

FACE 98IA043

To: Director, National Institute for Occupational Safety and Health

From: Iowa FACE Program

Subject: Farm worker suffocates in flowing grain while clearing a blocked grain auger.

Summary

A farm worker suffocated to death after being engulfed in flowing grain while trying to clear a blocked auger. Two workers were emptying a grain bin at a grain elevator owned by a large farm in northeastern Iowa. The auger had stopped moving corn indicating there was a blockage at the auger intake inside the bin. Both men entered the bin from the access door at the top of the 50-foot tall bin. They had probes and shovels with them for the clearing work. They had left the auger running and probed the corn with metal bars around the auger opening in the middle of the bin floor. The corn was approximately 10 feet deep at the sides and 6-8 feet deep in the middle of the 36-foot diameter bin. The blockage suddenly cleared and the flowing corn immediately began to suck one of the workers down. The other worker was looking the other way and was alerted by his co-worker yelling for help. He tried to assist his co-worker to get out but struggled to save himself from being pulled down as well. He scrambled out of the bin, turned off the auger and summoned for help. The controls for the auger were outside the bin and during the time it took to get out of the flowing corn, climb to the top access door, and down to the ground controls, the victim was engulfed in corn. No fall protection devices or lifelines were used and there was no emergency stop system for the auger. The rescue crews arrived and had some difficulty accessing the 50-foot tall bin. There was a side door at the bottom of the bin, but it was still under corn and not used during rescue. The victim was taken to a regional health center but was pronounced dead on arrival.

Recommendations based on our investigation are as follows:

Employers should provide rescue equipment, training and adequate supervision to ensure that safe practices are followed while workers are entering grain bins.

Grain handling facility owners should install "chairs" over the center unloading auger openings

Farmers and grain storage operators should ensure that adequate measures are taken to avoid spoilage of grain during storage.

Introduction

The fatality occurred during the summer of 1998 at a grain handling facility in Iowa. This facility was previously a commercial elevator, but had been privately owned for the last two years, purchased by a large local farm for their own grain handling and storage use. This farm had approximately 8,000 acres in corn and soybeans and also operated a 3,000 head hog production facility.

The interviewed farmer was one of two owners who had operated the farm for the last 17 years. The farm employed five workers besides the two owners and their family members. The two workers involved in this injury both started working for this farm in March 1998. The victim was 42 years old and his fellow worker was 21 years old. The victim had been a farmer before and was experienced in grain handling. The younger co-worker also had previous farm work and grain handling experience.

The farm had a written safety policy and provided safety training to all workers after hiring, as well as job-specific instruction in new tasks. There was no written safety procedure for working in a grain bin, however the established work procedure included always having one worker outside the bin as an observer in case something goes wrong inside the bin. Both workers had been performing this type of work previously at this farm and were aware of proper procedures. However, at this time both men entered the bin simultaneously without having anyone outside the bin as an observer. There was no formal supervisor-subordinate relationship between the two workers, although the victim (older and more experienced), usually took the lead.

The farm had other grain handling facilities with a total of about 20 bins, and work was performed at these sites for loading and unloading throughout the year. During the summer months the workers had not been involved in grain loading and transportation; this was their first day of grain handling in the last three months. This may have had some effect in their deviation from the normal safe procedures while entering the bin.

Investigation

The Iowa FACE program was notified about this fatality from a colleague at the *Institute for Rural and Environmental Health*. Additional information was gathered from EMS contacts, the County Sheriff, newspapers, and a site visit. Iowa OSHA conducted an investigation on site and found no violations of regulations. One FACE investigator visited the grain facility on September 12th, interviewed the owner of the farm and took photographs of the bin and the auger.

The grain handling facility had several large bins, an unloading structure with controls for the equipment, and an office. The injury occurred in bin #2, which is between three other bins and adjacent to the unloading structure. The bin is 40,000 bushels in volume, 36 feet in diameter and 50 feet in height. The bin has an access door at the

top and another access door at the side near the bottom. This bottom access door was covered by corn at the time of the injury and was not used for rescue. It is possible that it could have provided a quicker and easier access for rescuers by opening the access door and letting the excess corn flow out. The bin had two fans for aeration, air ducts under the level bin floor and perforated floor sections in double-Y configurations for airflow. The unloading auger was 10 inches in diameter and had an adjustable square opening at the center of the bin, measuring approximately 16 x 16 inches. The auger had been replaced three years ago. It was horizontal leading to a grain leg outside the bin.

