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#: 18MI004 **REPORT DATE:** 12/20/19

Farmer Pinned Between Skid Steer Loader Bucket and Frame

INCIDENT HIGHLIGHTS

DATE:
Winter 2018

TIME:
Between 4:30 p.m.-5:30 p.m.

VICTIM:
Farmer in his 50s

INDUSTRY/NAICS CODE:
Agriculture/11

EMPLOYER:
Sole Proprietor

SAFETY & TRAINING:
On-the-Job

SCENE:
Backyard of home

LOCATION:
Michigan

EVENT TYPE:
Machine

SUMMARY

In Winter 2018, a male farmer in his 50s died when he was pinned between the bucket and the frame of a skid steer. The decedent was loading wood into an outdoor wood burner that heated both his home and his farm office located in the barn. The decedent used the skid steer bucket to carry a log to the wood burner. He had previously bypassed the skid steer's safety lap bar. He stopped the skid steer on the concrete pad in front of the wood burner and exited the cab without turning off the machine. The incident was unwitnessed. When the decedent's spouse arrived home from work, she noticed the decedent "dangling" and called out to him..... READ THE FULL REPORT> (p.3)

CONTRIBUTING FACTORS

Key contributing factors identified in this investigation include:

- Rewired to bypass skid steer safety interlock mechanisms
- Safe operating procedures not followed when exiting loader
- Cold and snowy weather conditions

LEARN MORE> (p.7)

RECOMMENDATIONS

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

- Skid steer operators should never modify or bypass the manufacturer-installed safety interlocks.
- Skid steer operators should follow the manufacturer's warnings and instructions for safe mounting and dismounting.

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Michigan Fatality Assessment and Control Evaluation (FACE) Program

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SUMMARY

In Winter 2018, a male farmer in his 50s died when he was pinned between the bucket and frame of a skid steer. The decedent was loading wood into an outdoor wood burner that heated both his home and his farm office located in the barn. The decedent used the skid steer bucket to carry a log to the wood burner. He had previously bypassed the skid steer's safety lap bar. He stopped the skid steer on the concrete pad in front of the wood burner and exited the cab without turning off the machine. The incident was unwitnessed. When the decedent's spouse arrived home from work, she noticed the decedent "dangling" and called out to him. She ran to the skid steer, and seeing his position, immediately called for emergency response. When responders arrived, they turned off the machine to assess his condition. Finding him deceased, they restarted the skid steer and tilted the bucket to lower him to the ground, and then lowered the bucket to the ground.

INTRODUCTION

In Winter 2018, a male farmer in his 50s died when he was pinned between the bucket and frame of a skid steer. MIFACE learned of this death from the newspaper. MIFACE personnel contacted the decedent's spouse, who agreed to be interviewed. MIFACE reviewed the death certificate, police and medical examiner's reports during the writing of this report. The decedent's spouse gave permission for the MIFACE investigator to take pictures of the incident scene and wood burner. Pictures used in the report are courtesy of the responding police and those taken at the time of the MIFACE site visit.

EMPLOYERS

The decedent was a self-employed farmer and seed salesman. He bought the 81-acre farm in 1982. The farm had 77 tillable acres and he also rented 250 acres, which was planted, on a rotating basis with corn and soybeans. His farm office and seed office were both located in the barn. His seed was stored off site at a nearby warehouse.

WRITTEN SAFETY PROGRAMS and TRAINING

The decedent did not have a written health and safety program; as a sole owner with no employees, there was no Michigan requirement for a written program. His spouse could not recollect if he attended any farm safety programs or if/what type of safety training he may have received when he worked at non-farm jobs.

WORKER INFORMATION

The decedent grew up on a crop farm and, according to his spouse, was very familiar with farm activities. The decedent's children were involved in 4-H. The decedent raised pigs from 1986-2003 and used the skid steer to help herd and feed the pigs. After selling off the pigs, he used the skid steer to move seed and pull trailers. His wife mentioned that the decedent used the skid steer "most days".

He had worked for 20 years at a firm that engineered metal-based components for light vehicle engine, transmission and drive line applications. He retired from this firm in 2008 and had worked full time on his farm until he bought the seed business in 2015. Since 2015, he split his time between the seed business and farming.

INCIDENT SCENE

The incident scene was the backyard of the home, near the edge of the field at the outdoor wood burner (Photo 1).

Photo 1. Overview of incident scene. Photo by MIFACE investigator.

Wood Burner

The concrete, pad in front of the wood burner measured 5 feet wide by 9 feet 4 inches long. The wood burner was elevated from the ground by a concrete structure that was 4 inches wide by 9 inches tall. The wood burner door measured 1 foot 11 inches wide by 2 feet 7 inches tall. The wood burner door was approximately 4 feet above ground level (Photo 2).

