TO: Director, National Institute for Occupational Safety and Health

FROM: Iowa FACE Program

SUBJECT: *Tractor avoids oncoming car but rolls in a ditch killing the operator -- Iowa.*

SUMMARY

A 67-year-old farmhand driving an older tractor was distracted by approaching traffic while turning into a farm lane and over-steered slightly causing the tractor to enter a ditch and roll over. The victim was on the right shoulder of the highway, preparing to turn left into the farm lane. After he began his turn a car immediately appeared over a hill to the front and right of the tractor. This distraction caused the tractor operator to hurry across the highway and misjudge the entry into the farm lane. The narrow-front tractor drove too far to the left of the farm lane, and rolled in the steep ditch, killing the operator instantly. The victim was transporting a large bale of hay with the tractor using rear mounted hay hooks. This extra weight on the rear of the tractor, combined with the slope of the road, may have made the tractor light on the front end and difficult to steer accurately. The tractor had no ROPS and the man was crushed underneath the tractor.

RECOMMENDATIONS based on our investigation are as follows:

- *1. Tractors should be equipped with ROPS, especially if they are used for road transportation, loading, or mowing ,or if they are tricycle-type.*
- *2. Farmers, rural residents, and county/state road departments should pursue grading changes or post warning signs along the roadway to alert drivers of dangerous intersections with a farm lane or driveway.*
- *3. Farmers and other rural residents who have dangerous intersections on their property should consider how to re-route farm lanes and driveways to maximize visibility.*

INTRODUCTION

During the summer of 1996, a 67-year-old farm helper was killed when the tractor he was driving rolled over in a ditch. The Iowa FACE program was informed of the incident 2 weeks later by a FACE investigator from an adjoining state, where the victim lived. The victim worked weekends on the Iowa farm, which was owned by his daughter and son-in-law. Information was gathered from many sources, including newspapers, police reports, the Iowa State Department of Transportation (DOT), and interviews with the daughter and son-in-law.

A site visit was conducted by the Iowa FACE investigator two months after the fatal incident, at which time photographs of the tractor and the accident site were taken.

The 250 acre century Iowa farm produced cattle and hogs. The farm employed the farmer and his wife, with weekend help from the victim for the past 2 years. At the time of the incident, the man was working alone moving large hay bales using an older narrow-front tractor without a ROPS. As this was a small family farm, there were no safety programs or written policies in place. The victim, however, was quite familiar with the tractor's controls and handling.

INVESTIGATION

The victim was using an older narrow-front tractor to bring hay in from a field. The tractor had a front-mounted hay fork and rear-mounted bale hooks attached to the 3-point hitch. The victim was transporting a large, round bale of hay using rear-mount bale hooks. He was waiting on the right shoulder of a state highway, facing north, preparing to turn left into the farm driveway. The highway was sloped steeply, with the crest of the hill 200 feet to the north. The man signaled his turn with his outstretched left arm, and waited for traffic to pass.

Immediately after initiating his turn, a car appeared to the victim's right side over the crest of the hill. The car driver applied brakes hard and managed to stop before the farm driveway, then observed the tractor enter the ditch on the south side of the driveway and flip over. The tractor rolled over completely, crushing the operator underneath. The car driver, who lived a short distance away, drove home immediately and called 911. When emergency personnel arrived, a neighbor had already begun to upright the overturned tractor, however the man was dead at the scene.

The driver of the car states that the victim appeared distracted by her approach, and had his head turned to the right side prior to entering the ditch. Apparently, the man's primary concern was getting across the highway to avoid a collision. In so doing he missed the driveway by a few feet and entered the steep ditch adjacent to the farm lane. Nothing seems to have malfunctioned on the tractor prior to the overturn, and at the time of the FACE investigation, the tractor was in good working condition.

The weight of the round bale (typically over 1,000 lbs.) on the rear of the tractor shifts weight from the front wheels to the rear wheels and adversely affects the steering ability of the tractor. Rapid acceleration has the same effect and may further complicate steering. When the tractor with substantial additional weight in the back is set in the turning motion, the forces tend to spin the tractor around, and this makes it more difficult to straighten the tractor to move straight ahead. Both the reduced weight on the front wheels and the forces continuing the turn may have contributed to the incident, not allowing the operator to have full control of the tractor when steering into the farm lane.

