

Worker Crushed Under Forklift Tines

FACE 97-AK-040

Release Date: March 2, 1998

SUMMARY

A worker was killed while attempting to inspect a hydraulic leak on a forklift. He was working alone in a storage warehouse, retrieving a motor for a loader. The incident was not witnessed. It was surmised from the evidence that the worker (the victim), while moving a pallet of mixed items with the forklift, noticed a trail of hydraulic fluid along the warehouse driveway. He drove the forklift back into the warehouse and unloaded the pallet from the forks or tines of the forklift. With the motor on and the brake engaged, he raised the tines to place absorbent pads under the mast and hydraulic system. He then reached under the left tine to check the source of the leak. The hydraulic system failed, causing the tines to collapse on his head, neck, and shoulder.

When a co-worker went to the warehouse to locate a key, he found the victim pinned under the tines. Unable to raise the tines to free the victim, he went to a maintenance shop for help. Emergency medical services were notified and paramedics were dispatched to the incident site. Co-workers were able to raise the tines to free the victim. Finding no pulse, co-workers left the victim's position undisturbed and awaited the arrival of emergency medical technicians. The victim was pronounced dead at the scene.

Based on the findings of the investigation, to prevent similar occurrences, employers should:

- ensure completion of forklift training prior to the use of the equipment;
- ensure that only trained and authorized personnel be permitted to maintain, repair, adjust, and inspect industrial trucks (e.g., forklifts);
- ensure workers follow the manufacturer and company safety guidelines when operating equipment.

INTRODUCTION

At approximately 10:00 AM on November 8, 1997, a 24-year-old male shipping and receiving worker (the victim) was killed when the tines of the forklift he had been operating fell, crushing his head and neck. On November 10, 1997, Alaska Division of Public Health, Section of Epidemiology contacted the Alaska Department of Labor (AKDOL). An investigation involving an Injury Prevention Specialist for the Alaska Department of Health and Social Services, Section of Epidemiology ensued on November 11, 1997. Due to circumstances beyond the company's control, they were unable to accommodate an on-site visit. However, phone interviews were conducted with the employer's safety officer. The incident was reviewed with AKDOL officials. Alaska State Troopers and Medical Examiner reports, as well as AKDOL reports, were requested and reviewed.

The company in this incident was a privately owned logging operation that had been in business for 43 years. At the time of the incident, the company had 275 employees, of which 25 employees worked at the incident location. The victim had been employed by the company for three months as a shipping and receiving laborer and had just returned to work five days preceding the incident following a two-week absence. The victim had received verbal instruction on forklift operation but had not completed the company's forklift operator training course at the time of the incident.

The company had a written, comprehensive health and safety plan. All employees were required to attend an initial hire orientation. Because of the nature and remote location of many sites, safety training was usually conducted on-the-job. The company also provided a forklift operator training course. The course conformed to current occupational safety and health regulations and was conducted by an employee who was a certified forklift trainer. Classes consisted of eight hours of classroom and hands-on instruction including vehicle inspection and general operation. Classes were routinely scheduled at various company sites to fulfill employee training requirements.

INVESTIGATION

The incident occurred in a shop compound of a remote timber operation site. The compound was composed of several shops and buildings that provided supplies and maintenance services for the company's various types of operations and equipment. The warehouse was adjacent to the maintenance shop and behind an attached building housing the generator. Within the warehouse, diverse types of materials including equipment parts were stored on wood pallets arranged within the warehouse floor and on peripheral shelving units. The driveway entrance into the warehouse was behind the generator building. The driveway was moderately sloped to provide adequate drainage.

The forklift in this incident used a single-stage hoist cylinder. The hoist cylinder consisted primarily of a shell, rod assembly, retainer, lowering control valve, and an internal bleed-back valve. Pressurized hydraulic fluid entered at the bottom of the cylinder and filled the cavity between the outer shell and the rod assembly. As the hydraulic fluid pressure increased, the rod was forced out of the shell. Conversely, the reduction of hydraulic fluid pressure allowed the rod to retract back into the shell. The internal bleed-back valve was located at the base of the cylinder. The lower cylinder port was located on the side close to the bottom of the cylinder and was connected to the hydraulic fluid line. A small lowering valve was placed within the lower cylinder port to limit the amount of hydraulic fluid flowing out of the cylinder during the lowering phase in order to control the rate of descent.

