

TO: Director, National Institute for Occupational Safety and Health

FROM: Iowa FACE Program

SUBJECT: Farmer crushed underneath rotary mower while changing blades.

SUMMARY

In the spring of 1998 a 76-year-old Iowa farmer was killed while working on a rotary mower in his machine shed. The mower was attached to the three-point hitch of his tractor, which he had backed into a machine shed to change the mower blades. He raised the mower to a sufficient height to work underneath, but did not provide support or blocking for the mower. While he was lying on the floor working on the mower, the tractor hydraulics were leaking and the mower was slowly coming down. He was probably aware of the hydraulic problem, for he had been working with this same tractor and mower for several years. At one point, he apparently tried to roll out from under the mower, but became trapped between the right rear wheel of the mower and the mower deck. The mower continued to come down and pinned him to the floor, crushing him in the chest. A friend of the victim was expecting him to arrive in town for coffee and began to search for him when he did not appear. The farmer was found dead under the mower in his machine shed. The official cause of death was from suffocation.

RECOMMENDATIONS based on our investigation are as follows:

- 1. Machines should be supported securely during repair and maintenance, especially when working under heavy machine components.*
- 2. Hydraulic systems should be kept in good operating condition.*

INTRODUCTION

In May of 1998 a 76-year-old Iowa farmer was killed while working under a rotary mower. The Iowa FACE Program became aware of the incident several months later from the Iowa Department of Public Health and began an investigation. A site visit was conducted during the fall of 1998 by one investigator from the Iowa FACE program. This visit was timed to coincide with family members who were present at the farm preparing items for a farm auction. Other sources of information were the County Sheriff, who had photographs, the County Medical Examiner, the auctioneer, and the friend who found the victim in the machine shed.

The victim was a retired life-long farmer who was renting out his farmland, yet he remained very active and kept busy with custom mowing, garden tilling, and blade

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sharpening.

The farmer had been living at this location for the last 28 years and had owned and operated his tractor for the same time period. It was a small farm and the man had always worked alone.

There was no safety program at this farm, yet the farmer was experienced with his equipment, using it on a daily basis.

INVESTIGATION

The mower was powered by the power-take-off from the tractor, and was attached by a three-point hitch to the rear of the tractor. It had three 60cm (2 ft.) long blades and



two rear tires. It was in excellent operating condition. At the time of the accident, two of the three blades had been removed, and it was evident that the victim had been cleaning out grass from under the mower deck. Changing and sharpening blades was a routine job, and the victim was very experienced using the tractor and mower, and performing this necessary maintenance.

The tractor and mower were backed into a machine shed, and the victim was lying on the concrete floor working under the mower. No blocking was used, however, there were numerous items in and around the shed that could have been used to support

the mower. The victim reportedly had moderate arthritis in his shoulders, and it is likely he did not raise the mower to its maximum height, but rather a short distance off the floor to minimize shoulder movement. From photographs it appears that once the victim noticed the mower was dropping, he attempted to roll out from under the mower, but was stopped by the right rear wheel of the mower. The mower then continued to fall pinning him against the wheel and the floor, slowly crushing him in the chest. The victim had a routine of meeting with friends for coffee, and when he did not appear, one friend decided to look for him, and eventually found him pinned under the mower, obviously dead for several hours. The cause of death was suffocation due to massive chest trauma. No autopsy was performed.

After family members were notified, they tested the hydraulics on the tractor and found them to be leaking to the degree that it took about 30 minutes for the mower to settle once it was raised in the air. On the day of our visit, the mower had been removed, however a front-end loader was attached to the tractor. During 20 minutes, the front-end loader, which was partially raised, had also shifted down a significant amount, confirming the leaky condition of the internal hydraulic valves. The hydraulic fluid level was checked during our site visit, and was three quarts low, not sufficient to cause a problem since the capacity of the tractor was nine gallons. The tractor was over 35 years old, and minor leaking of the main hydraulic control valves is very common in tractors this old. Since these older tractors can usually generate full hydraulic pressure when needed, farmers are reluctant to repair them.

