TO: Director, National Institute for Occupational Safety and Health

FROM: Iowa FACE Program

SUBJECT: Loading dock worker crushed between forklift and flatbed truck -- Iowa.

SUMMARY: A 57 year old warehouse worker for a gypsum company was helping to load drywall onto a flatbed truck when a forklift driven by a co-worker suddenly lurched forward pinning him against the truck frame. The victim was standing in a narrow space between the forklift and the flat-bed semi-trailer positioning spacer strips of drywall on the truck bed. The co-worker had a large load of drywall on the forklift and was in process of leveling the load when the forklift went into gear and lurched forward. Normally the parking brake is set whenever the driver leaves the forklift, thus disengaging the transmission and preventing forward or reverse movement of the forklift. The driver had just dismounted the forklift to help the victim, then mounted it again to adjust the load. He must have immediately released the parking brake and had insufficient pressure on the service brake to disengage the transmission. After the accident the driver immediately backed away from the flatbed truck, and the victim fell to the ground. CPR was begun immediately and continued by emergency personnel, but was unsuccessful. The victim was rushed immediately to the hospital, but all efforts to revive him failed.

RECOMMENDATIONS following our investigation were as follows:

- *1. Employers should establish safe loading procedures with powered industrial forklifts in accordance with regulations, 29 CFR 1910.178 (m).*
- *2. Employers should provide adequate training for workers to follow safe practices when operating a forklift.*
- *3. Employees should follow safe working procedures when operating an industrial forklift.*

INTRODUCTION

On March 6, 1995 a loading dock worker for a gypsum plant in Iowa was killed when a forklift suddenly lurched forward pinning him against a flatbed truck. He and a co-worker were loading the flatbed trailer with sheets of drywall, which is a routine procedure in this warehouse location. On April 25 the Iowa FACE Program was notified of the incident by the Iowa State Medical Examiner's office. A site visit was conducted on July 20, 1995 by the Iowa FACE investigator. Other information was gained from the Iowa OSHA office, local newspapers, and an employer interview. Photographs were also taken on-site.

The employer was a gypsum products company having been in business for the last 30 years. The company has 3000 employees corporately and 86 employees at this plant. The victim had worked for this company for 20 years as an electrician and voluntarily transferred to the

loading dock two months prior to the accident. All employees are trained as forklift drivers and loading dock workers because of rotating work schedules which require everyone to work in these areas. The victim was very familiar with the equipment and procedures on the loading dock. Ten employees routinely work at one time on the loading dock on a continuous basis.

Written safety rules and procedures are in place at this company and they have an active safety program. Training is conducted in classrooms and in the plant for all employees. Mandatory refresher courses are offered every two years. This was the first work related fatality in the company's history.

INVESTIGATION

The accident site is a warehouse where drywall was loaded onto flat-bed semi-trailer trucks. Each truck is positioned on the concrete floor of the warehouse and forklifts are used for loading the drywall. Four trucks can be loaded at one time in this warehouse space. All surfaces are flat and dry and the area is well lit with interior lights. Each truck is loaded with varying sizes of drywall, loaded in flat stacks separated by risers or sleutter strips. A two-man crew loads each truck, one driving the forklift, the other gathering and positioning the sleutter strips. Each truck is loaded from the sides, the forklift approaching the truck perpendicularly. Occasionally the forklift driver will leave his machine to help with positioning the sleutter strips. Before doing this the correct procedure is to lower the load and set the manual parking brake which disengages the transmission, preventing forward or reverse movement of the forklift.

The involved forklift has hand hydraulic controls that control all fork movements. Foot controls consist of a service brake and a monotrol rocker gas pedal that controls forward and reverse movement. When the parking brake is set by hand or when the service brake is applied the transmission is immediately disengaged and power generated from the gas pedal is available for operating the hand hydraulic controls. If the parking brake is not set, the driver must apply the service brake to disengage the transmission when he desires to raise or adjust the forks. Failure to use either one of the brakes will result in immediate forward or reverse movement of the forklift when the gas pedal is pushed.

At the time of the accident the forklift was loaded with a large load of drywall and was positioned perpendicular to the truck approximately 3 feet from the truck edge. The driver had gotten off the forklift and was helping the victim arrange sleutter strips. The fork and the drywall load were resting secure on the warehouse floor. The victim was standing in the 3 foot space between the forklift and the flatbed trailer. When the driver resumed his position on the forklift he proceeded to raise and adjust the load of drywall. At this time the machine lurched forward and pinned the victim against the edge of the flatbed trailer, crushing him in the chest and abdomen. The driver backed off and the victim fell to the ground. CPR was begun immediately and continued by emergency personnel when they arrived, but was unsuccessful. Autopsy results showed massive internal injuries with rupture of several vital organs and blood vessels.

The forklift was examined by an independent company and found to be in normal operating

condition. The parking brake needed minor adjustment, but not enough that this could be considered a factor in this accident. The forklift driver stated he thought the parking brake was set when he left and re-entered the forklift. However it could not have been set at the exact time of the accident, as it would have disengaged the transmission.

The forklift driver was disciplined by the company for failure to follow proper procedures regarding the use of brakes on the forklift. The company has also changed loading procedures making loading a one-man operation, and also not allowing a forklift to idle perpendicular to a truck edge where workers may be present adjusting a load.

CAUSE OF DEATH

Probable cause of death from the medical examiner *is "massive crush injuries of the chest and abdomen with exsanguination*", due to *"crushed between forklift and flatbed"*

RECOMMENDATIONS / DISCUSSION

- **Recommendation #1** *Employers should establish safe loading procedures with powered industrial forklifts in accordance with regulations, 29 CFR 1910.178 (m).*

Discussion: The loading procedure in this case allowed a worker to stand in a narrow 3-foot space between the forklift and the trailer body while the forklift was in operation. It is difficult to safely control a forklift in narrow spaces given the natural limitations of drive trains, drivers, and controls. A driver error or mechanical malfunction can easily set the machine in motion and crush the worker in a narrow space, as happened in this case. The regulation mentioned above deals with driving, dismounting, and leaving the truck unattended. The load engaging means must be fully lowered, controls neutralized, and the brakes set to prevent any movement when dismounting the forklift. Same procedures should be followed if another worker must work in close proximity to the forklift. Adequate distance should be kept to allow the other worker time to escape in case of mechanical malfunction or operator error.

Other safer procedures include parking the forklift parallel to the semi-trailer when adjusting riser strips, and to make the loading process a one-man job, both of which the company has implemented since the accident. Each forklift driver is now required to adjust the riser strips himself and they are not permitted to idle a forklift perpendicular to a loading truck. This minimizes the risk even if a forklift malfunctions while dismounted.

- **Recommendation #2** *Employers should provide adequate training for workers to follow safe practices when operating a forklift.*

Discussion: Employees should be trained to follow safe procedures when dismounting and leaving a forklift unattended, as well as procedures when other workers are in close proximity. This includes the demonstration of safe distances to park or idle a forklift adjacent to stationary objects, allowing sufficient time and room for someone to escape in the case of machine malfunction or operator error. Adequate supervision should be provided to ensure that these safe loading procedures are followed at all times.

- **Recommendation #3** *Employees should follow safe working procedures when operating an industrial forklift.*

Discussion: At some point before or while lifting the load, the brakes were released and the forklift went into gear and jumped forward. Proper procedure would be to lift and balance the load with the parking brake set, releasing this brake only when the service brake is applied and forward or reverse movement of the forklift is desired. The driver in this case was disciplined for not following correct procedures with the parking brake. The parking brake should always be set when someone is in front of the machine, and released only when it is clear that no one is in danger.

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