MICHIGAN State FACE Program
Fatality Assessment & Control Evaluation

Michigan State University
Department of Medicine • Occupational and Environmental Medicine
909 Fee Road, 117 West Fee Hall • East Lansing, MI 48824 • 1-517-353-1846 • https://oem.msu.edu

REPORT#: **15MI031** **REPORT DATE:** 10/23/18

Owner of Farm Land Died Due to a Tractor Overturn to the Side into a Ravine

INCIDENT HIGHLIGHTS

DATE:
Spring 2015

TIME:
After 4:45 p.m.

VICTIM:
Farm land owner in his 80s

INDUSTRY/NAICS CODE:
Real Estate & Rental & Leasing/53

EMPLOYER:
Self-employed

SAFETY & TRAINING:
On-the-job

SCENE:
Farm Field

LOCATION:
Michigan

EVENT TYPE:
Machine

SUMMARY

In spring 2015, a male farm land owner in his 80s died when his 585 International tractor equipped with a front end loader and from which he had removed the rollover protection structure, rolled over to the side into a ravine. Strapped to a carrying mechanism on the rear of the tractor was a tank containing herbicide. The decedent had been in his rented field conducting weed-killing hand spraying activities at the field/woods edge. As he was returning home in the rain, he came across a washout of the ravine edge on the passenger side of the tractor. The tractor rolled to the side down the ravine wall, pinning him under the tractor. When a family member could not reach him on his cell phone… READ THE FULL REPORT> (p.3)

CONTRIBUTING FACTORS

Key contributing factors identified in this investigation include:

- Decedent removed the rollover protection structure and did not replace it with an equivalent means of protection.
- Field crop planted two-three feet from ravine wall edge.
- Cell phone model could not track incoming weather pattern. LEARN MORE> (p.5)

RECOMMENDATIONS

MIFACE investigators concluded that, to help prevent similar occurrences, employers should:

- Tractor owners should ensure their tractors have a manufacturer approved, certified, tractor specific rollover protection structure (ROPS) and seatbelts installed.
- Establish crop-planting limits/boundaries to maintain farm machine access to other fields/areas..... LEARN MORE> (p.6)

Fatality Assessment & Control Evaluation

Michigan State University
Department of Medicine • Occupational and Environmental Medicine
909 Fee Road, 117 West Fee Hall • East Lansing, MI 48824
1-517-353-1846 • https://oem.msu.edu

Michigan Fatality Assessment and Control Evaluation (FACE) Program

MIFACE (Michigan Fatality Assessment and Control Evaluation), Michigan State University (MSU) Occupational & Environmental Medicine, 909 Fee Road, 117 West Fee Hall, East Lansing, Michigan 48824-1315; http://www.oem.msu.edu.

MICHIGAN State FACE Program
Fatality Assessment & Control Evaluation

Michigan State University
Department of Medicine • Occupational and Environmental Medicine
909 Fee Road, 117 West Fee Hall • East Lansing, MI 48824 • 1-517-353-1846 • https://oem.msu.edu

SUMMARY

In spring 2015, a male farm land owner in his 80s died when his 585 International tractor, equipped with a front end loader and from which he had removed the rollover protection structure, rolled over to the side into a ravine. Strapped to a carrying mechanism on the rear of the tractor was a tank containing herbicide. The decedent had been in his rented field conducting weed-killing hand spraying activities at the field/woods edge. As he was returning home in the rain, he came across a washout of the ravine edge on the passenger side of the tractor. The tractor rolled to the side down the ravine wall, pinning him under the tractor. When a family member could not reach him on his cell phone, the family member called another family member to look for him. The family member and the farmer who rented the land were walking to where the decedent was last seen and found the overturned tractor. The family member called another family member who called for emergency response. The decedent was declared dead at the scene.

INTRODUCTION

In spring 2015, a male farm land owner in his 80s died when his tractor, from which he had removed the rollover protection structure, rolled over to the side into a ravine. MIFACE personnel contacted one of the decedent's family members who agreed to meet the MIFACE interviewer at the family home. Several family members were present at the interview, and then one of the family members took the MIFACE researcher to the incident site. MIFACE reviewed the death certificate and police report during the writing of this report. Pictures used in the report are courtesy of the responding police department and those taken at the time of the MIFACE site visit.