CAUSE OF DEATH

The official cause of death from the death certificate was *"suffocation due to crushing injury, left chest wall, as a consequence of a rotary mower falling on him"*

RECOMMENDATIONS / DISCUSSION

Recommendation #1 *Machines should be supported securely during repair and maintenance,*

when working under heavy machine components.

Discussion: This fatal injury could have been prevented by using suitable blocking under the mower deck. Since changing blades and cleaning the deck was a routine job, appropriate supports would have been needed often and should have been on hand. The mower was a relatively light implement, yet heavy enough to cause the injury. Once the hydraulic system began to settle, it was impossible to stop or raise it with muscle power alone. Machine elements supported by hydraulic lines should not be considered securely supported. A leak in the hydraulic lines or valves, a breakage, or someone touching the hydraulic controls may suddenly drop the raised machine element. Likewise a minor leak in the system is typical and will slowly allow the machine component to come down when the tractor is turned off. Proper supports should be kept available for maintenance work in the shop and suitable supports should be carried on the tractor for possible field maintenance.

Recommendation #2 *Hydraulic systems should be kept in good operating condition.*

Discussion: It is common for older tractors and implements to leak some hydraulic fluid. Even if the hoses, fittings, and cylinders are in good condition, internal leakage in older hydraulic pumps and valves can cause settling or jerky movement of hydraulic components. Generally, unlike automobiles, old small utility tractors have a very long life span and they maintain good resale value when properly maintained. Therefore it is often feasible to repair hydraulic and other problems as they arise. Hoses and fittings should be periodically examined for signs of wear and tear, which may lead to rapid collapse of machine components, and possible injury. Internal hydraulic leakage usually increases gradually over time. When it becomes significant, overhaul of the hydraulic elements becomes necessary to maintain this vital tractor function and to avoid injury, as in this case.

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Fatality Assessment and Control Evaluation

FACE

FACE is an occupational fatality investigation and surveillance program of the *National Institute for Occupational Safety and Health* (NIOSH). In the state of Iowa, *The University of Iowa*, in conjunction with the *Iowa Department of Public Health* carries out the FACE program. The NIOSH head office in Morgantown, West Virginia, carries out an intramural FACE program and funds state based programs in Alaska, California, Iowa, Kentucky, Maryland, Massachusetts, Minnesota, Missouri, Nebraska, New Jersey, Ohio, Oklahoma, Texas, Wisconsin, Washington, and Wyoming.

The purpose of FACE is to identify all occupational fatalities in the participating states, conduct in-depth investigations on specific types of fatalities, and make recommendations regarding prevention. NIOSH collects this information nationally and publishes reports and Alerts, which are disseminated widely to the involved industries. NIOSH FACE publications are available from the NIOSH Distribution Center (1-800-35NIOSH).

Iowa FACE publishes case reports, one page Warnings, and articles in trade journals. Most of this information is posted on our web site listed below. Copies of the reports and Warnings are available by contacting our offices in Iowa City, IA.

The Iowa FACE team consists of the following: Craig Zwerling, MD, PhD, MPH, Principle Investigator; Wayne Johnson, MD, Chief Investigator; John Lundell, MS, Coordinator; Lois Etre, PhD, CIH, Co-Investigator; Risto Rautiainen, MS, Co-Investigator.



<p>Additional information regarding this report or the Iowa Face Program is available from:</p> <p>Iowa FACE Program 105 IREH, Oakdale Campus The University of Iowa Iowa City, IA. 52242-5000</p> <p>Toll Free 1-800-513-0998 Phone: (319)-335-4351 Fax: (319) 335-4225 Internet: http://info.pmech.uiowa.edu/face/face1.htm E-mail: wayne-johnson@uiowa.edu</p>

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