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Apprentice plumber killed while using power lift

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SUMMARY

A 40-year-old apprentice plumber died after he was pinned between a ceiling water pipe and the rail of a personnel platform. The incident was not witnessed, but evidence suggested that he was using a straddle lift truck to elevate himself to a leaking water pipe. While leaning over the platform rail to manipulate the lift control lever with a 10-foot pole, he became pinned between the rising platform rail and the pipe. He was found approximately 30 minutes later by a co-worker who immediately began to lower the lift platform. As the pressure was released, the victim slid out of the personnel platform on the lift carriage and fell approximately 8 feet to the floor. The co-worker called 911, who instructed him to begin CPR until emergency medical services arrived. The victim was transported to a nearby hospital where he died 3 days later.

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 employees use equipment according to safe methods of operation specified by the employer and equipment manufacturer. Modifications or additions to equipment should be reviewed and authorized by the manufacturer prior to alteration and should meet all mandatory safety guidelines established for the alteration;

Ensure that equipment is inspected according to manufacturer's guidelines and any improperly functioning equipment is removed from service for repair or adjustment;

Design, implement, and enforce a comprehensive safety program that includes, but is not limited to, specific written policies and procedures for the assignment of safety responsibilities, safety training of all employees, use of equipment, and recognition and control of hazards.

INTRODUCTION

Shortly after 8:00AM on May 28, 1998, a 40-year-old male apprentice plumber (the victim) was severely injured when he was pinned between a ceiling pipe and the upper rail of a lift truck personnel platform on which he was standing. As the platform was lowered, the victim fell from the platform to the floor. He died May 31, 1998 from his injuries. On June 3, 1998, Alaska Department of Labor (AK-DOL) notified the Alaska Division of Public Health, Section of Epidemiology. An investigation involving an Injury Prevention Specialist for the Alaska Department of Health and Social Services, Section of Epidemiology ensued on June 9, 1998. The incident was reviewed with AK-DOL officials. Alaska State Troopers, Medical Examiner and AK-DOL reports were requested.

The company in this incident was a privately owned property management operation that had been in business for 47 years. Property management operations consisted of routine maintenance and repair services including, but not limited to, construction, plumbing, and heating system services for properties owned or under contractual agreement. The company had 20 employees of which two were journeyman and apprentice plumbers. Prior to the incident, the company had employed the victim (part-time and full-time) for 11 years, initially as a heavy equipment operator. In March 1997, he entered a company-sponsored plumber apprenticeship program that was supervised by a journeyman plumber.

The company did have written sections of a health and safety program, however, employee training was primarily on-the-job. On-the-job safety training usually addressed personal protective equipment, hazard identification, work practices, machinery and equipment use, and driver safety. In addition, the company scheduled first aid and CPR classes for its employees, which had voluntary attendance. "Toolbox" safety sessions were held as needed. Although the victim had been trained to use the powered industrial (lift) truck, he was not a certified forklift operator.

INVESTIGATION

The incident occurred in a building used by the company as a combination office and shop. The building also housed an upstairs apartment/storage area. The shop was used for the company's

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maintenance projects and services and contained supplies and several types of construction and specialized trades equipment. The building had a concrete slab floor. The support beams along the ceiling and walls were not recessed. Various types of pipes and conduit ran across the ceiling and down the walls. Several of the ceiling pipes were suspended (2 to 24 inches) to avoid being obstructed by unrecessed beams or other pipes and fittings. The day before the incident, the victim and two co-workers had been working on the pipes for the building heating system. The ceiling pipe involved in this incident was a water supply pipe, suspended approximately 1 foot from the ceiling and approximately 13 feet above the floor.

The lift truck involved in this incident was a self-propelled, straddle lift truck manufactured in the early 1960s and purchased by the company as military surplus in 1980. Military surplus equipment is purchased "as is." The manufacturer's operation manual was not with the truck nor had a replacement copy been requested. The truck was equipped with forks or tines for the movement, lifting, and stacking of palletized materials. Total vertical lift was 10 feet 9 inches. A 12-volt battery powered the electric drive and hydraulic pump motors. Movement controls were located at the rear of the truck on a steering arm. When not in use by the operator, the steering arm automatically returned to an upright position, activating a dead man cut-off switch for the movement controls. The throttle valve assembly was located on the side of the unit (Figure 1) and controlled the vertical motion of the lift carriage. When the lift control handle (Figure 2) was moved forward, a contact switch was actuated to start the hydraulic pump and raise the lift carriage. Conversely, when the lift control handle was moved back, it opened a valve to release hydraulic fluid back to the reservoir and lower the carriage. A spring connected to the handle arm within the throttle assembly caused the handle to automatically return to a neutral position and stop the lift mechanism unless constant pressure was applied to the handle. In this incident, the lift control did not function properly, and the lift carriage raised until the maximum height was reached or the handle was pulled back. The handle did, however, automatically return to neutral when released from the "down" position. The lift control handle had functioned in this manner since the time of purchase. The throttle assembly was not disassembled after the incident; therefore it was not determined what part(s) in the throttle assembly had malfunctioned.

Previous to the incident, workers had attached a compressed gas cylinder stand to the lift carriage to act as a personnel basket. The stand was 4 feet tall and consisted of a metal platform

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(approximately 2 1/2 feet square) with metal rails on the rear and sides welded to four metal corner posts. The rear corner posts were secured to the lift carriage using a 1-inch web strap. A chain with a clamp was on the front of the platform. Distance from the top of the basket when raised to the maximum carriage height to the floor was nearly 15 feet. During the previous day's work on the building heating system, workers used the lift truck to reach the ceiling pipes. Workers had been verbally cautioned not to use the personnel platform alone since the lift truck controls required an operator on the ground. However, a few workers had used the personnel basket alone by operating the lift control handle with a 10-foot pole (Figure 1) or a wood stick guided through a wire loop at the top of the mast while standing on the raised platform.

