DATE: January 2, 1996

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

SUBJECT: MN FACE Investigation 95MN04901
Farmer Dies After Tractor He was Driving Rolled Over on Him

SUMMARY

The victim was alone at the time that the unwitnessed incident occurred. This report is based on information obtained during a telephone interview with the victim's son and on a review of a copy of the sheriff's department report and copies of their photographs taken at the incident site.

A 75-year-old male farmer (victim) died of injuries sustained when the tractor he was driving rolled over on him. He was driving a farm tractor pulling a wagon loaded with 100 bushels of wheat. The tractor was not equipped with a rollover protective structure or a general purpose cab. The victim hauled loads of wheat from a field while his son used a combine to harvest the field. A few minutes after the gravity wagon was filled, the victim drove the tractor pulling the wagon from the field. The loads were pulled down the hill of a wet dirt field road. Approximately ten minutes later, the victim's son noticed smoke rising from the other side of the hill in the field road. He drove the combine to the incident site and discovered his father pinned beneath the overturned and burning tractor. Skid marks caused by braking of the tractors rear wheels indicated that the victim used the brakes to slow the speed of the tractor and wagon down the hill. The victim's son drove back to the wheat field where another tractor equipped with a front end loader was parked. He returned to the incident site with the tractor and loader and used the loader to free his father. After his father was freed, he drove to a nearby farm house and placed a call to emergency medical personnel. They arrived at the scene shortly after being notified. The victim was transported to a local hospital where he was pronounced dead on arrival. MN FACE investigators concluded that 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;

- tractor operators should be trained to recognize and understand the hazards associated with towing items that weigh nearly the same as or more than the tractor; and

- operators should lock both brake pedals together when driving in slippery conditions.

INTRODUCTION

On August 22, 1995, MN FACE investigators were notified of a farm work-related fatality that occurred on August 18, 1995. The county sheriff's department was contacted and releasable information obtained. Information obtained included a copy of their report and copies of their photos of the incident site. A site investigation was not conducted by a MN FACE investigator. The victim's son provided information about the incident during several telephone interviews with a MN FACE investigator.

INVESTIGATION

The victim was driving a two-wheel drive farm tractor pulling a gravity flow grain wagon. The tractor was approximately 25 years old and was not equipped with a rollover protective structure or a general purpose enclosed cab. It had a wide front wheel configuration and did not have dual wheels on either rear axle. The tractor did not have any counterweights mounted on it. The rear tractor tires contained some fluid but the exact amount could not be determined. The weight of the tractor according to the manufacturer's specifications was approximately 7500 pounds.

The gravity flow wagon weighed approximately 1250 pounds and had a capacity of 125 bushels. The wagon was loaded with approximately 100 bushels of wheat. The estimated weight of the wheat, based on a standard weight for wheat of 60 pounds per bushel was approximately 6,000 pounds. The estimated total weight of the wagon and wheat was approximately 7,250 pounds.

The victim's son used a combine to harvest a field of wheat on the day of the incident. Earlier on the day of the incident, the victim had hauled four or five wagon loads of wheat from the field. The loads were pulled down the hill of a field road that had a slope of approximately 30 degrees or 60 percent. When driving down the hill, the road curved to the left near the bottom

of the hill. The distance from the top to the bottom of the hill was approximately 75 feet. The dirt field road was wet from rain that fell several days before the incident. It was slightly wetter in the area of the incident due to afternoon shading caused by trees along the northwest side of the road.

A few minutes after the gravity wagon was filled, the victim drove the tractor pulling the wagon from the field. Although the speed of the tractor as it was driven from the field was unknown, the victim usually drove in first or second gear while pulling loads from the field. In second or third gear, the maximum speed of the tractor was approximately 3 to 4 miles per hour.

Approximately ten minutes after the victim left the field, the victim's son noticed smoke rising from the other side of the hill that the victim had driven over. He drove the combine to the incident site and discovered his father pinned beneath the overturned tractor. Skid marks caused by braking of the tractors rear wheels indicated that the victim used the brakes to slow the speed of the tractor and wagon down the hill. Apparently, as he turned the tractor to the left near the bottom of the hill,the momentum of the wheat and wagon exerted enough force against the tractor drawbar to cause the tractor to slide. The tractor and wagon "jack knifed" and as the tractor slid to the side, it overturned 180 degrees to the right and came to rest upside down. The victim was thrown from the tractor and was pinned beneath it. After the tractor overturned, it caught fire and the front portion of it burned.

The victim's son drove back to the wheat field where another tractor equipped with a front end loader was parked. He drove back to the incident site and used the tractor and loader to lift the overturned tractor from his father. After he freed his father, he drove to a nearby farm house and placed a call to emergency medical personnel. Emergency medical personnel arrived at the scene shortly after they were notified. They transported the victim to a local hospital where he was pronounced dead on arrival.

CAUSE OF DEATH

The cause of death listed on the death certificate was asphyxiation due to chest compression.

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 a seat belt. These structures, either a roll-bar frame or an enclosed roll-protective cab, are designed to withstand the dynamic forces acting on them 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 must 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 a rollover. All older tractors should be fitted with a properly designed, manufactured, and installed rollover protective structure and seat belt. If the tractor involved in this incident had been fitted 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: Tractor operators should be trained to recognize and understand the hazards associated with towing items that weigh nearly the same as or more than the tractor.

Discussion: The momentum of a vehicle in motion is directly proportional to the weight and speed of the vehicle. The total momentum of a tractor and a towed unit or units consists of the momentum of the tractor plus the momentum of the towed unit(s). If the total weight of a towed unit or units nearly equals or exceeds the weight of the tractor pulling them, dangerous situations may be created, especially as speed increases, while turning, or while driving on wet surfaces where traction may be reduced. All of these factors either were or may have been present and contributed to the occurrence of this incident. The momentum of the wagon and wheat may have exceeded the momentum of the tractor and resulted in a condition that increased the potential for loss of control by the operator. Recognition and an understanding of the hazards associated with towing items is essential to reduce the likelihood of dangerous situations that may result in tractor rollovers.

Recommendation #3: Operators should lock both brake pedals together when driving in slippery conditions or conditions where traction may be reduced.

Discussion: The center of gravity of most two-wheel drive tractors, is behind the midpoint of

the tractor's length and above the rear axle height. During turns, the forces acting on the tractor can cause it to roll over to the side. If an operator applies braking to only one rear wheel or uneven braking to the rear wheels while driving on slippery conditions or conditions where traction may be reduced, the tractor may suddenly begin to slide to the side. During a slide to either side, the forces acting on the tractor are similar to the forces that exist during high speed turns and they may cause the tractor to overturn. Whenever tractors are used to pull heavy loads or when they are operated on slippery surfaces, the brake pedals should be locked together to reduce the likelihood of causing the tractor to slide to either side and overturn as the result of uneven braking.

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.

George Wahl, M.S. Senior Safety Investigator MN FACE

David L. Parker, M.D., M.P.H. Principal Investigator MN FACE

Debora Boyle, D.V.M., Ph.D. Epidemiologist Principal MN FACE