At approximately 9:15 AM on the day of the incident, the victim was using the forklift to rearrange pallets of various materials in order to access a part for an equipment maintenance job scheduled few days later. He had used this forklift several times in the past and had recharged its battery earlier that morning. Maintenance records indicated no mechanical trouble with this forklift other than difficulty starting the motor.

The incident was unwitnessed but it was surmised that the forklift undercarriage struck an equipment

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part that fell from the pallet the victim was moving to an area outside the warehouse. Noticing an interrupted trail of fluid down the warehouse driveway, he returned the forklift to the warehouse, unloaded the pallet, and raised the unloaded tines. Leaving the motor running and the brake on, he began to position absorbent pads under the mast and hydraulic system to collect the leaking fluid. He then removed one glove, knelt down on the left side of the forklift, and reached under the tines to check the origin of the leak.

Approximately 30 to 45 minutes after the victim was last seen, a co-worker went to the warehouse to retrieve a key for a locked storage room. He found the victim pinned under the left tine of the forklift. After trying unsuccessfully to lift the tines manually and by the forklift controls, he went to the maintenance shop for help. Emergency medical services were dispatched at 10:03 AM. Co-workers were able to lift the tines using a come-along. Finding no pulse, they left the victim's position undisturbed until the arrival of an emergency medical technician (EMT) a few minutes later. Examination of the victim by the EMT indicated extensive head and neck injuries and absence of pulse and respiration; CPR was not initiated. The victim was pronounced dead at the scene.

The examination of the forklift by an AKDOL enforcement officer indicated the hydraulic fluid line had separated from the lower cylinder port. The lowering control valve was not found in the immediate area of the incident; it may have been forcefully ejected from the lower cylinder port or inadvertently displaced from the area during the emergency response. It was surmised that the victim may have dislodged the hydraulic fluid line during his inspection of the undercarriage and hydraulic system. The immediate and uncontrolled loss of hydraulic fluid caused the rapid descent of the forklift tines, forcefully pinning the victim's head, neck, and shoulder between the tines and the warehouse floor.

CAUSE OF DEATH

The medical examiner's report listed the cause of death as basilar skull fracture due to impact injury to the head.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Employers should ensure completion of forklift training prior to the use of the equipment.

Discussion: 29 CFR 1910.178(l) states “Only trained and authorized operators shall be permitted to operate a powered industrial truck.” While an employee may receive verbal training on the operation of the forklift from a certified forklift operator, this instruction should not be substituted for an approved, structured program. Employers should ensure scheduling practices accommodate the training needs of employees in order to facilitate the safe performance of their job duties. When instruction is not available due to schedule incompatibilities, location, or other conditions that prevent enrollment, the company may consider training an additional site-specific trainer, such as a mechanic due to their knowledge of trucks and their operation, to conduct forklift operator certification classes.

Recommendation #2: Employers should ensure that only trained and authorized personnel be permitted to maintain, repair, adjust, and inspect industrial trucks (e.g., forklifts).

Discussion: The company’s hazardous materials policy was in compliance with state and federal regulations and did direct the placement of absorbent pads under the vehicle to collect spilled or leaking fluids. However, the victim’s action of going under the raised tines without authorization or training placed his life in jeopardy. Regardless of operator experience, only approved maintenance and repair personnel should inspect and, if necessary, perform any maintenance, repairs, or adjustments on industrial trucks. In addition, 29 CFR 1910.178(q)(1) states: “Any power-operated industrial truck not in safe operating condition shall be removed from service. All repairs shall be made by authorized personnel.”

Recommendation #3: Employers should ensure workers follow the manufacturer and company safety policies and guidelines.

Discussion: The company in this incident had a comprehensive health and safety plan with a forklift training program centered on established company policy and occupational safety and health

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regulations. Management should implement and enforce established policies to facilitate both safe job practices and a more effective training program.

References

Office of the Federal Register: Code of Federal Regulations, Labor 29 Part 1910. Washington, DC: U.S. Government Printing Office, 1996.

Accident Prevention Manual for Business and Industry: Engineering and Technology. 10th Edition. National Safety Council, 1992.

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Fatality Assessment and Control Evaluation (FACE) Project

The Alaska Division of Public Health, Section of Epidemiology performs Fatality Assessment and Control Evaluation (FACE) investigations through a cooperative agreement with the National Institute for Occupational Safety and Health (NIOSH), Division of Safety Research (DSR). 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.

Additional information regarding this report is available from:

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