

MIFACE Investigation Report #10MI122

Subject: Farmer Pinned Under Driver's Side Front Tire of a Front-end Loader

Summary

In the fall of 2010, a male farmer in his 60s died when he was pinned under the driver's side front tire of a Ford tractor Model number 7740 equipped with a loader bucket. A walking path for his pastured horses was located on a steep slope on the north side of a sand-packed driveway leading to his home. A damaged tree was close to this walking path and the decedent was concerned that, if the tree fell, it would cause injury to his horses. The decedent drove the tractor to the tree's location and stopped it with the front wheels at the top of the embankment slope. It is postulated that the decedent parked the tractor with the bucket raised slightly and resting against the tree to help direct the tree's fall. The tractor was running so as to keep the bucket raised and against the tree. The decedent got out of the tractor and cut the tree. When the tree began to fall, the tractor moved forward and down the embankment (Figure 1). The decedent was unable to move to safety and was struck by and pinned under the front end loader's driver's side front tire. His wife found him and called for emergency response. The decedent was declared dead at the scene.



Figure 1. Position of decedent and tractor after tractor moved forward and down the embankment.

Key factors in this incident:

- Misuse of the tractor's loader bucket.
- Working on the ground in the travel path of the tractor.
- Improper tree felling techniques.

RECOMMENDATIONS

- Use tractors, including tractors equipped with attachments, according to manufacturer's operator's manual.
- Before initiating a task, conduct a site assessment to determine hazards and appropriate work practices to minimize identified hazards, including topography challenges, equipment location and working on the ground in the travel path of equipment.
- Use proper directional tree felling techniques (notch and back cut) with chainsaws and wear appropriate personal protective equipment to prevent injury.

- When working alone, establish a check-in procedure with another individual to help assure prompt emergency assistance.

BACKGROUND

In the fall of 2010, a male farmer in his 60s died when he was pinned under the driver’s side front tire of a Ford tractor Model number 7740 equipped with a loader bucket. MIFACE was notified of this incident by a newspaper article. The MIFACE researcher interviewed the decedent’s spouse at her home. During the writing of this report, MIFACE reviewed the Police Department report and pictures, death certificate and medical examiner’s report. All pictures used in the report are courtesy of the responding police department. Illustration 1 is copied from the MIOSHA General Industry Tree Trimming Standard. Any photograph showing identifying information was modified by MIFACE to preserve anonymity of the police department and emergency response personnel.

The decedent and his wife bought the farm in the early 1970s. The decedent bred and raised horses for 30 years. For the first 20 years, the horse breeding operation was a second job. For the last 10 years, he bred and raised the horses on a full-time basis. At the time of the incident, the herd numbered 50 to 60 horses. The decedent had 40 acres surrounding his home for pasture and an additional 80 acres across the road, where he grew hay to feed the horses. All of the farm equipment was stored in a pole barn which was located on the 80 acres across the road.

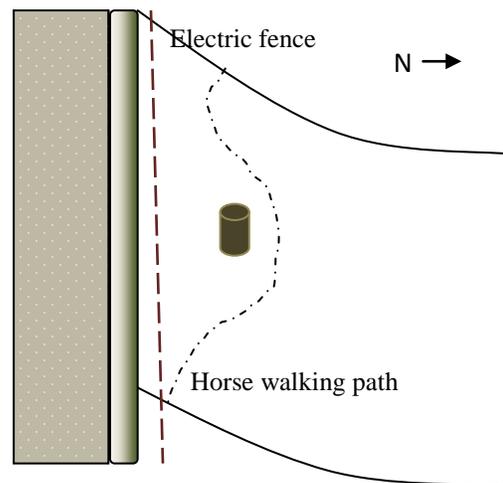
Three months prior to the incident, the decedent had hip replacement surgery. His wife indicated that he was working the farm during the second week of recovery and that his mobility was “pretty good”. The decedent was not taking any medicine for pain or for other conditions.

The decedent had a cell phone with him. Although he usually called his spouse, he did not on this day. His wife thought he was just involved in work and was not concerned about him not calling her.

INVESTIGATION

On the day of the incident, the decedent ate breakfast and told his wife he was going to cut hay. He left the house at approximately 10:00 a.m. It was not unusual for the decedent to work through the day and not come home for lunch. His spouse was in the house, and stayed there throughout the day until she left the house to go to town.

One of the horse pastures was located on the north side of the driveway leading away from the house to the road. Drawing 1 illustrates the incident scene.



Drawing 1. Incident Scene

The north side of the driveway had a steep drop off which then leveled out to the horse pasture. The packed sand driveway had an area approximately 5 feet wide between the edge of the driveway and the beginning of the slope down to the pasture. The driveway had a two- to four-inch area of soft sand between the packed sand area and the grass at the leading edge of the slope. The 24-inch diameter dead tree involved in the incident was located on the slope approximately seven feet from the driveway's edge.

