DATE: April 27, 1993

FROM: Minnesota Fatality Assessment and Control Evaluation (MN FACE) Project
Minnesota Department of Health

SUBJECT: MN FACE Investigation 92MN02501
Grain Elevator Owner's Son Dies After Being Engulfed in a Corn Bin

SUMMARY

A 32-year-old son (victim) of a grain elevator owner died from asphyxiation after being engulfed in a corn bin containing approximately 60,000 bushels of corn. The corn was being transferred to another bin, and the auger was in operation at the time of the incident. The victim, despite warnings from elevator employees, apparently entered the bin to knock apart some crusted grain. No stand-by person or witnesses were present at that time. When elevator employees could not find him after a complete grounds search, 911 was called for assistance in searching the bin. The victim's body was recovered near the center of the bin approximately 8 hours after he entered. He was pronounced dead at the scene and no resuscitation was attempted. MN FACE investigators concluded that, in order to prevent similar occurrences, the following guidelines should be followed:

> de-energize and lockout/tagout grain bin augers prior to entry;

> enter confined spaces only when a stand-by person is present and use personal protective equipment such as a safety belt and lanyard; and

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

INTRODUCTION

On December 21, 1992, MN OSHA informed MN FACE of a December 18, 1992, work-related confined space fatality. Police and county coroner reports were requested and

obtained. The employer was interviewed via telephone, but because of their extremely busy work schedule a site investigation could not be conducted until January 7, 1993.

The incident occurred at a local feed and grain elevator. The victim's father had owned the facility for about 15 years. The victim had worked at the elevator on and off during this period, but was not actually an employee. Five employees worked at the elevator. The assistant manager of the facility served as its safety officer and was on site full-time. The company had written safety rules and procedures for all tasks performed by workers. Confined space training, including auger lockout/tagout procedures, provision of harnesses and lifelines, and a bin entry permit system, was in place at the elevator.

INVESTIGATION

The incident occurred at a local grain elevator having six 60,000 bushel storage bins and two 110,000 bushel storage bins. Corn was being transferred a total of 715 feet, from a full 60,000 bushel bin to another for later grinding. It was estimated that there was approximately 10-15 feet of "head" space in the full bin. The bin auger, located at the bottom and center of the bin, was in operation at the time of the incident and was moving corn at a rate of 750 bushels per hour. It was 4:30 p.m.

The bin was a 48-foot diameter, 40-foot high metal structure. Its entry hatch, a 24-inch diameter opening, was located near the top of the bin on its conical roof. A caged ladder on the outside of the bin lead up to the entry hatch. The MN FACE investigator was informed by the elevator assistant manager that a confined space warning sign was posted near this entry hatch.

While the bin was still full, the victim, despite warnings minutes before not to enter the bin at that time because of the darkness and hazards, apparently entered the bin to knock apart crusting corn to prevent the auger from jamming. There were no witnesses to the bin entry. He was presumably swept up into the movement of the corn and became engulfed.

Other workers began missing the victim approximately 45 minutes after having last seen him. A search was conducted on the elevator grounds, but when he could not be located, a 911 call was placed for assistance in searching the bin. Five holes were punched into the bin with the bucket of a payloader to drain it of corn. Corn was hauled away with

payloaders and further removed from the bin with grain evacuators (vacs). Rescuers and coworkers recovered the victim, after 8 hours from the time of entry, near the bottom of the bin. Resuscitation of the victim was not attempted.

CAUSE OF DEATH

The cause of death listed on the death certificate was asphyxiation.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: De-energize and lockout/tagout grain bin augers prior to entry.

Discussion: The auger was still in operation at the time of this incident, and it probably contributed to this fatality by drawing 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). In addition, the employer could install a locked trap door at the entrance to the caged ladder, and supply only selected employees with a key. This would prevent bin entry by unauthorized personnel.

Recommendation #2: Enter confined spaces only when a stand-by person is present, and use personal protective equipment such as a safety belt and lanyard. This recommendation is in accordance with Minnesota Rules 5205.1040, Subp. 2.

Discussion: At least one person should stand by on the outside of confined spaces and be ready to give assistance in case of emergency. An approved safety belt or harness with an attached line secured outside the entry opening should be used by anyone entering and the stand-by person should be capable of pulling out a would-be victim. In a grain bin like the one described in this incident, manual removal of a worker in trouble may be impossible. A power winch, as the elevator's assistant manager suggested, could, therefore, be considered.

Recommendation #3: Retrofit grain storage facilities with mechanical leveling or raking devices to minimize the need to enter grain storage bins (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. Usually, cone-shaped piles of loose material can be leveled, and bridging of material prevented, by mechanical agitation or vibration of stored materials.

REFERENCES

1. 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.

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