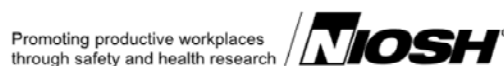




The National Institute for Occupational Safety and Health (NIOSH)



Farmer Dies After Tractor He was Driving Rolled Over on Him

Minnesota FACE 94MN029

SUMMARY

A 44-year-old male farmer (victim) died when the tractor he was driving rolled over on him. The tractor was not equipped with either a cab or a rollover protective structure. It had a narrow front wheel configuration. It did not have dual rear wheels. A front-end loader, equipped with a general purpose bucket, was mounted on the tractor. Soil erosion along a wooden cattle lot fence weakened the support posts. He used the tractor and loader to scoop a bucket of dirt from a remote area of a pasture and transported it to the fence to stabilize the fence posts. He drove the tractor toward the fence, traveling east, across inclined terrain which sloped to the operator's right. This resulted in the right side of the tractor being lower than the left side. The tractor suddenly rolled 180 degrees to the side, coming to rest in an inverted position at the bottom of the incline. He sustained severe chest injuries when he was pinned underneath the tractor as a result of the rollover. MN FACE investigators concluded that, in order to reduce the likelihood of similar occurrences, the following guidelines should be followed:

- all tractors should be equipped with a rollover protective structure and a seat belt;
- operators of tractors should only back up or drive forward down inclined grades and
- while in motion, tractors with loaders should be operated with the loader in the lowest possible position.

INTRODUCTION

On June 3, 1994, MN FACE investigators were notified of a farm work-related fatality which occurred on June 2, 1994. The county sheriff's department was contacted and releasable information was obtained. Information obtained included a copy of their report and copies of photos of the incident site. A site investigation was not conducted by MN FACE investigators.

The victim had been moving dirt with a tractor and front-end loader when the incident occurred. He was driving across an inclined area which sloped to the right side of the tractor. The tractor suddenly rolled over to the side and pinned the victim underneath the tractor. He was alone at the time of the incident.

INVESTIGATION

This investigation is based on a review, by MN FACE investigators, of a written sheriff's report of the incident. Also reviewed were copies of 31 photos of the incident site taken by officers of the sheriff's department.

The victim used a tractor and front-end loader to move dirt from a farm pasture to a cattle lot fence. The tractor was approximately 30-35 years old and was not equipped with any type of rollover protective structure or a general purpose enclosed cab. It had a narrow front wheel configuration and did not have dual rear wheels. The front-end loader was equipped with a general purpose bucket.

Soil erosion along a wooden cattle lot fence weakened the support posts. The victim used the tractor and loader to scoop a bucket of dirt from a remote area of a pasture. He transported the dirt to the cattle lot fence to stabilize the fence posts. He drove toward the fence traveling east across an incline which sloped to the south. The slope of the terrain resulted in the right side of the tractor being lower than the left side. Several photos of the incident site show the inclined terrain and the wooden cattle lot fence. From these photos the slope of the terrain was estimated at approximately 28 percent. This estimate was obtained by dividing the measured vertical distance of the terrain (1.4 units) by the measured horizontal distance (5 units). The tractor suddenly rolled 180 degrees and came to rest at the bottom of the incline, in an inverted position. The victim was pinned, lying on his stomach, partially underneath the tractor.

The victim's 17-year-old son was leaving the farm for school when he discovered his father pinned beneath the tractor. He used several chains and a large tractor to roll the tractor off of the victim. After freeing his father and observing that he was unconscious, he administered resuscitation efforts by giving him several breaths of air. Family members believe the victim, who was alone at the time of the incident, may have been pinned under the tractor for nearly fifteen minutes before being discovered.

Emergency medical personnel arrived at the scene approximately ten minutes after the victim was discovered. They transported the victim to a local hospital where he was pronounced dead approximately one hour after being discovered by his son.

Photos of the incident site taken by the sheriff's department show the right rear tractor tire and rim separated from the tractor wheel. The separated tire and rim are shown lying on the ground at a location where it probably would have struck the ground if still attached to the tractor during the rollover. Its location, next to the overturned tractor, appears to indicate that the separation occurred during the rollover. However, other photos clearly show a broken right rear wheel. A piece was or pieces were broken from the outer edge of the wheel at the point where bolts and lugs are used to securely fasten the wheel and rim together. From the photos, it could not be determined whether the wheel broke during the rollover, or if the wheel broke first, resulting in the tire and rim being separated from the tractor wheel before the rollover.

CAUSE OF DEATH

The cause of death listed on the death certificate was hepatic lacerations.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: All tractors should be equipped with a rollover protective structure and a seat belt.

Discussion: Preventing death and serious injury to tractor operators during tractor rollovers requires the use of a rollover protective structure and seat belts. These structures, either a roll-bar frame or an enclosed roll-protective cab, are designed to withstand the dynamic forces acting on it during a rollover. In addition, seat belt use is necessary to ensure that the operator remains within the "zone of protection" provided by the rollover protective structure. Government regulations require that all tractors built after October 25, 1976, and used by employees of a farm owner be equipped with a rollover protective structure and a seat belt. Many older tractors are in use on family farms and do not have, nor are they required by government regulation to have, such structures to protect their operators in case of rollover. All older tractors should be retrofitted with a properly designed, manufactured, and installed rollover protective structure and a seat belt. If the tractor involved in this incident had been retrofitted with a rollover protective structure and a seat belt, and the seat belt had been in use, this fatality might have been prevented.

Recommendation #2: Operators of tractors should only back up or drive forward down inclined grades.

Discussion: Tractors should be backed up or driven forward down steep grades and inclines to reduce the potential for a rollover. In this position, a tractor is more stable than when it is driven across or up an incline, and the potential for rollover is reduced. If the tractor had been backed up the incline, the slope of the incline would not have contributed to tilting of the tractor to the "side." If the tractor had been backed up or driven forward down the incline, this fatality might have been prevented.

Recommendation #3: While in motion, tractors with loaders should be operated with the loader in the lowest possible position.

Discussion: A front-end loader mounted on a tractor raises the tractor's center of gravity. In addition, the center of gravity rises further as the height of the loader is increased. Raising the center of gravity increases the potential of a side rollover, especially if the tractor is driven across inclined terrain. Therefore, it is recommended that a front-end loader be kept as low as possible whenever a tractor is in use or in motion. This is particularly important if the tractor is on inclined terrain. If the loader involved in this incident had been raised only several inches above the ground, this rollover and fatality might have been prevented.

REFERENCES

1. Office of the Federal Register: Code of Federal Regulations, Labor, 29 CFR Part 1928.51(b), U.S. Department of Labor, Occupational Safety and Health Administration, Washington, D.C., April 25, 1975.
2. Agriculture Safety, Fundamentals of Machine Operation, 1987, Deere & Company, Moline, Illinois, Third Edition.

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