An electric fence (red dashed line) was installed along the length of the driveway and was positioned between the driveway and the incident dead tree. A walking path had been created by the horses on this sloped area that was several feet below the electric fence and followed the path of the driveway and then veered north of the dead tree. His wife indicated that he had previously expressed concern that this tree would fall and injure the horses.

As the decedent traveled down the driveway to get to the pole barn he must have decided to take down this dead tree. He obtained the Ford tractor Model 7740 equipped with a loader bucket and a chain saw from the pole barn and drove the tractor to the incident site.

The decedent parked the tractor facing north. It is unknown if he turned the tractor off or set the parking brake. The decedent was working alone and the incident was not witnessed. The responding police hypothesized that the decedent raised the bucket slightly and positioned the bucket against the tree so he could use the weight of the tractor/bucket to help direct the fall of the tree.

The decedent was facing the stump with his back to the tractor working under the raised bucket. It appears that when the decedent completed his cuts on the tree and the tree fell, the tractor rolled or fell forward over the edge of the driveway's drop off (Figure 2). The tractor tire marks are located within the yellow circle on Figure 2. The decedent, still holding the chain saw in his right hand, did not have enough time to react. The rolling/falling tractor was stopped by the stump of the tree the decedent had just cut, causing him to be pinned under the driver's side tractor tire. The medical examiner report indicated that there were skid marks from the back tires on the sandy driveway (See Figure 2).



Figure 2. Driveway configuration and tractor position after moving forward when tree fell.

The time of the incident is unknown. His wife, as she was driving to the store, was surprised to see this tractor, as it was not the tractor usually used in the "hay work". She got out of the car and saw her husband pinned under the tire. She called for emergency response. The decedent was declared dead at the scene.

CAUSE OF DEATH

The cause of death as listed on the death certificate was blunt force trauma due to or as a consequence of a motor vehicle accident. Toxicology was negative for alcohol; toxicology was not performed for other drugs.

RECOMMENDATIONS/DISCUSSION

- Use tractors, including tractors equipped with attachments, according to manufacturer's operator's manual.

Every loader has limitations on ability to lift or hold itself in a raised position. Older units may have lost the ability to hold anything carried in the bucket with the engine stopped due to wear of the hydraulic system and components. As hydraulics system parts get worn, the bucket will lower to the ground, over time. So, operators tend to leave tractor's engine running to hold the bucket in the raised position.

The use of the tractor equipped with a loader bucket was not designed nor intended for use as an assist for applying pressure to assist in a tree felling activity, and thus was a misapplication of tractor use. It is unknown how much "push" or force was placed upon the tree by the tractor and bucket. If the force was substantial, stored kinetic energy was released when the tree fell, which could have forced the tractor over the edge of the driveway.

Tractor operators should read and understand the manufacturer's operator's manual(s) for the safe use of the tractor and attachments.

- Before initiating a task, conduct a site assessment to determine hazards and appropriate work practices to minimize identified hazards, including topography challenges, equipment location and working on the ground in the travel path of equipment.

There were several site topography issues for this work operation: the slope of the embankment, the location of the dead tree on the embankment, the sandy driveway, the soft driveway shoulder, and the electric fence. All of these issues would need to be taken into account in developing a strategy to safely fell the tree. It is unknown if the decedent identified these issues as potentially posing an issue for his felling operation.

When agricultural equipment is positioned on or near an incline, the equipment may move/roll down the slope, creating a hazard for downhill workers. If equipped, the operator should lower the tractor bucket to the ground, lock the brakes together and set the brake lock or, if equipped the park lock, and turn the engine off. If the equipment must be left running, then the park brake should be set with the transmission in neutral.

The decedent was downhill from and working in the travel path of the tractor and under the raised bucket. Working with his back to the tractor did not give him sufficient warning that the

tractor was moving downhill and he could not retreat from the tractor's travel path in time. Although not a factor in this incident, working under a non-supported hydraulically raised bucket is dangerous and could cause a severe injury if the hydraulics fail.

- Farmers should use proper directional felling techniques (notch and back cut) with chain saws and wear appropriate personal protective equipment to prevent injury.

Remove the tractor from this task and the work activity was tree felling. Although experience can be a great teacher and a necessary element in skill development, misguided experience can foster poor technique and enhance bad habits. The decedent had experience, but his work practices, such as lack of wearing appropriate personal protective equipment (gloves only), and his felling technique (notch, backcut and hinge wood) did not adhere to consensus or MIOSHA standards for tree removal.



