DATE: March 16, 1992

FROM: Fatal Accident Circumstances and Epidemiology (FACE) Project
Minnesota Department of Health (MN FACE)

SUBJECT: FACE Investigation MN9201 A 35-year-old male died after falling into and suffocating in a corn bin containing approximately 40,000 bushels of corn

SUMMARY

A 35-year-old male (victim) died on the farm he managed after falling into and suffocating in a corn bin containing approximately 40,000 bushels of corn. The corn was being unloaded onto semi trailer trucks for transportation to a nearby chicken farm. No standby person was present when the victim entered the bin and the grain auger had not been shut down. Earlier, corn flow from the auger had stopped intermittently, and the victim was apparently attempting to unclog a jam with a garden rake when the incident occurred. There were no witnesses. Approximately six hours after falling into the bin, his body was recovered near the point of corn removal at the bottom of the bin. He was pronounced dead on arrival at the hospital. MN FACE investigators concluded that, in order to prevent similar occurrences, farm personnel should:

> enter confined spaces only when a standby person is present and use personal protective equipment such as safety belts or harnesses when feasible;

> fully shut down operating equipment within confined spaces and use appropriate well-maintained tools for specific procedures;

> post warning signs at entrances to confined spaces containing stored grains; and

> retrofit grain storage facilities with mechanical leveling or raking devices, if possible, to minimize the need to enter grain storage bins.

INTRODUCTION

On January 30, 1992, a 35-year-old man died as the result of engulfment in 40,000 bushels of corn contained in a 48 foot diameter, 25 foot tall corrugated metal bin on his grain farm. He apparently fell into the corn, which was being drawn out of the bin at the time by an auger, while attempting to dislodge a "hot spot," or jam, in the bin with a garden rake. On February 10, 1992, MN FACE learned of the incident through a newspaper clipping and began their investigation. Copies of the sheriff's report and the county coroner's report were obtained.

MN OSHA was informed of the fatality and the county sheriff's department was contacted to obtain information. The incident was reviewed with a deputy sheriff. The victim's father, co-owner of the farm, provided information about the incident as well, and gave MN FACE staff permission to investigate the site. A site investigation was

conducted on February 19, 1992.

The father of the victim indicated that neither he nor his son had ever had any training in the hazards of confined spaces.

INVESTIGATION

The bin is 48 feet in diameter with a conical top. It is a metal outdoor structure, with a capacity of 50,000 bushels. It stands 25 feet high and was approximately four-fifths full of corn at the time of the incident. A metal ladder is attached to the outside of the bin leading up to the entry hatch. The hatch is a round, 18-inch diameter opening in the conical bin roof approximately one foot above the junction of the roof and sides of the bin. No personal protective devices to prevent an accidental fall into the bin were evident on either the ladder leading to the entry hatch or at the entry hatch itself.

There were no witnesses to the incident, but it is believed that the victim fell into the corn bin and became engulfed while attempting to dislodge a "hot spot" inside the bin with a garden rake. He was discovered missing approximately one hour after he was last seen, which was at approximately 3:00 pm. The head of the rake was loose and the victim's father believes it is possible that the head fell off the handle and the victim dove in to retrieve it. The rake head was later discovered at the bottom of the bin near the victim's body. The auger, which was drawing corn out of the bin, had not been shut down before entry and the victim, after falling into the bin, was apparently pulled by its action down to the bottom of the bin along with the corn.

Rescue workers and neighbors worked for approximately 4 1/2 hours removing corn to retrieve the victim. A large hole was ripped open on the side of the bin with blow torches to drain the corn and to allow entry. Shovels and snow blowers were used by workers for corn removal.

CAUSE OF DEATH

The coroner reported the cause of death to be suffocation.

RECOMMENDATIONS/DISCUSSION

***Recommendation #1*:** Confined space safe work procedures should be established and followed. Entry into confined spaces without a standby person present and appropriate personal protection equipment should not be allowed.

Discussion: Entry into confined spaces where the risk of engulfment exists is a hazardous situation. Safe work procedures would include becoming familiar with hazards associated with grain bins, and discussing confined space safe work procedures with other farm personnel. Informing others of intent to enter confined spaces on farms may reinforce consideration of safe work practices and rescue in event of an emergency.

At least one person should stand by on the outside of the confined space and be ready to give assistance in case of emergency, and an approved safety belt or harness with an attached line secured outside the entry opening should be used when feasible. This recommendation is in accordance with MN Rules 5205.1040, Subp. 2.

***Recommendation #2*:** Automatic equipment within a confined space should be shut down when it becomes necessary for a person to enter the confined space. Appropriate, well-maintained tools should be used during hazardous procedures so they do not contribute to the hazards.

Discussion: The auger was still in operation at the time of this incident and its action drew the victim to the bottom of the bin. It is recommended that any time a worker enters a storage area, the supply and discharge of materials should be stopped and the supply and discharge equipment should be locked out (NIOSH 1987). The loose head on the rake used in this incident may have contributed to this fatality. A rod or paddle, without parts which could fall off, may have been a better choice of tool for this type of procedure, and may have allowed the victim to perform the task without exposure to the engulfment hazard.

***Recommendation #3*:** Safety signs should be posted to warn workers of the hazards of working with stored grains (NIOSH 1987).

Discussion: Signs to warn of the hazards of stored grain in confined spaces should be an additional part of a safety program that is implemented to control the hazards associated with stored grain or other unstable materials or surfaces. Safety signs alone, however, are not sufficient to provide the information needed to prevent fatalities.

***Recommendation #4*:** Retrofitting grain storage facilities with mechanical leveling or raking devices should be considered if cost is not prohibitive (NIOSH 1987).

Discussion: Grain bins, silos, hoppers, or tanks where unstable materials are stored, handled, or transferred should be equipped with mechanical leveling or raking devices or other means for remotely handling materials. Devices of this nature would minimize the need for workers to enter storage facilities.

REFERENCES

1. MN Labor and Industry, Occupational Safety and Health Standards, Chapters 5205, 5206, 5207, 5210, 5215, Extract from 1991 MN Rules. 5205.1040, Subp. 2. St. Paul, MN.

2. NIOSH (1987) Alert: request for assistance in preventing entrapment and suffocation caused by the unstable surfaces of stored grain and other materials. Cincinnati, OH: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 88-102.