FACE INVESTIGATION

SUBJECT: Farmer Dies After Becoming Entangled in Unguarded Driveline on a Corn Auger

SUMMARY: An 82-year-old male farmer (the victim) died after becoming entangled in the driveline of a portable grain auger. The auger was connected to a tractor equipped with a power take-off (PTO) stub shaft, which powered the driveline of the auger. The PTO stub shaft on the tractor and the auger PTO driveline were shielded, but the secondary drive shaft on the auger was unguarded. The victim was working with his business partner (the partner) in a farmyard, transferring shelled corn from a truck into a grain bin. He had warned family members about the hazard of contacting the rotating drive shaft of the grain auger, and would walk around the tractor and auger to avoid contacting the drive shaft. The victim had knee surgery four months before the incident, and continued to experience knee pain and stiffness. When his knees were uncomfortable, he occasionally ducked under the elevated corn auger to get to the other side rather than walking the longer distance around the equipment. Immediately before the incident, the victim was standing next to the operating auger, at a point where the drive shaft was approximately four feet from the ground, when his shirt was caught and pulled by the rotating driveline. The shirt fabric was wound around the approximately 1 1/4 inch diameter drive shaft and the victim was pulled against the auger. (See Figures 1 and 2.) The partner had walked toward the truck a few moments before the incident occurred. He heard the tractor motor stop, then looked in the direction where the victim had been working. He saw him entangled in the shaft, with his face turning blue. The partner tried to pull and cut away the shirt fabric to free the victim from the shaft, but was unsuccessful. He then went across the road to call EMS services. Emergency vehicles arrived, and the victim's body was freed from the machine and transported to a hospital where he was pronounced dead on arrival. The FACE investigator concluded that, to prevent similar occurrences, farm machine/equipment operators should:

- **identify all rotating machinery/equipment components, and ensure that appropriate guards, recommended by the manufacturer or dealer, are installed**
- **observe and follow all applicable safety precautions when operating machinery driven by tractor power take-off equipment, including disengaging the PTO and stopping the tractor engine before approaching the machinery**
- **never step under or over a rotating shaft**
- **avoid wearing clothing that is loose-fitting, torn or ragged, or has details that could be caught by moving machine parts and lead to entanglement**

In addition, agricultural businesses should:

- **include safety management as an integral part of their business operation**

INTRODUCTION:

On October 21, 1995, an 82-year-old male farmer was strangled after his clothes were caught and wrapped around the unguarded driveline of a portable grain auger. The Wisconsin FACE field investigator was notified by the Wisconsin Department of Industry, Labor & Human Relations, Workers Compensation Division, on

December 13, 1995. On May 29, 1996, the field investigator visited the farm and met with the victim's wife. The FACE investigator also obtained the death certificate, the sheriff's and coroner's report and the state climatologist's weather report of the day.

The site of the incident was a crop farm purchased by the victim about fifty years before the incident. He had raised corn and soybeans as cash crops, and raised cattle to be sold as young stock. He had discontinued those activities about fifteen years ago, and started a combining and grain storage business with a partner. They provided custom combine services to farm neighbors in the vicinity, and stored some grain on the farm. The victim had retired from his primary occupation as a trucker about 20 years before the incident. He had not received any formal training on operating farm equipment, but learned through on-the-job training. There were no written safety policies or procedures for the farm activities. He had verbally warned family members about the hazard of contacting the rotating drive shaft of the grain auger, and would usually walk around the tractor and auger to avoid contacting the rotating drive shaft. The victim had knee surgery four months before the incident, and continued to experience knee pain and stiffness. Prior to the incident, there were no fatalities on the farm.

INVESTIGATION:

The farm property consisted of a farmyard with farmhouse, equipment sheds and grain storage bins, with crop and hay fields surrounding the farmyard. The grain auger involved in the incident was purchased used from an unknown source at least 15 years before the incident and was used each harvesting season since then. The auger was manufactured at least 35 years ago. A shielded PTO stub shaft on the tractor was attached to the completely shielded PTO driveline of the auger. A secondary drive shaft on the auger was positioned beneath the auger cylinder, and was unguarded.

