The National Institute for Occupational Safety and Health (NIOSH)

Worker Dies After Being Run Over By A Front-End Loader

Minnesota FACE Investigation 98MN030
Date: September 28, 1998

SUMMARY

A 31-year-old worker (victim) died of injuries he sustained after being run over by a front-nd loader at a construction site. The loader was equipped with an audible back-up alarm, however it was not working at the time of the incident. On the day of the incident, the loader was being used to transport chunks of broken asphalt and concrete to a rock crushing machine. The operator of the front-end loader was aware that the victim was working near the rock crusher, but didn't realize that he was walking in the area where he was operating the loader. The operator of the front-end loader had been driving backwards, down an earthen ramp and across the work site, when he felt that he had run over something. As he continued to back-up he observed the victim lying near the front of the loader. Another coworker placed a 911 call and emergency personnel arrived shortly after being called. They pronounced the victim dead at the scene.

MN FACE investigators concluded that, in order to reduce the likelihood of similar occurrences, the following guidelines should be followed:

- mobile equipment should be equipped with an audible back-up alarm as well as sensing units to detect pedestrian workers in the blind spots of equipment operators;
- employers should ensure that equipment is always maintained in the proper working condition;
- employers should ensure that heavy equipment is driven in a forward direction as much as possible; and
- employers should design, develop, and implement a comprehensive safety program.

INTRODUCTION

On June 1, 1998 MN FACE investigators were notified of a work-related fatal incident that occurred on May 29, 1998. The local police department was contacted and a releasable copy of their investigative report was obtained. Although a site investigation was not conducted, the detailed police department report, which included a transcript of their interviews that were conducted at the incident site and copies of their photographs taken at the incident site, provided specific and comprehensive information concerning the cause of this fatality. During MN FACE investigations, incident information is obtained from a variety of sources such as law enforcement agencies, county coroners and medical examiners, employers, coworkers and family members.

INVESTIGATION

On the day of the incident the victim and several other workers were working at a construction site where highway surface materials, asphalt and concrete, were recycled. At the site, chunks of asphalt and concrete were pulverized by a crusher to be used for new road bases. One of the workers had been operating a large front-end loader equipped with a bucket to transport the highway material to the crusher. The loader operator would pick up uncrushed material and drive up an earthen ramp where he would dump it into the crusher (Figure 1). The operator would then back down the ramp, across the work site, and pick up additional material.

The loader was equipped with an enclosed cab and measured 13 feet 7 inches from the roof of the cab to the ground. The operator's view was obstructed only in the areas directly beyond the cab's corner support columns. In addition, the size of the loader made it difficult for the operator to see workers or objects when they were in close proximity to the loader. The loader was equipped with an audible back-up alarm, however it was not working at the time of the incident. Based upon the manufacturer's brochure the loader had three reverse gears that ranged in speed from 4.9 mph to 14.6 mph.

Shortly before the incident, the operator of the loader dumped material into the crusher and backed down the earthen ramp. After reaching the bottom of the ramp he turned the loader (Figure 1) and continued to back across the work site. Although he knew that the victim was in the general work area, he was not aware that the victim was walking in the area where he was operating the loader. As the operator turned the loader and continued to back across the work site, he felt the right front wheel of the loader strike something. He continued to back a short distance and then observed the victim lying on the ground in front of the loader. He stopped the loader and notified another worker at the site to place a call to emergency personnel. They arrived at the site shortly after being notified and pronounced the victim dead at the scene.

Approximately two weeks prior to the incident the audible back-up warning device on the loader began to malfunction. When the loader was driven in reverse the warning device would make a steady sound rather than its normal intermittent sound. The loader operator stated during an interview immediately after the incident that he disabled the back-up warning device by cutting the alarm's wire. The wire remained cut at the time of the incident.