The workers at this facility had a lot of grain handling experience managing about 20 grain bins. Careful procedures were followed during harvest to ensure that grains were in good condition for storage, and aeration was used as needed to reduce moisture content to appropriate levels. At the time of the investigation the bin was empty, but as stated by the farm owner, corn in the bin at the time of injury was in good condition, with approximately 15% moisture.

At this grain handling facility there had been problems during earlier years prior to current ownership with moist spoiled grain. This was evident at the time of the investigation; the inside walls of the bin from ~ 10 foot height to ~30 foot height had spoiled grain stuck to the walls of the bin. The farm owner stated that it was likely that these hard clumps of spoiled grain were a factor in preventing movement of corn and ultimately clogging the auger. The workers entered the bin to probe and break up this blockage.

Some of the other bins have a “chair” on top of the auger opening. This chair is made of heavy gauge metal mesh on top and has open sides. The chair functions so that the pressure of the grain breaks any clumps of grain on top of the chair, and even if the top gets clogged, grain can still flow to the auger from all sides. These “chairs” were installed in some of the other bins and are usually provided in commercial grain handling facilities. In the bins at this location which had chairs, there had not been problems with the augers getting blocked.

There were no fall protection devices or other means to protect workers from being engulfed in flowing grain. In commercial grain handling facilities this is required, but on typical farm grain bins, harnesses and lifelines are not normally used. The usual safety measure, as used on this farm, is having an observer outside the bin who is able to assist or operate the controls when needed. The farm owner had considered installing ropes, lifelines, and other fall protection in the bins, but never followed through. Alternative possibilities to provide fall protection were discussed during the on-site interview.

Cause of Death: Suffocation

RECOMMENDATIONS / DISCUSSION

Recommendation 1: *Employers should provide rescue equipment, training and adequate supervision to ensure that safe practices are followed while workers are entering bins.*

Discussion: As stated in 29 CFR 1910.272(iii)(B)(2), when entering bins from the top, employees should (1) wear a body harness with a lifeline; (2) have an observer, equipped to provide assistance, stationed outside the bin maintaining communications with the worker inside the bin, (3) provide equipment for rescue specifically suited for the bin, (4) train the observer in rescue procedures, and (5) have no employees enter the bin underneath bridging conditions or where a buildup of grain on the sides could fall and bury the workers. The workers failed to follow some of these procedures and it is likely that having an observer outside the bin would have helped prevent this fatality.

Recommendation 2: *Grain handling facility owners should install “chairs” over the center unloading auger openings.*

Discussion: The “chair” is a metal structure covering the grain intake opening. It is at about 2-foot height, has open sides and a perforated top allowing grain to flow through. If there are clumps in the grain, they will likely enter from the center and be pushed against the perforated top which breaks them. Even if the top gets plugged, grain can flow through the sides. The “chair” is typically used in commercial elevators and was present in some of the other bins at this facility. The owner of this facility plans to install a “chair” in this bin as well, since his experience with “chairs” in other bins has been positive.

Recommendation 3: *Farmers and grain storage operators should ensure that adequate measures are taken to avoid spoilage of grain during storage.*

Discussion: An important method to prevent grain suffocations is to ensure that the grain is in good condition for storage. This will avoid problems with spoilage, obstructions in grain flow and respiratory exposure to mold spores and other hazardous organic dusts while handling spoiled grain. The moisture content of the grain must be below a certain level which is somewhat dependent on the temperature, type of grain and other factors, but is generally about 15%. Drying or aeration must be used if it is not possible to harvest the grains at adequately low moisture content. During unusually rainy harvest seasons, many farmers experience problems with grain storage. To avoid such problems, it would be important to ensure that adequate capacity is available for drying and/or aeration, especially so during worse than average harvest conditions.

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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.

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