EMPLOYERS

The decedent had owned and operated with other family members a 100-head dairy farm in the mid-1970s. Through the years he sold the dairy cows and began to raise pigs, eventually raising 6,000 head/year. He closed the dairy sometime in 1986 or 1987. He grew cash crops, corn feed, hay, wheat and soybeans on 1,100 acres. Upon retirement from growing crops, he rented his acreage to area farmers. He also maintained the wood lines and other areas surrounding the farm fields as part of the agreement from the farmer renting his field. He continued to manage the pig operation.

WRITTEN SAFETY PROGRAMS and TRAINING

The decedent did not have a health and safety program for the farm. He had attended commodity-specific MSU Extension meetings. The family member did not know if the meetings included safety and health topics.

WORKER INFORMATION

The decedent was working alone. Prior to the tractor rollover, a farmer who rented some of the land was working in one of the fields and saw the decedent spraying.

INCIDENT SCENE

The decedent had purchased the 585 International tractor equipped with a front 6-foot loader bucket in the mid-1980s from a Girl Scout troop in a neighboring state. The tractor came equipped with a factory-installed non-foldable rollover protection structure (ROPS). The decedent had removed the ROPS to facilitate operation in a low clearance building and had not replaced the ROPS with an equivalent means of protection. The family member interviewed by MIFACE indicated the decedent kept equipment in good working order so it was assumed that the tractor involved in the incident was in good working order. The decedent had four similar tractors and was very familiar with their operation.

At the time of the incident, a 100-gallon fiberglass spray tank was mounted to the tractor's three-point assembly and powered by the tractor's PTO.

There was a deep ravine (depth unknown) with steep sides on one edge of a planted field. To access the northern rented fields, the decedent had to drive alongside the ravine. The last row of the soybean field planted was approximately two- to three-feet from the edge of the ravine. In the area of the incident, there was a washout of the ravine edge (Photo 1). It is unknown when the washout occurred. The incident occurred approximately ½ mile from the road near the decedent's home.

Photo 1. Ravine washout

WEATHER

During the previous day, there was a period of heavy rain. On the day of the incident, it had been a cloudy/mostly cloudy day until approximately 3:30 p.m., when a light rain began to fall, then there was another short period of cloudiness. At approximately 4:30 p.m., it lightly rained, at 5:00 p.m. it was raining, and then at 5:15 p.m., it rained heavily. Temperatures which had been in the mid-80s dropped to the mid to low 70s. Winds were from the south to southwest ranging from 3-19 mph gusting up to 26 mph. [Weather Underground].

INVESTIGATION

The decedent primarily used the 585 International loader tractor to push broken limbs that had fallen into/near the fields that could cause an equipment/crop issue. This was the first time he had used the tractor to conduct spraying activities.

On the day of the incident, the decedent was up at 7:00 a.m. and started to lay tile at the pig operation shortly thereafter. At approximately 3:00 p.m., the decedent went home and told a family member that he was going out to the field. He did not specify which field. The family member told him that it was going to rain and the decedent responded "I've been in the rain lots of times".

The decedent drove the tractor with the mounted sprayer tank to one of the northern sections of the property to conduct hand-spraying activities. It is unknown how much herbicide product was in the spray tank when he started or how much was remaining at the time of the overturn because the tank was damaged at the time of the incident. The decedent had been traveling to the west using his right hand to spray. He had been on the north end of the field.

A farmer working in one of the rented fields saw the decedent conducting the hand spraying activities.

It is unknown when the decedent began his southbound journey home; prior to or when the rain began. Due to the rain, the field area was wet and muddy. The scene photographs of the responding police show that the decedent was utilizing the safe work practice of traveling with the loader bucket just a few feet above the ground (Photo 2). The ravine was located to the decedent's right side, on the passenger side of the tractor. To avoid injury to the newly planted soybean

plants, the decedent was traveling as close to the edge of the ravine as possible. While traveling home, the driver's side tires began to pick up mud because they were in the field area, while the passenger's side tires were in the grassy area of the wooded tree line/ravine edge. Upon coming to a washout at the top of the ravine the tire tracks show the tractor sliding off the edge and overturning into the ravine (Photo 3). The decedent was pinned beneath the overturned tractor.

