DATE: November 16, 1995

FROM: Minnesota Fatality Assessment and Control Evaluation (MN FACE) Program Minnesota Department of Health

SUBJECT: MN FACE Investigation 95MN04701
Construction Worker Dies After 9-Wheel Pneumatic Roller Rolls Over on Her

SUMMARY

A 39-year- old construction worker died of injuries sustained when the 20,000 pound nine-wheel pneumatic roller she was driving rolled over on her. It was not equipped with any type of rollover protective structure.

The construction company the victim worked for was contracted to pave and add new shoulders to several miles of a county highway. Prior to the occurrence of the incident, the victim was operating the roller near the top of a one-half mile hill. While compacting the asphalt, the victim may have felt she was driving too fast and attempted to shift into a lower gear. This was not possible while the roller was in motion**.**

The victim attempted to steer the roller as it continued to roll down the hill. The roller travelled approximately four-tenths of a mile down the hill until it entered a ditch. At the time the roller entered the ditch, it was travelling between 40 and 50 miles per hour. The roller then travelled approximately 100 feet through the ditch, prior to striking a rock embankment. The roller travelled across the rock embankment another 41 feet before it rolled upside down. Emergency medical personnel arrived at the incident site shortly after being called, but the victim was pronounced dead at the scene. MN FACE investigators concluded that to reduce the likelihood of similar occurrences, the following guidelines should be followed:

- pneumatic rollers should be equipped with a rollover protective structure and a seat belt; and

- design, develop, and implement a comprehensive safety program.

INTRODUCTION

On September 5, 1995, MN FACE investigators were notified of a construction work-related fatality that occurred on July 7, 1995. The county sheriff's department was contacted and releasable information obtained. Information obtained included a copy of their report of the incident, witnesses' statements, and copies of their photos of the incident site. OSHA was contacted and releasable information was obtained. A site investigation was conducted by MN FACE investigators on September 18, 1995.

The employer in this incident was an asphalt paving company that had been in business for 34 years. The company employed about 70 workers and had one safety officer on staff. The safety officer was responsible for safety programs and procedures. Employee training was conducted on-the-job, primarily by other employees. Eighteen employees were present at the incident site at the time of the incident. The victim had worked for the employer for three months and had previous packing experience with another asphalt paving company. It is unknown how much experience or what type of equipment the victim had operated at the previous employer. The victim had worked at the incident site for two days.

INVESTIGATION

On the afternoon of the incident, the victim was driving a piece of construction equipment called a nine-wheel pneumatic roller that was used for compaction purposes. The 20,000 pound pneumatic roller was not equipped with any type of rollover protective structure. The roller's drive system consisted of a four speed manual transmission coupled with a variable speed hydrostatic drive. Movement of the roller required the operator to manually place the transmission in one of four selectable gears while the roller was stationary. The forward or backward movement of the roller was controlled by the forward or backward movement of a lever that controlled the hydrostatic drive. Forward movement of the lever caused the roller to move forward. Backward movement of the roller was obtained by moving the control lever through its neutral position and the continued movement of the lever in the opposite direction from that required to drive the roller forward. The hydrostatic drive system enabled the operator to change the direction of travel of the roller without shifting the manual transmission between gears. The speed of the roller was dependent on how far the lever was moved from its neutral or center position. During packing operations, the normal speed of the roller was 3 to 5 miles per hour. When the roller was being driven from job to job, speeds of up to 15 miles per hour were

possible.

The construction company the victim worked for was contracted to pave and add new shoulders to several miles of a county highway. The previous day, the victim had operated the roller on a hill that was steeper (slope of 6 degrees or 9 percent[1]) than the hill involved in the incident. It was unclear how much additional experience the victim had working on hills. Prior to the occurrence of the incident, the victim was operating the roller near the top of a one-half mile hill (slope of 4 degrees or 6 percent[2]). After compacting the asphalt near the crest of the hill, the victim drove the roller downhill around a curve in the road. Upon driving around the curve, the victim may have seen how steep the hill was and felt that the gear she was driving in was too high. She may have shifted the roller into neutral while attempting to shift into a lower gear. However, once the machine was in neutral, it was not possible to shift into a lower gear and roller began to accelerate down the hill.

The victim had control of the roller for approximately one-quarter of a mile down the hill because she was able to steer it around a paver and three other employees of the paving company. As the victim steered around the paver, she left the paved road and drove on the gravel portion of the road for another quarter of a mile. At that point the roller entered a ditch and was travelling between 40 and 50 miles per hour. The roller then travelled approximately 100 feet along the side of ditch prior to striking a rock embankment. The embankment had a slope of approximately 25 degrees and 46 percent[3]. The roller travelled across the rock embankment another 41 feet before it rolled over, upside down, 180 degrees. Emergency medical personnel arrived at the incident site shortly after being called, but the victim was pronounced dead at the scene.

CAUSE OF DEATH

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1. A slope of 9 percent has a vertical drop of 9 feet over 100 feet of horizontal distance.

2. A slope of 6 percent has a vertical drop of 4 feet over 100 feet of horizontal distance.

3. A slope of 46 percent has a vertical drop of 46 feet over 100 feet of horizontal distance.

The cause of death listed on the death certificate was severe head trauma.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: All pneumatic rollers should be equipped with a rollover protective structure and a seat belt.

Discussion: Preventing death and serious injury to pneumatic roller operators during paver rollovers requires the use of a rollover protective structure and seat belts. These structures, either a roll-bar frame or an enclosed roll-protective cab, are designed to withstand the dynamic forces acting on it during a rollover. In addition, seat belt use is necessary to ensure that the operator remains within the "zone of protection" provided by the rollover protective structure. Many older pneumatic rollers are in use and do not have, nor are they required by government regulation to have, such structures to protect their operators in case of rollover. All older pneumatic rollers should be retrofitted with a properly designed, manufactured, and installed rollover protective structure and seat belt. If the pneumatic roller involved in this incident had been retrofitted with a rollover protective structure and a seat belt and the seat belt had been in use, this fatality might have been prevented.

Recommendation #2: Employers should design, develop, and implement a comprehensive safety program.

Discussion: Employers should ensure that all employees are trained to recognize and avoid hazardous work conditions. A comprehensive safety program should address all aspects of safety related to specific tasks that employees are required to perform. OSHA Standard 1926.21(b)(2) requires employers to "instruct each employee in the recognition and avoidance of unsafe conditions and the regulations applicable to his work environment to control or eliminate any hazards or other exposure to illness or injury." Safety rules, regulations, and procedures should include the recognition and elimination of hazards associated with tasks performed by employees.

REFERENCES

1. Office of the Federal Register: Code of Federal Regulations, Labor, 29 CFR Part 1928.51 (b), U.S. Department of Labor, Occupational Safety and Health Administration, Washington, D.C., April 25, 1975.

2. Office of the Federal Register: Code of Federal Regulations, Labor, 29 CFR Part 1926.21 (b) (2), U.S. Department of Labor, Occupational Safety and Health Administration, Washington, D.C., July 1, 1994.

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