TO: Director, National Institute for Occupational Safety and Health

FROM: Iowa FACE Program

SUBJECT: Asphalt machine runs over and kills worker -- Iowa.

SUMMARY

In the summer of 1996, a 35-year-old construction worker, who had been on the job only four days, died after being run over by an asphalt road-widening machine when it ran backwards over him. The man was part of a 9-man crew who were widening a state highway. The victim's job was to walk to the side and rear of the road widener, visually adjusting the machine's side-mounted spreader arm. The road-widening crew normally lays down two layers of asphalt: the machine moves slowly forward applying the first layer, then must back up to lay the second layer. After the first layer was applied, the victim apparently jumped on the machine as it was backing up, slipped off and was run over by the right front tire. Fresh asphalt on the bottom of his boots may have contributed to his fall. The machine weighed 40 tons and amputated his left leg and injured his hemipelvis. The man was flown to a regional hospital and had major complications of significant internal bleeding and cardiac arrest, and died nine days later.

RECOMMENDATIONS based on our investigation are as follows:

1. Heavy equipment operators must always remain aware of the location of workers around their machines.
2. Operators must not permit riders on industrial equipment or vehicles that are not designed for passengers.
3. Employees working in heat stress environments should be given a period of acclimatization and be scheduled for work periods and rest breaks in accordance with recognized standards (ACGIH and NIOSH).
4. Workers who are not fit for duty due to illness or fatigue should not be assigned to hazardous tasks.

INTRODUCTION

In August 1996, a 35-year-old worker for a road construction company died from complications after being run over by an asphalt road-widening machine. The Iowa FACE program became aware of the incident from the State Medical Examiner's office and began an investigation. The asphalt road-widening machine was being used in various locations around the state, therefore a site visit from the Iowa FACE investigator was delayed until early winter at company headquarters where the machine was stored. The company safety director was interviewed and several photographs of the machine were taken.

The employer is a construction company that specializes in highway construction, paving, and re-surfacing. The company has been in business for 50 years and employs over 450 employees during the peak of construction in summer months. There were nine men working on this asphalt paving crew when the accident occurred. The victim working on the ground and the

machine driver were operating the road-widening machine.

The safety program for this company was comprehensive and included seasonal safety seminars for groups of workers, drivers, and machine operators. On-site meetings were held prior to the start of any new construction project. Weekly safety talks were specific for each crew, covering a variety of topics, and employees were required to sign-in attendance at these meetings. Written procedures existed for each job duty and new employees were given specific instructions regarding any equipment they would be operating, including safety guidelines. One universal company policy was that employees were never to ride equipment unless it is designed for passengers. This was the victim's fourth day on the job, and he had not received complete formal company training. He did receive on-the-job training including safety precautions concerning his specific duties. In addition, the machine operator states he told the victim not to ride on the side of the machine, but to climb up on top if he wished to ride. This suggestion apparently contradicts the company's stated policy as the top was not equipped for passengers but was designed with a railing that enclosed the operators platform.

INVESTIGATION

The 9-man crew was working on a state highway, preparing it for repaving. The victim and the driver of the road-widener were working alone laying down a strip of asphalt on the right shoulder of the road. The road-widener is a machine that accepts hot asphalt material by truck on its front side, then distributes it to the left or right side of the machine by adjustable spreader arms.

The victim was the "ground man," who walked beside the machine to adjust the width and height of the asphalt strip according to changing road conditions. The driver of the machine was seated on the top right side. The driver states that he had just finished completion of the first layer of asphalt and yelled to the victim who was to the right and rear of the machine at a safe distance. The operator then put the machine in reverse gear and began to back up the machine, avoiding cones and other barriers on the road. He was looking over his left shoulder while sitting on the right, front driver's seat. The driver did not report visual contact with the victim again until after the injury. The machine had a backup alarm which was operational at the time.

After approximately 100 feet of backward travel, the victim was caught behind the front tire. Since no one observed the actual incident, it was suggested that the worker may have jumped on the outstretched spreader arm on the right side of the machine, slipped and fell under the tire. Although the machine was traveling only a few miles per hour, by the time the driver heard the victim shouting and stopped the machine, it had already run over the victim. The driver moved the machine off the victim and rushed to his aid.

