of Federal Regulations 29 CFR 1910. Washington, DC: U.S. Government Printing Office, Office of the Federal Register.

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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 a participating State reports an occupational fatality and requests technical assistance. The goal of these evaluations is to prevent fatal work injuries in the future by studying the working 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.

States participating in this study: North Carolina, Pennsylvania, South Carolina, Tennessee, and Virginia.

Additional information regarding this report is available from:

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