Photo 2. Tractor after removal from ravine. Note height of bucket arms and fiberglass tank positions

It was approximately 6:00 p.m. and the decedent had not yet returned home for dinner. His wife called another family member and indicated the decedent was not home, and asked whether the decedent was at this family member's home. Replying no, his wife asked the family member to go look for the decedent. The family member did not know exactly where to look for him so he called the farmer renting the field and asked if he had seen the decedent. The farmer replied yes, he had seen the decedent and told the family member the location where the decedent had been working. The family member drove a golf cart to the last known sighting of the decedent and saw the tractor's wheel marks where the decedent had traveled through the field.

The family member followed the tractor's tire tracks and saw the decedent's overturned tractor approximately one hour later. He called via cell phone to another family member, who called for emergency response. The decedent was declared dead at the scene.

Photo 3. Tractor overturned in ravine. Note steepness of walls and washout

While the event was unwitnessed, a possible scenario was developed from the available information. Wet conditions believed to be present with soil type and grass surface may have combined with turning, braking and movement of spray solution in the tank to cause a magnified turn into the ravine when the washout was encountered. There was no indication the brake pedals were locked together. If they were not, the application of braking to the ravine side brake could have increased the magnitude of the turn. The "pendulum" effect of a less than full spray tank combined with the "unloading" of front wheels may have allowed the front wheels to slide on the wet grass toward the ravine. If the washout was encountered at the same time it would be difficult to impossible to correct.

CAUSE OF DEATH

The death certificate listed the cause of death as blunt force trauma. No autopsy or toxicological blood tests were performed by the medical examiner.

CONTRIBUTING FACTORS

Occupational injuries and fatalities are often the result of one or more contributing factors or key events in a larger sequence of events that ultimately result in the injury or fatality. The following unrecognized hazards were identified as key contributing factors in this incident:

- Decedent removed the rollover protection structure and did not replace it with an equivalent means of protection.
- Field crop planted two to three feet from ravine wall edge.
- Cell phone model could not track incoming weather pattern.
- Working alone.
- Possible operator fatigue.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Tractor owners should ensure their tractors have a manufacturer-approved, certified, tractor specific rollover protection structure (ROPS) and seatbelts installed.

Discussion: Rollover protective structures (ROPS), when used in combination with a seatbelt, are 98 percent effective in preventing death and serious injury in the event of a tractor overturn. The tractor had originally been equipped with a factory-installed non-foldable rollover protection structure. The decedent removed the solid bar ROPS because he could not drive it into a storage building (an excepted practice under OSHA/MIOSHA standard 1928.51(b)(5)). He did not ensure that equivalent protection was provided – such as a foldable ROPS. If the decedent had a tractor dealership install a foldable ROPS – when the unit was used for a non-excepted practice, and if the ROPS and seatbelt were used as intended, the decedent might have survived the tractor overturn.

To maintain the operator safety, tractor operators should ensure that all of their tractors are equipped with a tractor-specific ROPS and seatbelt certified/approved by the manufacturer. To maintain the zone of protection provided by the ROPS, the seatbelt must be used. Operators should assure any unit where the ROPS has been removed for authorized operations is only used for those operations. Older tractors manufactured prior to 1976 do not come equipped with a ROPS. To assist farmers in finding a ROPS for these older tractors, the University of Kentucky Extension program developed the Kentucky ROPS Guide, which can be used by any US or Canadian farmer to locate retrofit ROPS for older tractors or even “gray market” tractors (i.e., non-U.S. made tractors imported without manufacturer authorization). The guide is available online at http://www.ca.uky.edu/rops.

Recommendation #2: Establish crop-planting limits/boundaries to maintain farm machine access to other fields/areas.

Discussion: The outside row of soybeans was planted approximately two- to three- feet from the edge of the ravine edge. This limited distance between the edge of the field and the ravine narrowed the traveling room the victim had to avoid injury to the crop. A planting boundary should be established so that the outside planting row does not impinge on an access area to other fields/areas. The grass boundary from the edge of the ditch should be at least equal to the depth of the ditch. A good rule of thumb is to stay back from the edge of the ditch as far away from the bank as the ditch is deep. The weight of the tractor could cave the bank in if too close to the shear line.

When a ditch/ravine depth is unknown, if possible, make a best effort to have marking posts several feet away from the edge of ditch when equipment movement occurs between the crop field edge and the ditch/ravine edge. It is unknown how well the ditch was defined at the time of the incident. The path, as shown in Photo 4 (taken at the time of the MIFACE site visit) has tall grass and shrubbery at the very edge of the ditch and growing up from the sides of the ditch, making it difficult to determine the ditch edge.