At approximately 8:00 AM on the day of the incident, the victim entered the shop, which was unoccupied at that time. The incident was unwitnessed, but it was surmised from the position of the lift truck and two pipe wrenches found on the platform that the victim was attempting to fix or tighten a ceiling water pipe that had begun to leak overnight. The victim moved the lift truck into position under the pipe. Having no one to assist him and without fall protection equipment, he stepped onto the platform and activated the lift control to raise the platform. As he approached the water pipe, he leaned over the corner of the rear and right side rails to use the 10-foot pole to push the lever back to neutral (Figure 3). The victim was unable to stop the platform and as it continued upward, his upper chest was compressed between the rails and pipe. The pressure against the pipe caused it to rupture, spraying cold water over the victim.

A co-worker (the witness) arrived at the worksite at approximately 8:50 AM. The witness found the victim pinned and unresponsive. He immediately began to lower the lift carriage. Upon the release of pressure, the victim slid from the carriage and fell approximately 8 feet to the floor, landing headfirst. At 8:53 AM, the witness called 911 and was instructed to begin CPR. An emergency medical crew arrived at 9:10 AM. The victim was taken to a nearby hospital where he later died from his injuries.

CAUSE OF DEATH

The medical examiner's report listed the cause of death as severe closed head injury due to employment related fall/equipment-related incident.

RECOMMENDATIONS/DISCUSSION

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

Discussion: While an employee may receive verbal or on-the-job training for the operation of a power lift truck from another experienced operator, this should not be substituted for an approved, structured program to certify employees as forklift operators. 29 CFR 1910.178 (l) states “Only trained and authorized operators shall be permitted to operate a powered industrial truck.” While OSHA does not specify the training requirements (i.e., amount, type, or frequency), training should include inspection prior to use, function and proper use, and procedures when the truck is defective. Employers should ensure forklift training is scheduled to accommodate the needs of employees in order to facilitate the safe performance of their job duties.

Recommendation #2: Employers should ensure that employees use equipment according to safe methods of operation specified by the employer and equipment manufacturer. Modifications or additions to equipment should be reviewed and authorized by the manufacturer prior to alteration and should meet all mandatory safety guidelines established for the alteration.

Discussion: In this incident, the power lift was modified to incorporate a personnel platform on the lift carriage. This modification meant an operator was required to be present on the ground and at the controls whenever the platform was used. Although the victim was an experienced heavy equipment operator who was reportedly familiar with the safe operation of the lift truck, he did not follow safe operational procedures. Employees have a responsibility to abide by all safety procedures and practices established by their employer. Employers should provide positive incentive for employees to work safely. A spot inspection program would help ensure compliance with safety requirements.

In addition, the manufacturer should be consulted on all equipment modifications and additions prior to alteration in order to maintain safe operation of the equipment and minimize any hazards associated with the change(s). Modifications and additions authorized by the manufacturer may change the equipment category that requires additional safety issues to be addressed. Employers should review work activities, personal protective equipment (such as fall arrest systems), and

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the need for additional employee training as directed by the manufacturer and other regulatory agencies prior to placing equipment back in service. Personal protective equipment should suit the particular work situation. Additional information for selection, use, and employee training considerations may be found in 29CFR1910.66 (Appendix C, Section III), "Additional non-mandatory guidelines for personal fall arrest systems."

Recommendation #3: Employers should ensure that equipment is inspected according to manufacturer's guidelines and that any improperly functioning equipment is removed from service for repair or adjustment.

Discussion: In this incident, the lift control handle did not return to the neutral position and needed to be moved manually to stop the lift carriage. 29 CFR 1910.178(p)(1) states, "If at any time a powered industrial truck is found to be in need of repair, defective, or in any way unsafe, the truck shall be taken out of service until it has been restored to safe operating condition." 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." All equipment should be inspected, serviced, and maintained according to the manufacturer's guidelines. The operation, maintenance, service, and repair instruction manual(s) if not available at time of purchase should be requested from the manufacturer to ensure the proper assemblage and function of the equipment and its components.

Recommendation #4: Design, implement, and enforce a comprehensive safety program that includes, but is not limited to, specific written policies and procedures for the assignment of safety responsibilities, safety training of all employees, use of equipment, and recognition and control of hazards.

Discussion: In this incident the victim was enrolled in an apprenticeship program sponsored by his employer. In accordance with 29 CFR 29.5(b)(9), the apprenticeship program must have "Adequate and safe equipment and facilities for training and supervision, and safety training for apprentices on the job and in related instruction." A comprehensive safety program helps improve employee safety through awareness and recognition of worksite hazards and avoidance of injury. Employers or safety managers should complete a job hazard analysis for every task. The safety program should address these hazards as they affect work activities, equipment

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operation, and selection of personal protective equipment, and the consequences when company policies and practices are not followed. The National Safety Council recommends that safety training should be conducted—

for all new or reassigned employees

when new or modified equipment is placed in service

whenever procedures are revised or updated

when new information is available or required

when employee knowledge needs to be expanded

when employee interest in safety and efficiency needs improvement

References

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

National Safety Council. Accident Prevention Manual for Business & Industry: Administration & Programs. Tenth Edition. Chicago IL, 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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