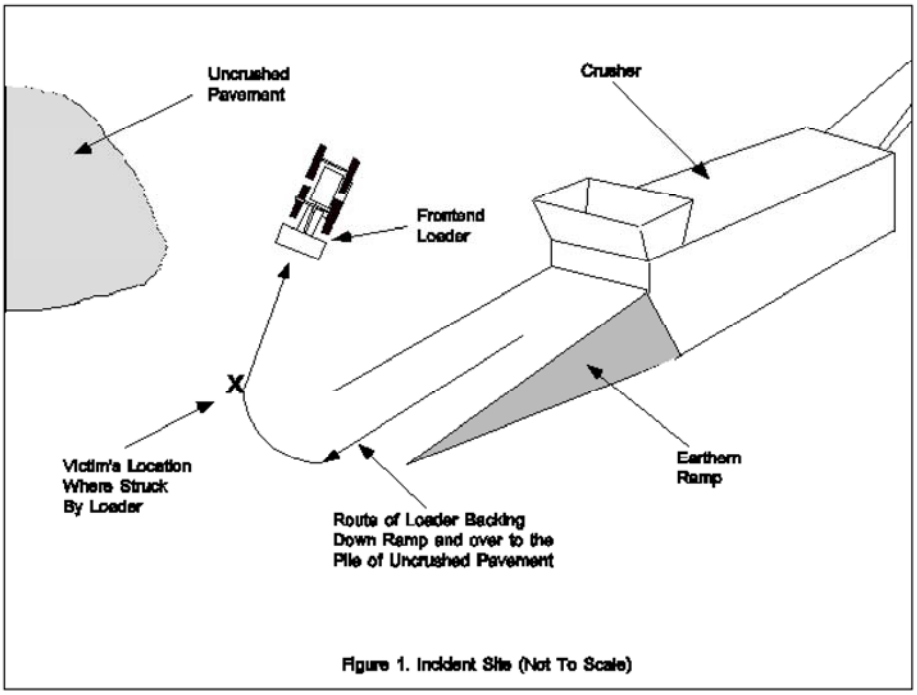

Figure 1. Incident Site (Not To Scale)

CAUSE OF DEATH

The immediate cause of death listed on the death certificate was multiple blunt force injuries.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Mobile equipment should be equipped with an audible back-up warning device as well as sensing units to detect pedestrian workers in the blind spots of the equipment operator.

Discussion: The loader involved in this incident was equipped with an audible back-up warning device, however it was not functioning at the time of the incident. The audible back-up warning device was intended to warn pedestrian workers when the loader was moving in reverse. While this type of warning device can prevent injury by notifying workers to move out of the way, it is unable to alert equipment operators of the presence of pedestrian workers. In addition, pedestrian workers may become desensitized to audible back-up warning devices because they sound whenever the equipment is moving in reverse. Equipping mobile equipment and vehicles with sensing units such as radar activated back-up warning devices to detect the presence of pedestrian workers in the blind spots of equipment and warn both the operator and the pedestrian would provide an additional margin of safety.

Recommendation #2: Employers should ensure that equipment is always maintained in the proper working condition.

Discussion: Employers should ensure that equipment is regularly inspected and maintained. Upon inspection, if equipment is found to need repair, the equipment should be taken out of use until it is repaired. In this incident, the audible back-up warning device was not working because the alarm's wire had been cut. If the loader had been regularly inspected and maintained, and the audible alarm had been maintained in the proper working condition, this fatality may have been prevented.

Recommendation #3: Employers should ensure that equipment is driven in a forward direction as much as possible.

Discussion: When equipment is driven in reverse, pedestrian workers are at greater risk of being run over. Whenever feasible, equipment should be driven forward to reduce the likelihood of workers not being seen. In this incident, the loader operator backed down an earthen ramp and across a work site when the victim was run over. If the earthen ramp had been built with a side exit ramp (Figure 2), the operator would have had to operate the loader in reverse only while going down the ramp. He then could have driven the loader forward down the side exit ramp and increased the likelihood of observing and avoiding pedestrian workers in front of the loader. An additional measure of safety could be provided by erecting barriers along the sides of the ramps to prevent workers from walking on the ramps. Pedestrian barriers would limit ramp usage to equipment entering the main ramp or leaving the side exit ramp.

Recommendation #4: 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.

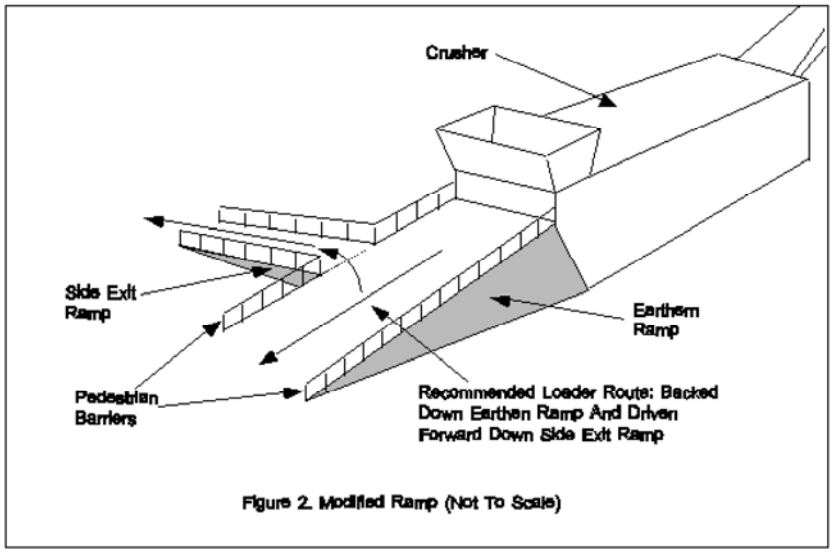

Figure 2. Modified Ramp (Not To Scale)

REFERENCES

1. 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.

To contact Minnesota State FACE program personnel regarding State-based FACE reports, please use information listed on the Contact Sheet on the NIOSH FACE web site Please contact In-house FACE program personnel regarding In-house FACE reports and to gain assistance when State-FACE program personnel cannot be reached.

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