

DATE: February 22, 1999

FROM: Minnesota Fatality Assessment and Control Evaluation (MN FACE)

SUBJECT: MN FACE Investigation 99MN00701
Farmer Dies After Falling 45 Feet From Silo

SUMMARY

A 45-year-old farmer (victim) died from injuries sustained when he fell 45 feet from a silo. On the morning of the incident, the victim had climbed up the enclosed silo ladder to check the level of corn inside the silo. The day before the incident occurred, the victim and his brother had been filling the silo with shelled corn. Shortly after opening the silo door, the victim was overcome by a toxic gas which caused him to collapse and fall head first down the ladder chute. The victim's brother discovered him lying at the base of the silo and immediately placed a call to emergency medical personnel. They arrived at the scene shortly after being notified and pronounced the victim dead at the scene.

MN FACE investigators concluded that, in order to reduce the likelihood of similar occurrences, the following guidelines should be followed:

- workers who must enter a silo within several weeks of filling should ventilate the silo and wear a self-contained breathing apparatus before entering it.

INTRODUCTION

On January 15, 1999, MN FACE investigators were notified of a farm work-related fatality that occurred on September 26, 1998. Although a site investigation was not conducted, a detailed written report from the sheriff's department and a telephone interview provided specific information concerning this fatality. During MN FACE investigations, incident information is obtained from a variety of sources such as law enforcement agencies, county coroners and

medical examiners, employers, coworkers and family members.

INVESTIGATION

On the day preceding the incident, the victim and his brother had been filling a silo with high moisture shell corn. On the morning of the incident, the victim was going to climb up the silo chute and open one of the silo doors to check the level of corn inside. The victim did not operate the blower in an attempt to ventilate the silo of toxic gases prior to climbing the silo ladder.

The silo had an enclosed chute which provided a protected area for workers to climb the silo door ladder rungs from the ground to the top of the silo. The victim climbed to a height of approximately 45 feet and opened the fifth silo door. Shortly after opening the door, the victim was overcome by a toxic gas, possibly nitrogen dioxide, and collapsed. After collapsing, he fell in a head first position down the silo chute to a concrete floor at the base of the silo. The victim was found by his brother who had last seen the victim approximately 30 minutes earlier. He immediately placed a call to emergency medical personnel. They arrived at the scene shortly after being called and pronounced the victim dead at the scene.

CAUSE OF DEATH

The cause of death listed on the death certificate was asphyxia carbonica. Other significant conditions contributing to death include skull fracture secondary to fall after asphyxia.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Workers who must enter a silo within several weeks of filling should ventilate the silo and wear a self-contained breathing apparatus before entering it.

Discussion: Exposure to silo gas can cause permanent injury or death. Nitrogen dioxide, which is heavier than air, may form yellowish layers of mist above the silage or drain down the silo chute. The strong silage odor can mask nitrogen dioxide's bleach-like odor. It may be present even if it can't be seen or smelled. Highly concentrated silo gas can kill a person in a matter of seconds, along with anyone who attempts a rescue. In low concentrations, silo gas damages the respiratory system when nitrogen dioxide combines with moisture in the lungs to form nitric acid. This acid can severely damage lung respiratory tract tissue and cause permanent damage.

Although the highest concentrations of nitrogen oxides usually occur within 48 hours after a silo is filled, no one should enter a silo without using special precautions, for four to six weeks or longer after filling. Workers should ventilate the silo using a silo blower or other ventilation systems for 15 to 30 minutes before entering to let fresh air in above the silage. Even silos without roofs can accumulate dangerous gases, because these gases are heavier than air. In addition, a self-contained breathing apparatus must also be worn to ensure an adequate oxygen supply is available.

REFERENCES

1. Michigan State University -Extension. "MSU - Fresh Silage Can Contain A Deadly Threat To Health." 28 Aug. 1997. (8 Feb. 1999).

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