Skid Steer

The specific year the decedent purchased the previously owned Melroe 440 Bobcat skid steer involved in the incident was unknown; according to his spouse, it was many years ago. When purchased by the decedent, the loader was equipped with functional control interlocks connected to a restraint bar (seat bar), which had to be lowered in front of the operator before the engine could be started or the foot-operated lift-arm and bucket controls could be operated.

His spouse remembered that the seat bar safety feature was functional; she remembered lowering the seat bar when she entered the machine. She could not remember how long ago the decedent rewired and bypassed the two safety interlock systems that required the skid steer operator to be seated with the seat bar in place before the hydraulic and traction systems could be engaged.

The decedent had modified the skid steer, installing a toggle switch to bypass the seat bar safety feature to allow him to get in/out of the skid steer so he could move lumber into the wood burner with the skid steer still being able to run while not being in the seated position. (Photos 3 and 4)

Photo 2. Wood burner. Photo by MIFACE investigator.

WEATHER

Weather Underground was utilized to check the weather conditions on the day of the incident. A nearby weather station reported that there had been light snow in the hour prior to the incident. The temperature was 14^0F with a dew point of 3^0F. Winds were from the northwest at 13 mph. [Weather Underground]

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INVESTIGATION

The decedent's wife, who was a medical professional, left for work approximately 6:30-6:45 a.m. the morning of the incident. She spoke with her husband that morning and he indicated he was going to try to sell some seed. He went to a nearby city to sell and then, around noon he spoke with his wife and visited his in-laws. At approximately 3:00pm, he went to the seed warehouse.

Photo 3. Interlock system bypass. Note safety bar wired to top of cage and seat interlock bypassed.

The decedent routinely used the skid steer to load logs into the wood burner. He was dressed in muck boots, jeans, thermal underwear, Carhart jacket, gloves and hat. A neighbor saw him in the skid steer around 4:40-5:00pm, which was his normal time to load the wood burner with wood. The police report indicated that the central boiler was functioning; there was burning wood inside the stove. It is unknown if the door to the wood stove was opened; police pictures show the door closed, and there is no mention of whether the door was open or had been closed by emergency responders. His wife indicated that the logs were heavy, so rather than manually lift the logs into the wood stove, he would transport them to the stove with the skid steer bucket. When the skid steer was positioned close to the wood stove, he would raise the bucket a few feet, climb out of the operator cage onto the bucket, and push the log(s) into the stove.

His wife left work around 5:00 p.m. and arrived home around 5:30 p.m. When she pulled into the driveway, she thought she saw her spouse standing on the skid steer. She yelled to him "Get down before you hurt yourself!". Looking more closely, she saw that he was "hanging" from the bucket; his upper torso was pinned between the bucket and the frame of the machine. The decedent's left arm was above his head. She ran over to him.

Photo 4. Note toggle switch, rewired light, wire on safety bar

Her medical background "kicked in" and she did not want to try to release him from the machine because she was afraid that if he was still alive, releasing him could cause further injury and since she was by herself, she would not be able to adequately control

the complications, so she called for emergency response.

Emergency responder arrived approximately 10 minutes later. When the police department arrived, the skid steer's transmission was engaged, the engine was running, and the tires were slowly rotating although the skid steer was stuck in place and not moving forward. It was located approximately 16-20 feet away from the wood burner (Photo 5). The skid steer's boom was extended up into the air. In the bucket was a log that was three feet long with a circumference of 18-24 inches standing upright/vertical towards the front of the bucket.

The incident was unwitnessed. A possible scenario is as follows: The decedent attempted to exit the operator cab/cage with the bucket partially elevated while the skid steer was running to push the log into the stove. He did not activate the parking brake. While exiting, due to the cold/wet/slippery surfaces, the decedent slipped. His head injuries suggest that the slip/fall may have caused unconsciousness allowing extended contact to the loader foot control. Because of the bypassed safety feature, when the "heeled" area of the foot pedal was pressed toward the skid steer floor, the bucket arms raised up, pinning him between the extended boom and bucket and the skid steer's operator cage. The decedent's upper back was pinned against the edge of the skid steer operator cage while the bucket was against his upper chest. When pinned, due to the limited space, his body may have contacted the drive lever, "pushing" it back toward the operator seat. Since the skid steer was still under power, and the parking brake was not activated, the skid steer moved in reverse at a slight arc until it contacted and was stopped by a pile of snow/ice.

Photo 5. Location of skid steer loader when decedent was found.

Fire department personnel turned the engine off and then checked the decedent. He was unresponsive and did not have a pulse. Fire department personnel restarted the skid steer and tilted the bucket to free him.

MIOSHA Citations

Since there were no employees, MIOSHA did not perform a fatality inspection for this death.

CAUSE OF DEATH

The death certificate listed the cause of death as blunt force head and neck trauma. Post-mortem toxicology found alcohol at .018 g/dl, (below the allowable blood alcohol concentration of .08 g/dl for operating a motor vehicle), caffeine, and sertraline (an anti-depressant).

