UK UNIVERSITY OF KENTUCKY ACADEMIC PROGRAMS ATHLETICS UK HEALTHCARE RESEARCH SITE INDEX Search UK

FINAL KY FACE #98KY077

Date: 14 December 1998

SUBJECT: Tractor Driver Killed in Overturn While Mowing

SUMMARY

A 44-year-old farm owner was killed when the tractor he was driving overturned. Using a rotary mower attached to a Ford 600 tractor, the farmer was mowing an area along the gravel road leading to his home in a very remote area of the county. On the east side was a fence and on the west a brush covered embankment. At the top of the seven-foot embankment was a sloping field that had been mowed earlier in the season. The tractor, having been purchased six weeks earlier, had undergone maintenance work but was not equipped with a Roll Over Protective Structure (ROPS) or a seatbelt. After making one pass around the hillside bordering the road, he continued a second pass in a counterclockwise direction traveling northward, parallel to the gravel road. The tractor's right front wheel went over the edge of the embankment, causing the tractor to overturn and come to rest on top of the victim's head in the center of the road. A neighbor discovered him about a half hour later and called emergency medical services (EMS). In order to prevent similar incidents, the Kentucky FACE investigator recommends that:

* older model tractors should be retrofitted with ROPS and seatbelts;

* operators should wear seatbelts when on ROPS-equipped tractors;

* tractor wheels should be weighted to afford maximum stability;

* tractors should be equipped with front-end counterweights;

* novice operators should familiarize themselves with both the equipment and the land prior to beginning activities;

* courses for novice tractor operators should be offered; and,

* rural counties should periodically update road maps/signs, instruct citizens to write out directions to their farms, and implement enhanced 911 systems.

INTRODUCTION

On 4 October 1998, FACE investigators were notified of the death of a 44-year-old male involved in a tractor overturn. The incident occurred on October 2 and an on-site investigation took place on October 12. A FACE investigator, along with a nurse from the Community Partners for Healthy Farming project, accompanied EMS personnel and the county coroner to the scene. Copies of the coroner's report, the death certificate, newspaper articles, and the State Police report were obtained. Photos and measurements were taken of the scene, the tractor and the mower. An interview with the victim's widow was conducted. An agricultural engineer and a representative of the equipment manufacturer were consulted.

The victim in this case had previously worked full-time as a police officer in Florida for several years.

Following an injury he retired from the force, moved to Kentucky and purchased a farm with very hilly terrain. He had little farming experience prior to moving to the 120-acre farm. According to his wife, he was a non-insulin-dependent diabetic and took medication for attention deficit disorder, but was generally in good health following recent back surgery. Five weeks prior to this incident, he had had a close call but was able to jump free of the overturning tractor.

INVESTIGATION

The victim had worked for a police department and a fire department before moving to this remote farm in Kentucky. Although he was receiving disability benefits from a work-related injury, he was able to do farm chores and maintain the farm he had purchased a few years earlier. He and his wife had a few cattle, horses and goats on the farm. Like other farms in the region, this farm was situated in rolling hills with very little flat land.

The tractor in this case was a 28-horsepower gasoline powered 4-cylinder 1956 Ford Model 600. This 2700-pound tractor was designed as a general purpose farm tractor and originally sold for about $1800. It had no PTO shield or SMV emblem. This tractor had been 95% restored, and on the day of the incident the victim was operating it without the hood because it was being painted. Most of the restoration had been completed by a prior owner. The victim had purchased the tractor from a neighboring farmer about six weeks prior to the incident. His experience using farm tractors was limited to the past two years. The wheels were spread to 54 inches and the wheel base measured 80 inches. The hour meter read 2058. Both rear tires were air-filled and in good condition. Brakes functioned well on the day of the investigation.

On the day of the incident, the weather was dry and about 75 degrees. The victim decided to mow portions of the property using the tractor and a five-foot wide single blade rotary mower. This was the second time he had done the task of mowing; the first was the same day he purchased the tractor. However, this was the first time he had mowed this particular portion of the farm using this tractor and mower.