A site visit was completed at the farm to view and photograph the tractor and the ditch where the overturn occurred. There was nothing apparently abnormal about the ditch or the highway next to this farm. Weather conditions were not a factor, nor was the sun in position to cause glare or poor visibility. However, this intersection of the highway with the driveway is poorly

seen by road traffic approaching from the north. This is a known hazard, especially dangerous when farm tractors with implements are entering or leaving the highway. In addition, local residents report multiple near-accidents when a school bus has stopped at the farm, forcing southbound motorists to brake suddenly to avoid a collision.

The Iowa State Department of Transportation has reviewed the accident site, taken measurements, and made recommendations for grade correction. This highway is on the list for resurfacing, and the county has agreed to correct the grade at this point to improve visibility in and out of this farm in the future. The DOT states that farmers are to check with the State before creating or moving an access lane to a field or farm. Since farm driveways and field access lanes are so common in Iowa, it did not seem practical to post warning signs for every entry / exit point onto highways. If multiple warning signs were posted on all roads, their effectiveness could be reduced to the point of being ignored.

CAUSE OF DEATH

The cause of death was listed as *traumatic asphyxiation due to tractor rollover*. No autopsy was performed.

RECOMMENDATIONS / DISCUSSION

Recommendation #1 *Tractors should be equipped with ROPS, especially if they are used for road transportation, loading, or mowing, or if they are tricycle-type.*

Discussion: Older tricycle type tractors are common on row crop production farms, being used for a variety of tasks, in all environments. On level ground, few farmers have experienced problems, but operating these tractors near steep ditches is very dangerous due to the unstable front end and the high probability of overturn. Rear counterweights or liquid-filled tires improve stability, but the operator must still be constantly aware of changing slopes, ditches, holes, and bumps which can dangerously shift the tractor's center of gravity. Tricycle type tractors are significantly more prone to rollovers than wide-front tractors, and should not be used with front-end loaders or hay forks which can significantly change the machine's center of gravity. Installation of a ROPS on this older tractor would likely have saved the operator's life by preventing a complete rollover. Installation of ROPS is recommended on all tractors which do not have it, especially if the tractor is used for road travel, mowing, loading, transportation or daily chores.

Recommendation #2 *Farmers, rural residents, and county/state road departments should pursue grading changes or post warning signs along the roadway to alert drivers of dangerous intersections with a farm lane or driveway.*

Discussion: Highways typically have several entry/exit points for farms and farm fields in rural areas. Warning signs for all these intersections may not be feasible, however, they may be justified if the intersection is dangerously hidden by a curve or, as in this case, a hill. Residents in these situations should contact their state DOT office and initiate procedures to have a warning sign posted. In this case, analysis of the intersection by the state DOT has led to

a planned grade reduction of the hill in the near future when the highway will be resurfaced.

Recommendation #3 *Farmers and other rural residents who have dangerous intersections on their property should consider how to re-route farm lanes and driveways to maximize visibility.*

Discussion: In this case, the farm entrance came directly off a state highway, within 200 feet of the crest of a hill. This had been a well-known safety hazard to the residents of this farm for many years. Another location for the farm lane would be safer, one which would increase the stopping distance for motorists, perhaps on the crest of the hill itself, or further south. This may require considerable expense, and possibly cause inconvenience, however, it would provide safer access and peace of mind for the farm's residents and visitors. As this particular farmer has 5 young children, this is an especially important option to consider.

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Fatality Assessment
&
Control Evaluation Program
(FACE)

The University of Iowa, in conjunction with the National Institute for Occupational Safety and Health (NIOSH), is investigating the causes of work-related fatalities in the State of Iowa. FACE is a surveillance program that identifies all occupational fatalities, conducts in-depth, on-site investigations on specific types of fatalities, and makes recommendations for employers and farmers to help prevent similar fatal accidents in the future.

Iowa is a major farming state, and therefore the Iowa FACE Program deals with many occupational deaths on the farm. It is a very hazardous profession that claims hundreds of lives nationally every year. We publish detailed reports that are disseminated to key agricultural leaders in Iowa who share our concern for the safety of farmers. To reach and effectively communicate with this independent and vulnerable group is a worthy challenge here in Iowa.

NIOSH funded state-based FACE Programs include: Alaska, California, Colorado, Indiana, Iowa, Kentucky, Maryland, Massachusetts, Minnesota, Missouri, Nebraska, New Jersey, Wisconsin, and Wyoming.

Additional information regarding this report or the Iowa Face Program is available from:

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