Figure 3. Locations of cuts made on tree stump

A proper notch (undercut) and back cut directs the tree's fall and the hinge wood (holding wood) keeps the tree under control and in its directed fall path. If appropriate felling techniques had been utilized, the need for the tractor/bucket would not have been necessary, and this tragedy could have been avoided.

Figure 3 shows the tree stump of the tree felled by the decedent. It appears that the decedent made the undercut on the tree on the side of the tree facing the road and the back cut on the tree on the side of the tree facing the pasture.

MIFACE measured both the undercut and the back cut made by the decedent on the 24" diameter tree. The undercut (See Illustration 1 from the MIOSHA Tree Cutting Standard). The MIOSHA General Industry Safety and Health Standard, Part 53, Tree Trimming and Removal Standard rules state:

- An undercut shall be large enough, about 1/3 the diameter, to safely guide the tree and reduce the possibility of the tree splitting.
- A back cut shall leave sufficient hinge wood (the distance between notch and back cut) to guide the tree's fall in the desired direction and to hold the tree to the stump during most of its fall. A back cut shall be about 2 inches (50.8 mm) above the undercut and as level as possible.

Figure 1
APPROVED UNDERCUTS

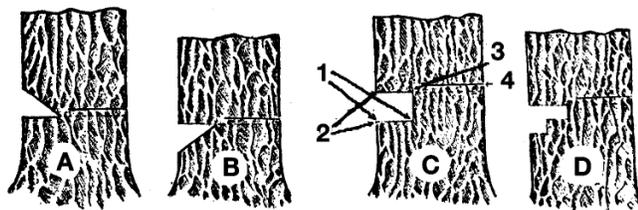


Illustration 1. Figure 1 of MIOSHA General Industry Standard Part 53 showing approved undercuts

- When working alone, establish a check-in procedure with another individual to help assure prompt emergency assistance.

The decedent would routinely check in with his wife during the day, but it was not at a “scheduled” time, so, when he did not call, his wife was not concerned for his safety. Although the decedent had his cell phone at the time of the incident, he was unable to use it for safety alert purposes. If he had missed his scheduled call in time, his spouse most likely would have tried to find him or sent another individual to do so. Although it may not have prevented his death, a scheduled time to check in with someone when an individual is working alone could prevent an injury from becoming a fatality.

Agricultural workers, including farmers, regularly work alone on the farmstead. Therefore, it is important to establish an effective communication system for the individual who is working alone to contact other people who can provide emergency assistance. The frequency of checking in to another individual should be appropriate based on the hazards to which the isolated worker is exposed. The check-in procedure can be initiated by a family member or the individual who is working alone and should be established based upon what is practical for the worksite circumstances. In agricultural settings, the availability of cell phone or walkie/talkie coverage should be established if that is the means of communication selected.

RESOURCES

MIOSHA standards cited in this report may be found at and downloaded from the MIOSHA, Michigan Department of Licensing and Regulatory Affairs (LARA) website at: www.michigan.gov/mioshastandards. MIOSHA standards are available for a fee by writing to: Michigan Department of Licensing and Regulatory Affairs, MIOSHA Standards Section, P.O. Box 30643, Lansing, Michigan 48909-8143 or calling (517) 322-1845.

- MIOSHA General Industry Safety Standard, Part 53: Tree Trimming
- Laborer Dies When a Water Truck Drifts Downhill and Pins Him Against a Retaining Wall – Tennessee. NIOSH In-house FACE Report 2006-06. <http://www.cdc.gov/niosh/face/In-house/full200606.html>
- Farmer Crushed against Tractor Tire by Gravity Flow Wagon Box while Unhitching. Iowa Case Report 05MI034. <http://www.cdc.gov/niosh/face/stateface/ia/05ia034.html>
- Farmer Dies After Tractor Rolls and She is Pinned Under the Tractor Tire. Wisconsin FACE 95WI043. <http://www.cdc.gov/niosh/face/stateface/wi/95wi043.html>
- Clark, Josh. "How Wheel Chocks Work" 20 October 2008. HowStuffWorks.com. <http://auto.howstuffworks.com/auto-parts/towing/equipment/accessories/wheel-chocks.htm> 26 February 2013.

Key Words: Farmer, tree cutting, struck by, tractor, embankment slope, Agriculture

MIFACE (Michigan Fatality Assessment and Control Evaluation), Michigan State University (MSU) Occupational & Environmental Medicine, 117 West Fee Hall, East Lansing, Michigan 48824-1315; <http://www.oem.msu.edu>. This information is for educational purposes only. This MIFACE report becomes public property upon publication and may be printed verbatim with credit to MSU. Reprinting cannot be used to endorse or advertise a commercial product or company. All rights reserved. MSU is an affirmative-action, equal opportunity institution.

May15, 2013