The 40 ton machine amputated the man's left leg below the knee and caused severe tissue damage to his thigh and groin region. The victim was alert while in the ambulance en route to a county hospital and was immediately prepared for flight to a regional hospital. He did not talk about how the accident happened. Shortly after being stabilized at the regional hospital, he suffered massive internal pelvic bleeding, cardiac arrest, and multiple secondary complications

that eventually lead to his death nine days later.

Fresh asphalt on the bottom of the victim's shoes and on the outstretched right-side spreader arm may indicate that he slipped from the arm while the road-widener was backing up. The victim had frequently been walking inside the right arm of the machine making adjustments using an auxilliary control panel mounted on the side of the machine. Normally these adjustments are made by the machine operator, taking verbal directions from the ground man. It is possible that he was attempting to make some adjustments while the machine was backing up. Since the driver was looking over his left shoulder, it is possible he didn't see the victim on the right side of the machine. Crew members reported that the victim was overly-fatigued that day and perhaps not fit for duty. This may have motivated him to jump on board the machine, rather than walk back.

At the time of our investigation, the machine was being modified. The side-mounted auxilliary control panel was being dismantled, and its functions were being wired into a remote control which could be safely actuated by the ground man walking behind the machine. This was done to eliminate the possibility of walking inside the wing trying to make adjustments while the machine was in operation.

CAUSE OF DEATH

The cause of death from the Medical Examiner's report was, *"complications of crush injury to left hemipelvis and left leg".*

RECOMMENDATIONS / DISCUSSION

Recommendation #1 *Heavy equipment operators must always remain aware of the location of workers around their machines.*

Discussion: All vehicle operators must be aware of their surroundings and know where pedestrian workers are located at all times. Equipment should not be placed in motion if workers in the area are not in view and clearly out of harm's way. The machine driver had warned the victim, then backed up in normal fashion, but he did not notice where his co-worker was at the time.

Recommendation #2 *Operators must not permit riders on industrial equipment or vehicles that are not designed for passengers.*

Discussion: Machine operators and employees should be trained to recognize machinery hazards while on the job site, especially the hazard of riding on vehicles that are not equipped for passengers. Supervisors and machine operators must have necessary authority to enforce compliance with company policies. The machine operator reportedly instructed the victim about proper procedures while on the job, however, the fact that he frequently adjusted the machine from inside the side arm indicates safety rules were not always followed.

Recommendation #3 *Employees working in heat stress environments should be given a period of acclimatization and be scheduled for work periods and rest breaks in accordance with recognized standards (ACGIH and NIOSH).*

Discussion: Fatigue and heat stress are common contributors to injuries, illness and death on construction sites. Work conditions should be evaluated and work/rest periods adjusted based on temperature, humidity, clothing to be worn and work load. During the long days on construction sites in summer, new workers should be allowed approximately two weeks in order to become acclimatized to strenuous work in heat and humidity. This may involve more frequent work breaks, time out of the sun, increased water intake, proper clothing, and closer supervision. Fatigue and heat stress probably contributed significantly in this case to the worker's fall under the machine.

Recommendation #4 *Workers who are not fit for duty due to illness or fatigue should not be assigned to hazardous tasks.*

Discussion: Employees indicated that the victim may not have been well rested or fit for work. Placing employees with compromised health into hazardous duty must be avoided. Any worker who has become over fatigued, heat stressed, ill, or injured may compromise the safety of other workers and the public, and should be taken off the job site. The employer should provide adequate supervision to ensure workers are in sufficient health to work safely.

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Fatality Assessment
&
Control Evaluation Program
(FACE)

The University of Iowa, in conjunction with the National Institute for Occupational Safety and Health (NIOSH), is investigating the causes of work-related fatalities in the State of Iowa. FACE is a surveillance program that identifies all occupational fatalities, conducts in-depth, on-site investigations on specific types of fatalities, and makes recommendations for employers and farmers to help prevent similar fatal accidents in the future.

NIOSH funded state-based FACE Programs include: Alaska, California, Colorado, Indiana, Iowa, Kentucky, Maryland, Massachusetts, Minnesota, Missouri, Nebraska, New Jersey, Wisconsin, and Wyoming.

Additional information regarding this report or the Iowa Face Program

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