Along the west side of the single-lane sloping gravel road leading to the farmhouse was a non-fenced hillside dotted with a few trees. It was this mixed grass two-acre field the victim intended to mow. The gravel road sloped eight percent toward the south. A fence bordered the road along its eastern edge to contain the few cows, goats and horses owned by the victim and his wife. Along the western edge of the road was a steep (56% slope) brush covered embankment about six feet up from the road surface. At the top of the embankment the grassy two-acre field continued at a 15% slope westward up the hill to a row of trees.

The heavy-duty three-point hitch rotary mower was made of 3/8" steel and was in good condition for a mower of this age, estimated to be about 25 years old. It had also been restored. The unit did not have any guards to prevent flying projectiles, nor did it have a PTO shaft shield.

The victim had made one counterclockwise cut around the field by entering it at a point where it gently sloped up from the gravel road about 30 feet south of the brush covered embankment. On the second pass around the field, he attempted to mow closer to the brush when the right front wheel began to slide over the embankment. Unable to stop the forward momentum of the tractor, it continued over the steep hill, overturned to the right 180 degrees and crushed the victim under the steering wheel. It is not known whether the victim attempted to jump clear of the overturning tractor.

The victim was found at 10:30 am by a neighbor who was coming down the gravel road to visit. He ran to the house and called 911. First on the scene was the rescue squad. EMS followed within a few minutes and upon arriving at the scene found no pulse or respiration. The coroner was called, and he pronounced the victim

dead at 12:30 pm. The EMS personnel who responded to the call were Farm Medic trained and used a gasoline-powered hydraulic ram to free the victim. State Police arrived at the scene a few minutes later.

Older model tractors had PTO drives that are termed "transmission driven" or sometimes called ground driven PTOs. With this type of PTO, the PTO shaft is coupled directly to the input shaft of the transmission and a single clutch controls both the transmission and the PTO. Thus when the PTO is Control lever is engaged and the transmission is in gear, the two are locked

together. Therefore when the wheels of the tractor are turning the PTO drive line will also turn. Also, if there is a force driving the PTO, such as the momentum of the spinning blade on the rotary mower, it will drive the transmission even with the tractor clutch depressed because the two are still directly coupled together. If the transmission is returned to the neutral position then the rear tractor wheels are no longer coupled to the transmission drive shaft and the momentum of the PTO will not drive the rear wheels. [Most newer tractors have a double acting clutch system that when depressed part way will disconnect the drive shaft to the transmission but

leave the PTO engaged. By fully depressing the clutch both the transmission and the PTO are disengaged. This is useful when operating balers and forage harvesters so if they start to plug up the forward motion of the tractor can be stopped and the PTO will continue to operate and clean the machine out.]In most cases the operator's normal reaction for an emergency would be

to depress the clutch and brake peddles to stop the tractor. In this case the braking force was required to over come the forward momentum of the tactor and also the flywheel momentum of the spinning mower blade.

CAUSE OF DEATH

The cause of death was massive head injuries.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Older model tractors should be retrofitted with ROPS and seatbelts.

Discussion #1: Tractor owners and operators should contact their county extension agent, local equipment dealer or equipment manufacturer to see if retrofit rollover protection and operator restraint systems are available for their equipment.

The tractor in this incident, manufactured in 1979, was not equipped with a ROPS or an operator restraint system, which protect the operator in the event of a rollover. ROPS first became available as optional equipment on farm tractors in 1971. These safety features were not required on tractors until 1976, when OSHA Standard 29 CFR 1928.51 went into effect. This standard required employers to provide ROPS and safety belts for all employee-operated tractors manufactured after October 25, 1976. However, this standard does not apply to family farms or farms employing fewer than 11 employees. Since 1985, as a result of voluntary agreements by tractor manufacturers, all new tractors sold in the US have been equipped with ROPS and safety belts (MMWR Jan.29, 1993). A retrofit ROPS and operator restraint system are available for this 1979 tractor. Tractor owners should contact dealers, manufacturers or county extension agents for information on sources of retrofit ROPS and operator restraint systems.

Recommendation #2: Operators should wear seatbelts when on ROPS-equipped tractors.

