DATE: March 11, 1994

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

SUBJECT: MN FACE Investigation 93MN06601
Farmer Suffers Fatal Crushing Injuries When Caught Between a Loader's Hydraulic Cylinder and its Body Frame

SUMMARY

A 26-year-old male hog farmer (victim) died from injuries he suffered when caught between the frame of a small skid steer loader and the hydraulic cylinder which raised and lowered its bucket. The loader's protective cage had been removed so that it could be used in hog buildings on the property having low ceilings. The victim was using the loader to pile manure in a corner of a large hog containment building; he was alone at the time of the incident. According to family members having knowledge of the task and the victim's work practices, the loader probably stalled facing the manure pile with its bucket in an elevated position. Because of his location and inability to move the loader back, the victim attempted to exit the loader from its left (driver's) side and, as he was getting out, inadvertently hit the left hand control which operated the loader's hydraulic cylinders. He was caught between the loader's left cylinder and body frame as the bucket lowered. He was discovered dead on the scene by other family members about two hours after having last been seen. MN FACE investigators concluded that, in order to minimize the occurrence of similar incidents, the following guidelines should be followed:

> do not alter or remove protective structures and other safety devices from machinery;

> protect operators of machinery from the hazards of scissor points on machinery through the use of appropriate guards; and

> follow manufacturer's recommended procedures for boarding and exiting machines.

INTRODUCTION

MN FACE was notified of an October 16, 1993 farm work-related fatality on October 29, 1993. Available information from the county sheriff and coroner was obtained. The victim's family was

contacted on November 17, 1993, but because of farming operations, a site visit could not be arranged immediately. A site investigation and interviews with family members were conducted on January 8, 1994.

The incident occurred on a large family-owned and operated hog farm having multiple home sites. The victim lived and worked on the site where injury occurred for three or four years. The skid steer loader involved in the incident had been purchased new in 1985. An operator's manual and safety booklet were included with its purchase. His brothers indicated that the victim was familiar with its operation, and that he used the loader between two and three times per week for various chores on the farm.

INVESTIGATION

The incident occurred in a large wooden barn with sliding doors at both ends. The building's length was divided approximately in half by a metal fence and gate. One half of the barn contained hogs; the other half was used for storing animal bedding, equipment, etc. The barn floor was cement.

The victim was alone and cleaning the hog containment area with a small skid steer loader, or uni-loader, at the time of the incident. The loader was a 16 horse power unit with two-lever hand control. The controls were directly in front of the operator's seat. The left control operated the hydraulic cylinders which raised and lowered the loader's bucket. The right control operated the bucket's tilt angle. A metal brace on the loader's right cylinder could be manually placed to lock the bucket in a fully extended upright position. It could not be used for locking the bucket in an intermediate position. The hydraulics to lower the bucket were operational even when the loader engine was shut off. Warnings regarding the hazards of exiting the loader with a raised bucket were in place on the loader, but were obscured with a heavy layer of dirt and grime. The protective cage enclosing the loader's operator compartment had been removed to allow access and use of the loader in buildings on the property having only 6- to 6 1/2-foot high ceilings. Low buildings are common on hog farms to maintain warmth for the animals, and the loader was used regularly, at least once per week, in such buildings. The loader was equipped with a seat belt.

The victim was piling manure in one corner of the hog area with the loader. Evidence suggests that the loader stalled in front of and facing the manure pile. It was sitting at a 45 degree angle in relation to the corner with its bucket in an elevated position. Because of his location and inability to move the loader back, the victim did not exit the loader through its front end, as was his customary practice. He attempted to exit the loader from its left (driver's) side and, as he was getting out, inadvertently hit the left hand control which operated the loader's hydraulic cylinders. He was caught between the loader's left cylinder

and body frame as the bucket lowered and suffered crushing chest injuries.

He was deceased when a brother discovered him, about two and one-half hours after having last been seen alive. The loader was flooded and its battery was nonfunctional at that time. The cylinder had come down on the victim's right side; his lower back and legs were still in the loader's operator compartment. His right foot had jammed under the right hand control, causing the bucket to tilt fully forward onto the barn floor after lowering and raised the front end of the loader off the floor. A 911 call was placed and first responders assisted in releasing the victim from the loader using a large front end loader and chain. The victim was transported to a hospital where he was pronounced dead on arrival.

CAUSE OF DEATH

The cause of death listed on the death certificate was respiratory arrest due to or as a consequence of a crush injury to the chest wall.

RECOMMENDATIONS/DISCUSSION

***Recommendation #1*:** Do not alter or remove protective structures and other safety devices from machinery. This recommendation is in accordance with MN Rules 5205.0710.

***Discussion*:** In addition to providing protection from the hazards of the scissor points at a loader's hydraulic cylinder and body frame, the protective cage on a loader, in conjunction with use of a seat belt, protects the operator from tipping/roll-over hazards and falling overhead hazards. Hazards which are not readily apparent may result and/or additional hazards may be created when protective structures or devices are removed or altered on machinery. Manufacturers, or others having knowledge of accepted engineering requirements, should be consulted when machinery modifications are necessary. In this case, shoveling manure into building areas that are tall enough to accommodate the existing loader and cage, or purchasing a new loader with a shorter cage, may be necessary. Comparable loaders having cage heights at only 6 feet are available.

***Recommendation #2*:** Protect operators of machinery from the hazards of scissor points on machinery through the use of appropriate guards. This recommendation is in accordance with MN Rules 5205.0765.

***Discussion*:** The hydraulic cylinder's manually operated brace was not much use during work on this

farm since the bucket was rarely, if ever, used in the fully upright position. Many manufacturers of loaders are currently installing control lock-out devices in the form of a seat bar. When not in place across the operator's lap, the bar deactivates controls and locks out hydraulics to reduce the possibility of inadvertently dropping a raised bucket. These bars must be lowered or raised to operate or exit from the machine, respectively, and their function is independent of bucket height. Retro-fitting older loader models with a control lock out may be cost-prohibitive at this time.

Recommendation #3: Follow manufacturer's recommended procedures for boarding and exiting machines.

Discussion: Loaders should always be shut off and their buckets lowered before boarding or exiting. Though perhaps difficult, the victim could have lowered the bucket and exited through the front of the loader. Machine operators should keep in mind that hazards which result when recommended procedures are not followed are real. To avoid them it is necessary to always remain alert and conscious of them.

REFERENCES

1. Minnesota Labor and Industry, Occupational Safety and Health Standards, Chapters 5205, 5206, 5207, 5210, 5215, Extract from 1991 MN Rules, 5205.0710 and 5205.0765. St. Paul, Minnesota.

2. Anderson, K.C., Smith, G.L. 1988. Human Presence Activated Safety Systems for Mobile Off-Road Equipment. ASAE Paper No. 88-5516. ASAE, St. Joseph, MI.

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