On the day of the incident, the victim and the partner were transferring a load of shelled corn from a truck into a grain bin. The air temperature was about 35E F. with no precipitation. At 1:30 P.M., the victim was standing next to the grain auger, while the partner was working near the truck. The tractor PTO was operating the PTO driveline of the auger, and the secondary drive shaft was also rotating along the length of the auger. The victim was wearing an untucked, long-sleeved shirt over two other shirts for warmth. He occasionally ducked under the elevated corn auger to get to the other side rather than walking the longer distance around the equipment. The event was unwitnessed, but apparently his shirt was caught and pulled by the rotating driveline. At the point of entanglement, the drive shaft was approximately four feet from the ground and the shaft surface was rusted and rough. The shirt fabric was wound around the approximately 1 1/4 inch diameter drive shaft and the victim was pulled tightly against the auger. (See Figures 1 and 2.) The partner had walked toward the truck a few moments before the incident occurred. He heard the tractor motor stop, then looked in the direction where the victim had been working. He saw him entangled in the shaft, with his face turning blue. The partner tried to pull and cut away the shirt fabric to free the victim from the shaft, but was unsuccessful. He then went across the road to call EMS services. Emergency vehicles arrived, and the victim's body was freed from the machine and transported to a hospital where he was pronounced dead on arrival.

CAUSE OF DEATH: The death certificate listed the cause of death as strangulation.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Farm machine/equipment operators should identify all rotating machinery/equipment components, and ensure that appropriate guards, recommended by the manufacturer or dealer, are installed.

Discussion: Here, a rotating drive drive shaft was exposed during the operation of the auger. The aged auger had been purchased without a shield on the secondary driveline, and no guards had been installed in the 15 years since the purchase. Unguarded moving belts, sprockets, chains, and rotating drive lines expose workers to entanglement resulting in injuries and even death. If retrofit guards had been installed over the exposed drive shaft, the incident may have been avoided. To prevent installation of an inadequate guard, machine/equipment owners should consult with the manufacturer or dealer before installing any guard.

Note: Since the incident, the victim's family had the auger cut and torched into pieces that would be too small to be used for parts. It was replaced by an auger with guards on all moving parts.

Recommendation #2: Farm machine/equipment operators should observe and follow all applicable safety precautions when operating, maintaining or repairing machinery driven by tractor power take-off equipment, including disengaging the PTO and stopping the tractor engine before approaching the machinery.

Discussion: In this incident, the victim was observing the action of a grain auger driven by a PTO, and his clothing became entangled in the unguarded drive shaft. He apparently tried to duck under the elevated auger rather than walking around the equipment to get to the other side. When working with PTO-driven equipment, the PTO should be disengaged and the tractor engine shut off before approaching the equipment. These precautions provide protection from contact with the moving machine parts and from the unexpected engagement of power when an operator is cleaning, servicing, adjusting, or repairing the equipment. If the PTO had been disengaged and the tractor engine stopped before the victim approached the auger, this fatality would have been prevented.

Recommendation #3: Farm machine/equipment operators should never step under or over a rotating shaft.

Discussion: . The incident might have been prevented if the victim had walked around the operating auger and tractor, instead of ducking under the auger.

Recommendation #4: Farm machine/equipment operators should avoid wearing clothing that is loose-fitting, torn or ragged, or has portions that could be caught by moving machine parts and lead to entanglement

Discussion: When working around equipment, particularly rotating drive lines, workers should wear well-fitting clothing that is free of drawstrings, tabs and loops, loose threads or flaps of cloth that could be caught by a machine part. The victim in this incident was wearing a loose-fitting shirt with the bottom untucked. The incident might have been prevented if the victim's clothing was more form fitting without tails to be caught in the machine.

