

Cement Finisher Dies After Being Crushed Against Doorway by Cement Truck Chute--  
North Carolina

SUMMARY

A 32-year-old male cement finisher (the victim) died after being crushed against a temporary doorway by the chute of a cement truck. The victim was a member of a 4-man crew patching holes in a 5-acre warehouse floor. A temporary doorway had been cut in the warehouse wall for access. The cement truck backed up to the doorway in a manner that allowed the dispensing chute to extend through the door. The chute was located approximately 22 feet from one side of the 8-foot-wide by 10-foot-high doorway. Two crew members stood on each side of the chute as concrete was dispensed into a backhoe bucket. The victim was located on the side of the chute nearest the doorway. While the concrete was being dispensed, the bridge wheels above the chute began to drop. As the carriage for the bridge wheels struck the chute, it pushed the chute toward the doorway. The chute struck the victim and pinned him against the doorway slightly above waist level. The other crew members pushed the chute away from the victim and freed him while workers summoned the EMS from a construction trailer. When the emergency medical service (EMS) arrived, the victim initially refused treatment, but was convinced by EMS personnel to go to the hospital to be checked out. The victim was released from the hospital, but collapsed later in the afternoon and was taken to the hospital a second time. He died on the operating table later that night. NIOSH investigators concluded that, to prevent similar occurrences, employers should:

- instruct and train employees to utilize safety features incorporated into the design of equipment
- ensure that qualified personnel check the operation of the system hydraulics and retention latches periodically (according to manufacturer's specifications) and instruct operators on proper usage.

Additionally,

- manufacturers of equipment should consider installing safety warning devices on equipment.

INTRODUCTION

On July 30, 1996, a 32-year-old male cement finisher (the victim) died of injuries he received when the chute of a cement truck struck him and pinned him against a doorway. On August 14, 1996, officials of the North Carolina Occupational Safety and Health Administration (NCOSHA) notified the Division of Safety Research (DSR) of this

fatality, and requested technical assistance. On September 25, 1996, a DSR safety engineer and safety specialist conducted an investigation of the incident. The incident was reviewed with employer representatives, the NIOSH compliance officer, and the county coroner. Photographs taken immediately following the incident and schematics of the truck's hydraulic system were reviewed during the investigation.

The employer in this incident was a concrete contractor that employed 40 workers and had been in operation for 21 years. The employer had a comprehensive written safety program and safety policy. Training was performed on the job. The crew at the incident site were citizens of Mexico and worked for the employer 9 months a year, then returned to Mexico. The employer's insurance carrier provided training materials in Spanish which were utilized during tailgate safety meetings. The victim had worked for the employer for 8 years. This was the first fatality experienced by the employer.

## INVESTIGATION

The employer had been sub-contracted to pour the concrete for the truck bays and to patch the damaged floor of a 5-acre distribution center warehouse. The floor of the warehouse had been damaged in various places by a crane's outriggers as the crane placed warehouse roof joists in position.

A temporary 8-foot-wide by 10-foot-high doorway had been cut in the warehouse wall to allow access for the concrete to the interior of the warehouse. The cement truck (from another employer) would back up to the door in a manner that would allow the dispensing chute of the truck to extend through the door to the interior of the warehouse. The concrete would be dispensed into the bucket of a backhoe that would take it to the damaged areas of the floor.

At the time of the incident, 9:30 a.m., the four-man crew was preparing to repair the last damaged area of the warehouse floor. The truck had backed slowly down a grade toward the warehouse door when it arrived at the site. As the truck backs up, the bridge wheels at the rear of the truck are raised automatically by the truck's hydraulic system toward their cradle at the top of the truck's drum, where the wheel carriage hydraulically latches into place. The bridge wheels were held in place hydraulically against the highway enroute to the site to more evenly distribute the truck's weight (Figure).

When the truck was in place its two-section chute was lowered through the doorway. The chute was located approximately 22 feet from one side of the doorway. Three extension sections were then placed on the chute.

Two crew members were standing on each side of the chute as the concrete was being dispensed. The victim was standing on the side of the chute closest to the side of the doorway (22 feet away). As the concrete was being dispensed, the carriage for the bridge began to drop. When the carriage struck the chute, the chute was pushed toward the

victim, striking him and pinning him against the doorway slightly above waist level. The other crew members pushed the chute away from the victim and freed him while other workers called the EMS from a construction trailer at the site. When the EMS personnel first arrived, the victim refused medical treatment. He was then persuaded to travel in the ambulance to the emergency room where he was treated and released. The victim collapsed later in the day and was transported a second time to the hospital. At 3 p.m., a magnetic resonance imaging (MRI) test was performed and it was discovered that the victim had internal injuries. The victim died on the operating table at 9 p.m.

Although the carriage is supposed to latch in place automatically, crew members stated during interviews with the NIOSH compliance officer that the carriage did not latch smoothly in the course of the truck's previous trips to the site, but snapped into place with a loud bang. None could remember hearing the carriage snapping into place at the time of the incident.

Warning labels on the truck called for the chute to be locked into place and the bridge wheel carriage to be chained to the truck before dispensing any concrete. Neither of these warnings was heeded.

A faulty valve or component in the hydraulic system could have allowed hydraulic fluid to leak back to the reservoir resulting in a loss of system pressure against the high pressure side of the bridge wheel actuator piston. A loss of hydraulic pressure against the actuator piston could allow the unlatched bridge wheel carriage to creep down and contact the concrete chute, thus forcing the chute to move in a counterclockwise direction and contact the victim.

## CAUSE OF DEATH

The death certificate listed the cause of death as hepatic and vascular trauma due to blunt chest and abdominal trauma.

## RECOMMENDATIONS/DISCUSSION

Recommendation #1: Employers should train and instruct employees to utilize safety features incorporated into the design of equipment.

Discussion: Warning labels on the truck stated that the bridge wheel carriage must be chained to the truck before concrete is dispensed. Although the chain was attached to the bridge wheel carriage, it was not connected to the truck. Additionally, the chute was not locked in place. Employers should instruct employees as to the importance of following safety warning labels on equipment, and train employees in the correct methods to utilize

these safety features. Utilization of either of these features may have prevented this incident.

**Recommendation #2:** Employers should ensure that qualified personnel check the operation of the system hydraulics and retention latches periodically (according to manufacturer's specifications) and instruct operators on proper usage.

**Discussion:** Periodic inspection and operation of the hydraulic system should be performed to ensure proper operation of the bridge wheels and retention mechanisms. A faulty valve or valves or other component in the hydraulic system could have allowed the system pressure on the high pressure side of the bridge wheel actuator piston to bleed down to the reservoir. A loss of hydraulic pressure against the actuator piston in the absence of manual bridge wheel retention could allow the bridge wheel to creep down and contact the unlocked concrete chute, thus forcing the chute to move in a counter clock-wise direction and contact the victim. If the bridge wheels had been raised until the mechanical latch fully engaged, a loss in hydraulic pressure would not have allowed the bridge wheel carriage to lower and contact the concrete chute. Inspection and operation of the system hydraulics along with operational instruction for personnel might have prevented this incident.

**Recommendation #3:** Manufacturers of equipment should consider installing safety warning devices on equipment.

**Discussion:** An audible safety warning device, such as those installed on some industrial equipment that sound when equipment is backing up, could be installed on the cement trucks. The device would be activated when the truck was backing up and the bridge wheel carriage was raising, and would not be deactivated until the bridge wheel carriage was hydraulically latched in place.