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 hazards were identified as key contributing factors in this incident:

- *Rewired to bypass skid steer safety interlock mechanisms*
- *Safe operating procedures not followed during exiting of operator cab: skid steer still running, parking brake not engaged*
- *Cold and snowy weather conditions*
- *Working alone*
- *Equipment selection (No assistive log lifting device)*

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Skid steer operators should never modify or bypass the manufacturer-installed safety interlocks.

Discussion: The skid steer had a functional lift control system (LCS) and a Bobcat interlock control system (BICS) for safety when purchased by the decedent. The LCS contained a seat bar sensor; the seat bar must be lowered all the way down, the engine started, and the lift arm button momentarily pressed before the lift arm hydraulic system could be activated. If the seat bar was raised or the engine was shut off during normal operation, the lift arm hydraulics would be deactivated. The BICS required the operator to be in the seat with the seat bar down before the loader's lift and tilt hydraulic system would be activated and the traction drive system could be operated. The decedent rewired the safety system to bypass the LCS and BICS safety systems so that the skid steer could be operated with the seat bar in a raised position, thus creating the circumstances that caused his death (Photo 6).

Photo 6. Bypass of interlock system

Recommendation #2: Skid steer operators should follow the manufacturer's warnings and instructions for safe mounting and dismounting.

Discussion: It is unknown if the skid steer was purchased with an operator's manual. The decedent had operated a skid steer for many years and was familiar with the safety systems and the safe operation of the machine. His spouse indicated the decedent made the decision to bypass the safety systems to allow for easier access to the wood in the bucket when loading the wood stove.

The design of the skid steer used by the decedent required him to enter and exit through the front of the machine and over the bucket. The foot pedals, which operated the hydraulic lift arms and bucket tilt were located on the floor of the skid steer. It is unknown "how" the decedent exited the loader, but he did not follow the manufacturer's recommended

procedure: 1) Lower the lift arms and place attachment flat on the ground, 2) Stop the engine, 3) Apply the parking brake, 4) Release the seat belt, raise the seat bar and move the foot pedals until they lock, then 5) Exit the machine.

The decedent was wearing muck boots, which increased the likelihood of "heeling" the foot pedals when he exited the cab. Because the machine was running and the safety systems bypassed, when he was moving his left foot to continue exiting the cab, he apparently "heeled" the pedal, causing the lift arm to raise and pin him against the frame. The weather conditions (e.g. snow on his muck boots) and/or a combination of the alcohol and antidepressant may have contributed to his foot pressing the pedal.

Recommendation #3. Perform a job safety analysis to identify and minimize potential risks.

Discussion: One person operations or individuals working alone may elevate potential risks. A job safety analysis (JSA) should be completed for these operations to understand and minimize the risks. Examples of potential minimization strategies that might have been considered to minimize the risks of loading the stove include: 1) reversing the bypass and returning the unit to its original condition, 2) using a loading mechanism (e.g., log lifter, grapple unit on skid steer), 3) retrofitting the skid steer to enable lift arm cylinder locks to be operated from the seat area to support the elevated arms, 4) using smaller firewood, or 5) loading the stove using two people rather than one person.

Equipment manufacturers are a good source of information regarding attachment options to perform the work (such as a grapple unit for a skid steer). An example of a "home-made" log lifters can be found on YouTube (e.g. https://www.youtube.com/watch?v=zCrSUC6CVqc).

Michigan AgrAbility, funded by a U.S. Department of Agriculture (USDA) grant, is a partnership between Michigan State University Extension (MSU Extension) and Easterseals Michigan AgrAbility to provide services to farmers with disabilities, illnesses or aging conditions. To assist a farmer with a disability, Michigan AgrAbility designed a log lifter to enable the farmer to more easily load his outdoor wood burner. (https://www.youtube.com/watch?v=EbTBHRm8O1s). Contact Michigan AgrAbility for more information.

ADDITIONAL RESOURCES

- OSHA Safety and Health Information Bulletin SHIB 01-12-2009. *Hazards Associated with Operating Skid-Steer Loaders with Bypassed and/or Improperly Maintained Safety Devices.* https://www.osha.gov/dts/shib/shib011209.html
- Skid Steer Safety. (2012) Farm and Ranch eXtension in Safety and Health (FReSH) Community of Practice. Retrieved from http://www.extension.org/pages/64425/skid-steer-safety.
- NIOSH Alert DHHS (NIOSH) Publication Number 2011-128: *Preventing Injuries and Deaths from Skid-Steer Loaders.* December 2010. https://www.cdc.gov/niosh/docs/2011-128/default.html
- Michigan AgrAbility. https://www.easterseals.com/michigan/our-programs/employment-training/agrability.html
- Bobcat training kits and safety resources: https://www.bobcat.com/owners/safety-training/resources/courses

DISCLAIMER

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REFERENCES

Weather Underground [2014]. Weather history for nearby weather station. The Weather Channel Interactive, Inc.

ACKNOWLEDGEMEMENT

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