Recommendation #5: Farm business operators should include safety management as an integral part of their business operation.

Discussion: Components of an effective safety management system include a written safety program, hazard analysis and control, training programs and safety committees. Each of these components should be developed to meet the specific needs of individual businesses, and be incorporated into the business operating plan. The financial cost of implementing the program may be considered expensive, but the business investment would prevent fatalities and serious injuries. In this case, the entanglement would have been prevented by using equipment that was properly guarded. Although the practice of purchasing and using older-model equipment without guards may be regarded as acceptable in small agricultural businesses, the hazard of entanglement is present and should be avoided.

REFERENCES

Safety Management on the Farm, Mark A. Purschwitz, 1996, Department Bulletin of University of Wisconsin-Madison College of Agricultural and Life Sciences, Madison, WI.

Safe Grain and Silage Handling, DHHS, Public Health Service, Centers for Disease Control & Prevention, National Institute for Occupational Safety & Health, Division of Safety Research, October, 1995 (NIOSH Publication No. 95-109).

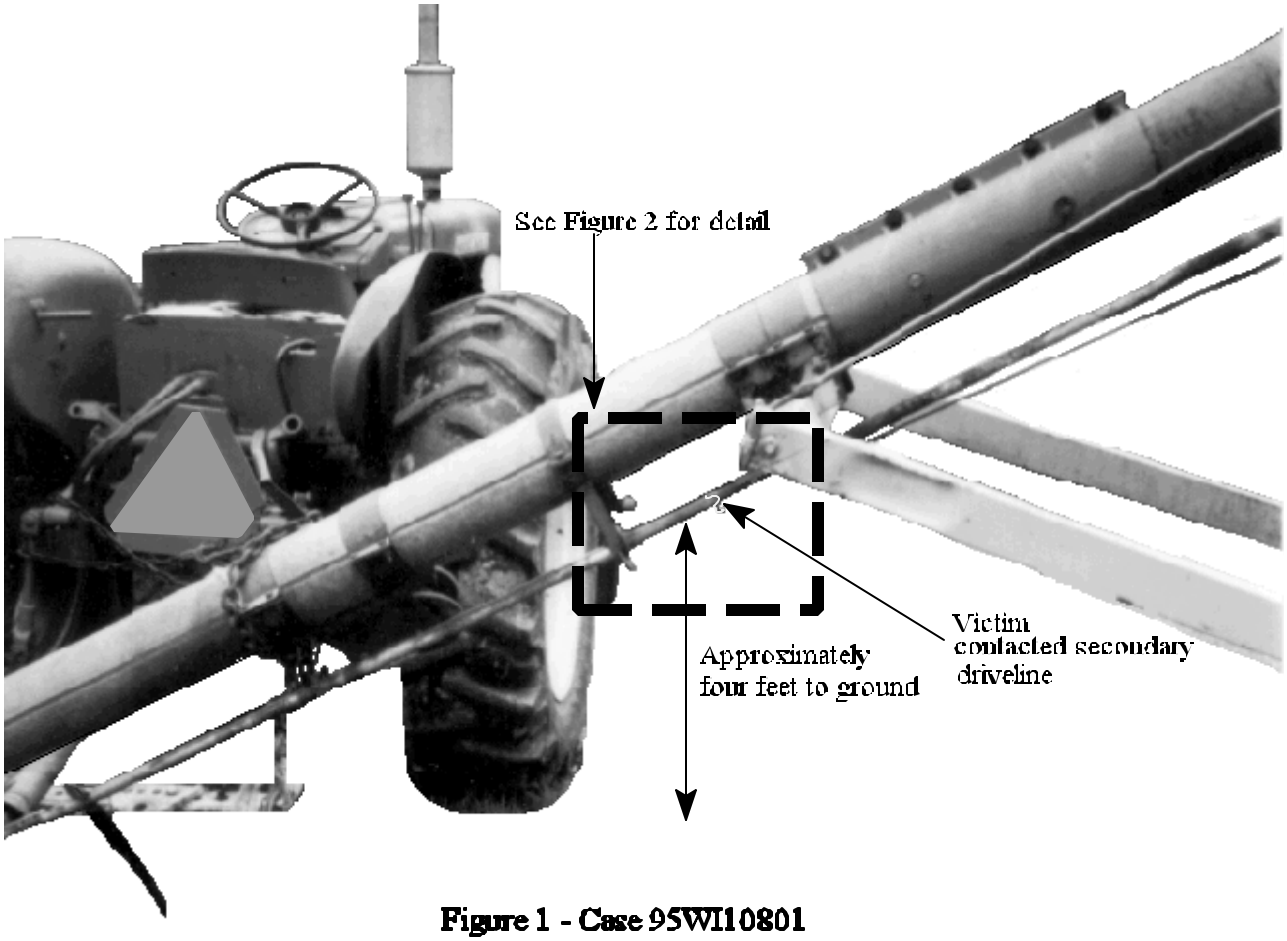

Figure 1 - Case 95WI10801

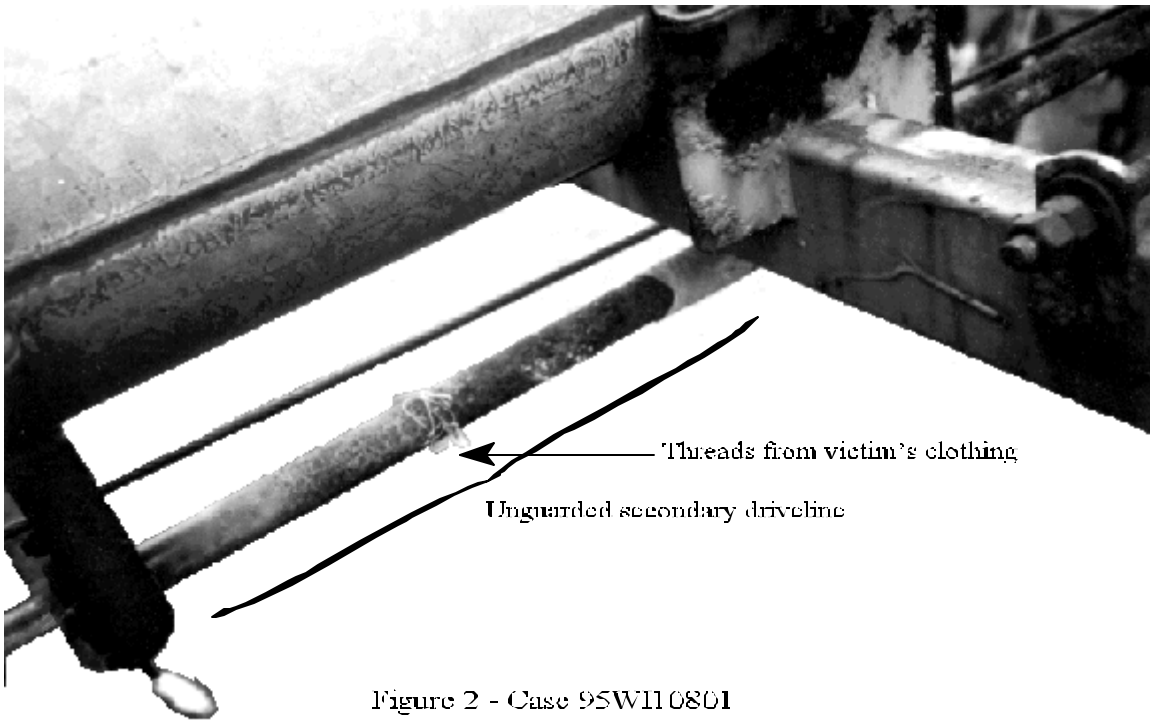

Figure 2 - Case 95WI10801