Photo 4. Field edge close to ravine edge. Arrow shows direction of travel

It does not appear that the ditch bank caved in, but the victim was operating the tractor too close to the ditch according to the police report, thus allowing the tractor to enter the ditch.

Consideration should be given to field edge clearing and maintenance timing. Factors to consider include but are not limited to:

- Are there hidden hazards at the time of activity?
- Are control practices required when crops are present or can they be completed when the field is fallow, pre-plant or post-harvest?
- Can specific hazards, such as ravine edges, be effectively marked for growing season passage?

Recommendation #3: When working alone, establish a check-in procedure with another individual to help assure changing weather conditions can be communicated and prompt emergency assistance provided.

Discussion: 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 individuals who can provide weather updates and/or emergency assistance. The frequency of communication between individuals should be based on the hazards to which the isolated worker is exposed. The check-in procedure could 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 this incident, the family member knew it was going to rain. The decedent and the family member could have discussed having the family member watch the weather radar and when the storm was close, call the decedent on his cell phone to alert him of the impending storm, since the decedent's cell phone was not a model capable of monitoring weather patterns.

The decedent was, most likely, hurrying home to get out of the rain. The speed at which he was driving his tractor could have led to the tractor "bouncing" which also has a tendency to cause "oversteer" due to no suspension on the tractor.

The decedent did not share with his family members where he was going to be hand spraying the weeds, which made it difficult for other family members to find him. The individual working alone should share where he/she will be working, and call in if changing work locations. Additionally, the decedent did not call his family member when he was leaving the field in which he was working and heading home. If he had notified the family member, an expected time of arrival home

would have been known, and when that time passed and he was not home, more timely response would have been initiated.

In agricultural settings, the availability of cell phone coverage should be established if that is the means of communication selected. Although a check-in procedure would not have prevented the tractor rollover, a scheduled time to check in with someone when an individual is working alone could prevent an injury from becoming a fatality.

Recommendation #4: Be aware of the dangers of fatigue and weariness when operating tractors and take frequent breaks.

Discussion: The decedent was in his mid-80s and had begun work early that day, laying tile, which could be considered a strenuous activity. He then went out to work in the field for a few hours. It is unknown how many breaks from work the decedent took during his workday or the duration of those breaks. The decedent was described as a hard worker, and in good health. It was, most likely, raining heavily when he was returning home. He may have been anxious to get home and out of the rain. He may also have been fatigued after a long day's work. If the decedent was tired, he may not have been holding onto the wheel as tightly. If it was heavily raining, and the decedent was driving at a higher rate of speed, the potential of the decedent to lose grip on the wheel if the front tire(s) caught a rut, pulling the wheel free from his grip. Effects of fatigue can include reduced alertness, slower reaction time, impaired decision making and concentration which can increase the risk of injury. MIFACE encourages both employers and employees to consider fatigue as a potential safety issue and implement strategies to manage fatigue.

ADDITIONAL RESOURCES

- University of Kentucky College of Agriculture, Food, and Environment. *Kentucky ROPS Guide*. http://rops.ca.uky.edu/?utm_medium=301&utm_source=www
- MIFACE Investigation Report #11MI115: *Farmer Run Over and Pinned Under Tractor Tire*. https://oem.msu.edu/images/MiFACE/11MI115.pdf
- National Institute for Occupational Safety and Health (NIOSH). *Work Schedules: Shift Work and Long Hours*. https://www.cdc.gov/niosh/topics/workschedules/default.html

DISCLAIMER

Mention of any company or product does not constitute endorsement by the Michigan FACE program or the National Institute for Occupational Safety and Health (NIOSH). In addition, citations to websites external to NIOSH do not constitute NIOSH endorsement of the sponsoring organizations or their programs or products. Furthermore, NIOSH is not responsible for the content of these websites. All web addresses referenced in this document were accessible as of the publication date.

RESOURCES

ACKNOWLEDGEMEMENT

The Michigan FACE Program would like to acknowledge the decedent's family members for providing assistance and information for this investigation.

MICHIGAN
State FACE Program
Fatality Assessment & Control Evaluation

Michigan State University
Department of Medicine • Occupational and Environmental Medicine
909 Fee Road, 117 West Fee Hall • East Lansing, MI 48824 • 1-517-353-1846 • https://oem.msu.edu