DATE: June 9, 1995

FROM: Minnesota Fatality Assessment and Control Evaluation (MN FACE) Program, Minnesota Department of Health

SUBJECT: MN FACE Investigation 95MN00901
Tire Repair Business Owner Dies After His Head Became Pinned Between the Protective Cage and the Bucket/Lift Arm of a Skid-Steer Loader

SUMMARY

A 51-year-old tire repair business owner (victim) was killed when his head became pinned between the protective cage and the bucket/lift arm of the skid-steer loader he was operating. At the time of the incident, the victim was working alone removing snow and ice from the parking lot of the tire business. The victim's son found the victim and notified emergency response personnel. Officers from the local police department found the victim in a prone position inside the vehicle with his body resting on the loader's controls and his head caught between the right-side lift arm and the vehicle chassis. Fire department personnel cut the hydraulic lines to the lift arm and extricated the victim. The victim was transported to a local hospital where he died a short time later. Police investigators at the incident scene found the vehicle to be equipped with a seat belt but noted that it was in "an unused condition."

MN FACE investigators concluded that to reduce the likelihood of a similar incident, the following activities should be performed:

- Use seat belts whenever operating a skid-steer loader; and
- retrofit existing skid-steer loaders with interlock mechanisms which disable or disengage the loader or certain loader functions if the loader is not properly operated.

INTRODUCTION

On April 11, 1995, MN FACE investigators were notified of a machine-related fatality that occurred on January 27, 1995. The police department and county medical examiner were contacted and releasable information was obtained. This information included the local police department's complaint and supplementary investigation reports and the coroner's report. On April 27, 1995, MN FACE investigators visited the site of the incident and confirmed that the employer was no longer in business. A copy of the owner's manual for the equipment involved in the incident was procured from a local equipment distributor.

INVESTIGATION

A 51-year-old tire repair business owner (victim) was killed when his head became pinned between the protective cage and the bucket/lift arm of a skid-steer loader he was operating to clear ice and snow from parking lot. The loader was a four-wheeled, gasoline powered skid-steer loader (commonly referred to as a 'bobcat'). The loader, a Gehl brand 'Hydracat,' model HL2500-A,
was approximately 20 years old and had been purchased in used condition by the business approximately two years prior to the incident. The victim routinely used the loader and was familiar with its' operation.

According to the operator's manual for the vehicle, the bucket of the skid-steer loader was supported by two lift arms located on either side of the vehicle which were anchored at the rear of the chassis. Raising and lowering of the lift arms/bucket was performed by a hydraulic cylinder attached under each lift arm and to the chassis. Operational controls for the vehicle consisted of two adjacent 'T' levers located on a control panel directly in front of the operator's seat. Each lever moved forwards, backwards, and rotated to control various movements of the loader. The left lever controlled the forward, backward, and turning motions of the loader and the right lever controlled the raising and lowering of the lift arms and the tilt of the bucket. The vehicle was equipped with a seat belt and an overhead guard. Expanded metal panel guards protected the operator on the right and left sides of the operator's location. Entry into the operator position was made from the front of the vehicle by climbing over the control panel.

At the time of the incident (approximately 7:05 pm), the victim was removing snow and ice from the parking lot of the tire business. The victim was working alone; however, his 20-year-old son was at the business location. The victim's son observed the vehicle to be stationary but running with the wheels spinning and the victim pinned between the vehicle frame and the bucket/lift arm. The victim's son turned off the vehicle and immediately notified emergency personnel. Officers responding from the local police department found the victim to be in a squatting position inside the vehicle with his body resting on the hand controls and his head outside the protective cage. The victim's head was observed to be crushed between the vehicle chassis and the right-side lift arm.

The police officers attempted to manually lift the bucket but were unable to do so. Paramedics and Fire Department personnel arrived at the scene and unsuccessfully attempted to start the vehicle in an effort to raise the bucket. Fire department personnel then attempted to use hydraulic equipment ('jaws of life') to lift the bucket but resorted to cutting the vehicle's hydraulic lines which allowed rescue workers to lift the bucket and extricate the victim from the vehicle. The victim was immediately transported to a nearby hospital where he died shortly after arrival.

Following transport of the victim from the incident scene, police investigators analyzed the incident location. Within the vehicle, a seat belt was observed to be attached to both the right and left sides of the operator seat and hanging from it's brackets. The investigators noted that the seat belt appeared to be in "an unused condition." The pins holding the bucket to the lift arms were observed to be removed or loose. These were apparently removed by rescue workers in their attempt to remove the victim.

CAUSE OF DEATH

The cause of death stated on the death certificate was cerebral lacerations and skull fractures resulting from a blunt force injury to the head.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Use seat belts whenever operating a skid-steer loader.

Discussion: Seat belts are designed and installed to keep the operator within the safe confines of the vehicle during both normal operation and in cases of accidents (e.g., rollover). If used properly, the seat belt will not allow any part of the operator's body to be placed in pinch points or other locations where it could be hurt. The use of seat belts with skid-steer loaders is especially important due to the inherent hazard of pinch points associated with the movement of the lift arms and bucket.

Recommendation #2: Retrofit existing skid-steer loaders with interlock mechanisms which disable or disengage the loader or certain loader functions if the loader is not properly operated.

Discussion: A variety of safety interlock mechanisms have been incorporated into new models of skid-steer loaders by their manufacturers. These interlocks inhibit operation unless certain safety activities are performed or disengage critical operations or movements in the event of a potentially hazardous event (e.g., the operator leaving the seat while the loader is running). Three common interlock methods include:

- A seat belt interlock which does not allow for the loader to be started without the seat belt locked. Although effective, this method requires the operator to activate the control and may be easily circumvented by locking the seat belt without using it.

- A restraint bar which lowers and locks into a position in front of the operator when the loader is operated. This bar provides a barrier for the operator from being thrown from the loader and may be interlocked with the ignition or other system to require it's use.

- A deadman interlock switch on the operator's seat which disengages or deactivates certain functions, such as raising or lowering of the lift arm, if the operator leaves the seat for any reason. This passive interlock does not require any action on the part of the operator and would be the recommended method to be used in retrofitting older equipment.

REFERENCES

1.Gehl Company, Owner's Manual for HL-2500A Loader, Form No. 901352, Gehl Company, West Bend, WI 53095.

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