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Farmer Dies After Being Run Over By Tractor

DATE: March 8, 1995

MN FACE Investigation 94MN07401

SUMMARY

A 57-year-old male part-time farmer (victim) died of injuries sustained after he was knocked down and run over by a farm tractor. The victim had operated the tractor earlier on the day of the incident. The tractor engine had been stopped, and the transmission was either left in a forward gear or while the tractor was stopped, the transmission was shifted into gear. The victim apparently thought the tractor's transmission was shifted into PARK. He stood in front of one of the rear wheels, turned the ignition key to the ON position, and pushed the start button. The engine started, and when it accelerated to an operating speed, power was transferred through the "automatic" type transmission to the rear wheels. The tractor moved forward and knocked the victim to the ground. The rear wheel that struck the victim traveled across his pelvis and part of his chest causing serious crushing injuries. Emergency medical personnel were notified and arrived at the scene shortly after the incident occurred. The victim was transported to a local hospital and then flown to a major medical center where he died several hours later. MN FACE investigators concluded that to reduce the likelihood of similar occurrences, the following guidelines should be followed:

- machinery should only be started when a qualified operator is seated in the operator's seat; and
- machine components and safety equipment should be maintained in proper working order.

INTRODUCTION

On December 5, 1994, MN FACE investigators were notified of a farm work-related fatality that occurred on October 29, 1994. The county sheriff's department was contacted and releasable information obtained. Information obtained included a copy of their report of the incident. A site investigation was conducted by a MN FACE investigator on February 7, 1995. During the site investigation, information concerning the incident was provided by an attorney representing the victim's family. Additional tractor design information was provided by an employee of a local machinery dealer. The dealer sells and repairs equipment manufactured by the manufacturer of the tractor involved in this incident.

INVESTIGATION

The victim had operated the tractor earlier on the day of the incident. The tractor engine had been stopped, and the transmission was either left in a forward gear or while the tractor was stopped, the transmission was shifted into gear. The victim apparently thought the tractor was in PARK. He stood in front of one of the rear wheels, turned the ignition key to the ON position, and pushed the start button. The engine started, and when it accelerated to an operating speed, power was transferred through the "automatic" type transmission to the rear wheels. The tractor moved forward and knocked

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According to the serial number, the tractor involved in this incident was built in 1963 or 1964. It had a wide front wheel configuration and a front end loader with a general purpose bucket mounted on it. The tractor did not have dual wheels on either rear axle. It was not equipped with a general purpose cab or any type of roll-over protective structure. The tractor's transmission was essentially an "automatic" type transmission with nine forward gears and two reverse gears. The tractor had a foot-operated clutch on the left side (when facing the front of the tractor). When the tractor was being operated, the transmission could be shifted between gears either with or without using the clutch.

According to information from an employee of a local machinery dealer, the tractor was originally equipped with a safety switch in the transmission. The switch was designed to prevent the engine from being started unless the transmission was shifted into PARK. According to diagrams in the tractor manufacturer's service manual, a push button type safety switch was originally installed inside the transmission. The switch was connected to the ignition switch by a single wire and also had a grounding clip which was always connected to the transmission case. A spring loaded pin and roller mechanism inside the transmission was connected via a small cable to the gear shift mechanism. Apparently whenever the transmission is in PARK, the cable is released and the spring loaded pin/roller contacts the push button switch to complete a path to ground. When the transmission is shifted into gear, the cable pulls the pin/roller assembly away from the push button switch, causing an open circuit (i.e., the path to ground is open or broken). When the circuit is open, the electrical circuit needed to activate the starter is disabled.

An examination of the tractor during the site visit seemed to indicate that the single wire to the internal transmission switch was connected. The wire from the gear shift selector to the point where it entered the transmission case was approximately 35 inches long. It had been spliced together at a point approximately 10 inches from the transmission case. The wire coming from the transmission case was green. The wire from the gear shift selector was black. The different wire colors and the splice indicated that a change had been made relative to the safety switch since the tractor was manufactured. It was not apparent whether the switch was changed or whether just the wire had been cut and spliced with a different type of wire as a result of being torn loose. The wire hung in an open area above the clutch pedal on the left side of the transmission case where it could be hooked and torn loose by an operator while operating the tractor or while mounting or dismounting the tractor. It could not be determined from either the visual inspection of the tractor or from the service manual diagrams whether the wire was originally installed by the manufacturer in the exposed manner in which it was observed during the site visit. Since the small cable from the shift level mechanism to the pin/roller mechanism is apparently inside a small tube connected to the top of the transmission, it could not be determined if the cable was still connected and/or operating as originally designed and installed.

During the site investigation while seated in the tractor seat several attempts were made to engage the engine starter. With the gear shift lever in PARK, the ignition key was turned to the ON position, and the start button was pushed. The starter was activated, and the tractor engine turned several revolutions. The transmission was shifted into either 6th or 7th gear, and again the start button was momentarily pushed. Again the starter was activated, and the tractor engine turned several revolutions. The transmission was shifted into either 2nd or 3rd gear, and the start button momentarily pushed. Again the starter was activated, and the tractor engine turned several revolutions. The safety switch did not prevent the tractor engine from being started when the transmission was in gear. A determination of why the safety switch did not prevent the engine from being started required that a significant portion of the transmission be disassembled and examined by a qualified service mechanic.

CAUSE OF DEATH

The cause of death listed on the death certificate was massive crush injury to chest and pelvis.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Machinery should only be started when a qualified operator is seated in the operator's seat.

Discussion: The operator's seat of farm tractors and machines provides a work station from which the operator can maintain proper control. Proper control is necessary not only during operation of the tractor or machine but also whenever the engine is started. While seated in the operator's seat, an operator should check the engine throttle position, disengage the clutch, and shift the transmission into neutral or park before the engine is started. Before starting tractor engines, the operator should also ensure the power-take-off is disengaged. Performance of these precautions will reduce the likelihood of the tractor or machine accidentally moving forward or backward after the engine starts. In addition, if the tractor or machine does unexpectedly begin to move in either direction, an operator seated in the seat will not be in danger of being run over and will be in position to regain and maintain safe operating control.

Recommendation #2: Machine components and safety equipment should be maintained in proper working order.

Discussion: All machine components should be checked periodically to ensure that they are working properly. Accidents are more likely to happen when worn or broken parts are not replaced and when shields and safety devices are not in place or working properly. Safety devices such as neutral-start switches, shields, and guards are designed to prevent operators from being injured. These devices should be kept in good condition through periodic inspections and maintenance. Devices that are defective should be immediately repaired or replaced. Maintenance and repairs should be done by following the procedures in operator's or service manuals provided by manufacturers.

REFERENCES

1. Agriculture Safety, Fundamentals of Machine Operation, 1987, Deere & Company, Moline, Illinois, Third Edition.

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