Discussion #2: Operators of ROPS-equipped tractors should secure themselves in the safety zone by wearing

the seatbelt. A ROPS alone provides protection, but without a fastened seatbelt an operator can be thrown from the tractor and possibly crushed by the tractor or even the ROPS itself. It is not recommended that operators wear a seatbelt on a non-ROPS equipped tractor. When ROPS are sold as retrofit kits, they include a seatbelt designed to be installed in conjunction with the ROPS. It is the responsibility of the operator to use the seatbelt.

Recommendation #3: Tractor wheels should be weighted to afford maximum stability.

Discussion #3: Tractor owners and operators should, when operating on sloping terrain, fill their tires with water containing an antifreeze ingredient (calcium chloride or ethylene glycol) to increase weight and tractor stability. Axle weights can also be added to increase stability.

Weight distribution of the tractor is critical on sloping land. By increasing rear tire weight with fluid or axle weights, tractor stability increases. Water can be added to the tires through the valve stem opening. This service is offered by many farm implement dealerships. On this tractor, fluid-filled tires could have added up to 400 pounds per tire. It is uncertain whether tire weight alone could have prevented this fatality; however, added weight provides traction and balance. In this case, the front wheels could have been extended outward to improve tractor stability.

Recommendation #4: Tractors should be equipped with front-end counterweights.

Discussion #4: Additional weight on the front of this tractor would have increased its stability and steering capabilities. With the weight of the five-foot heavy-duty mower attached to the three-point hitch and extending beyond the rear tires, the steering is affected by a reduction of the downward forces on the front wheels. To counteract, additional weights should be added to the front of the tractor.

Recommendation #5: Novice operators should familiarize themselves with both the equipment and the land prior to beginning activities.

Discussion #5: Owners/operators should be offered safety courses and materials to identify hazards, evaluate risk and develop safe operating procedures. The information should be easily accessible to the part-time farmer. Offering such information to farmers through county extension agents can be an avenue for intervention and prevention.

As a part-time farmer, the victim had only part-time experience on his equipment. Education could have (1) shown the victim hazards of hillside tractor operation; (2) demonstrated safe practices with a clutch of this type; and (3) helped the victim to select a different approach to this particular land slope.

Recommendation #6: Courses should be offered by county extension that would address basic tractor and farm safety practices.

Discussion #6: In this case the tractor operator had minimal experience on this tractor and in operating farm equipment. Classes offered for new farmers could alert operators of possible hazards, the availability and cost of ROPS and the need to assess terrain prior to initiating a task. These classes could be advertised at the time the property is transferred and the deed recorded at the courthouse. This would allow new farmers who might not be experienced in farm equipment operation to learn about hazards and how to prevent injury on the farm.

Recommendation #7: Rural counties should periodically update road maps/signs, instruct citizens to write out directions to their farms, and implement enhanced 911 systems.

Discussion #7: In this case locating the farm proved particularly difficult. It was situated where three Kentucky counties merge and roads are not well marked. Although in this case the victim died instantly and a rapid response would not have helped, in other cases it may be crucial that emergency medical personnel are able to locate injured farmers rapidly. Updating road maps and rural road signs would facilitate this.

******

Between 1994 and 1997, 92 farmers were killed in Kentucky while operating farm tractors. 55 of these deaths were tractor overturns, 24 were tractor runovers, 7 were cases where the operator was thrown from the tractor, and 6 resulted from highway collisions. At least 86 of these farmers would probably have survived had they been on ROPS-equipped tractors and secured in seatbelts.

REFERENCES

Standard Number 1928.51, Subpart C, US Department of Labor, Occupational Safety and Health Administration, OSHA CD-ROM (OSHA A94-2), February 1994.

National Safety Council Data Sheet I-6222-Reaf. 85 Tractor Operation and Roll-Over

Protective Structures, 1978.

US Department of Health and Human Services, PHS, Centers for Disease Control and Prevention National Institute for Occupational Safety and Health. *Update*. NIOSH Reports on the Preventability of Tractor Rollovers. January 29, 1993.

MMWR 42(03);57-59.

Official Guide - Tractors and Farm Equipment, North American Equipment Dealers Association Fall 1994 Edition.

j:\d\f\rpts98\98ky077.wpd