



FATALITY ASSESSMENT AND CONTROL EVALUATION

Farm Worker Dies during Grain Bin Auger Entanglement Case Report: 04NY121

SUMMARY

On November 9th, 2004 a 53-year-old farm worker was killed when he became entangled in a grain bin auger. At the time of the incident, the victim was cleaning the remaining wheat out of a grain bin when he became entangled in the sweep auger that was moving around the floor of the bin. Hooks on the sweep auger caught the material on the worker's pants and his legs were subsequently entangled in the auger. A co-worker working nearby heard the drive belts begin to squeal and after turning off the drive mechanism, discovered the entangled victim. The co-worker immediately asked the farm owner to call 911 while he and another worker went to the aid of the victim. The co-workers cut the material of the victim's pants loose and worked to disentangle the victim's legs from the auger. Emergency responders arrived within minutes and transported the victim via ambulance to the nearby hospital where the victim was stabilized prior to being transported via helicopter to the nearest major trauma center. The victim died from his injuries six hours later at the trauma center.

New York State Fatality Assessment and Control Evaluation (NY FACE) investigators concluded that to help prevent similar incidents from occurring in the future, employers/farm owners should:

- ***Ensure that workers do not enter grain bins while the unloading mechanism is operating;***
- ***Establish lockout/tagout procedures and ensure workers follow them any time a worker enters a grain bin or other confined space;***
- ***Provide employees with proper training in lockout/tagout procedures and procedures for safe entry into confined spaces, such as grain bins and;***
- ***Consider utilizing grain bin and auger designs that can help ensure safety for workers such as self-unloading or bottom-unloading bins.***

INTRODUCTION

The New York FACE (NY FACE) program learned of the agricultural-related fatality through a news article on November 12th and subsequent referral call from a regional OSHA Compliance Officer. The incident involved a 53-year-old Caucasian male farm worker who was working inside a grain bin sweeping and shoveling some remaining wheat when he became entangled in a sweep auger that was moving around the floor of the bin.

A NY FACE investigator met with the investigation team at the area OSHA office on January 21st, 2005 to learn background details related to the incident. Additionally, the FACE investigator visited the farm location where the incident occurred on January 27th, inspected the grain bin, and spoke with the farm owner regarding the incident. The death certificate and Medical Examiner's reports related to the incident were also reviewed.

The incident occurred at a large dairy farm with 3,500 working acres, 510 dairy cows, and 15 full-time farm workers. The victim had worked on this farm for the past five years. He had considerable prior experience working on farms, having owned his own farm for many years and working on other farms prior to his employment at this particular farm.

INVESTIGATION

On November 9th, 2004, three employees and the farm owner were loading corn from a grain bin into a transport truck in order to transfer the corn into a different bin. The victim was removing the remaining bushels of wheat from the floor of this bin in preparation for the transfer of corn from the first bin. The grain bin where the victim was working was a 1972 Butler grain bin (Photo 1), 30 feet in diameter with a vertical auger in the center of the bin. The auger moved grain up from the center of the bin into a chute which dispensed the grain into a waiting vehicle. The bin also had an approximately 14-foot-long sweep auger. The auger rotated around the circumference of the inside of the grain bin, moving grain from the radius of the bin toward the center at which point the center auger moved the grain vertically upward and out of the bin.



As is common with this type of bin, when the grain level inside the bin becomes low and the grain is at floor level, the sweep augers remove as much of the material as possible and carry it toward the center of the bin. At this point, it was standard practice for a worker to enter the grain bin, with all of the machinery turned off, and to sweep or shovel the remaining grain toward the center to

remove it from the bin. When a considerable amount was piled against the auger, the worker would go outside the bin and re-energize the electricity to the auger motor which would transport the material up and out of the bin (Photos 2 & 3). This method would require repeated shoveling, sweeping, and re-energizing until all of the remaining grain had been removed from the bin.



Photo 2. Grain bin door and electrical panel.

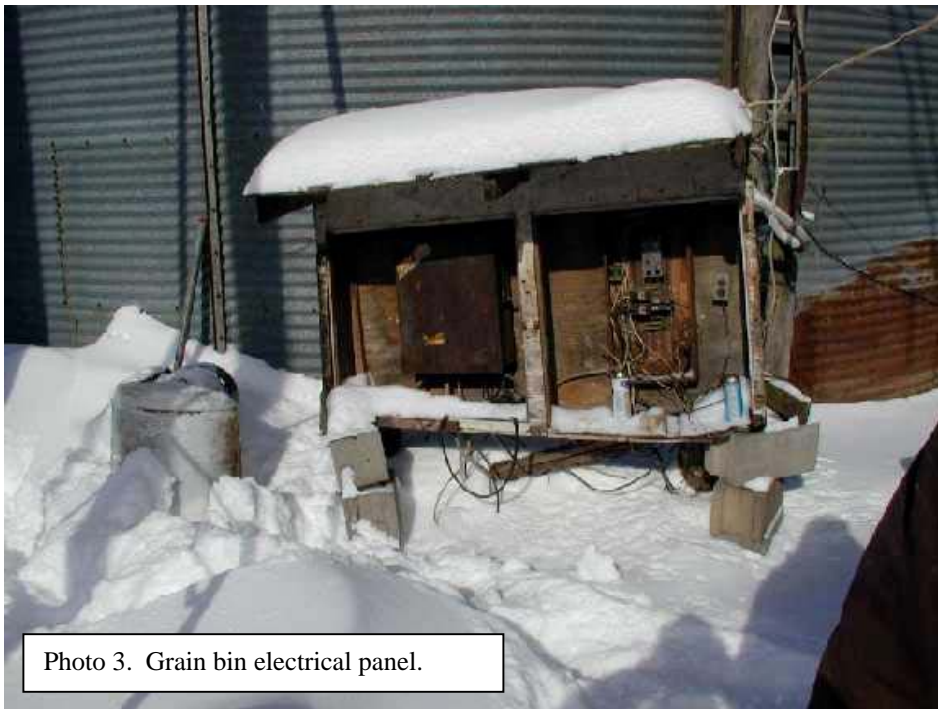


Photo 3. Grain bin electrical panel.

On the day of the incident, the victim was removing all remaining wheat from the bin while the co-workers were working to remove corn from a nearby grain bin to be loaded into a transport truck

operated by the farm owner. As a co-worker came out of the bin containing corn, he heard the drive belt begin to squeal on the drive mechanism in the nearby bin. The drive mechanism has a large electric motor with a pulley that utilizes rubber drive belts to drive the pulley on the end of the auger. Upon hearing the squealing, the co-worker immediately ran over to the power station outside of the grain bin and shut off the power to the motor. He then called to the victim who had been working inside the bin, with no response. He looked inside the grain bin and saw the victim lying on the floor entangled in the middle portion of the 14-foot sweep auger.

The co-worker immediately told the farm owner who called 911. Two co-workers went to the aid of the victim, discovered that the auger had entangled the victim's pants, and proceeded to cut the victim's pants off of the auger shaft. Since one of the victim's legs was under the auger and the other leg was over the auger, the workers backed off the auger so they could remove the victim.

The victim was unconscious with labored breathing when the ambulance crew arrived on the scene. The ambulance transported the victim to a nearby hospital where he was stabilized, and then transported him via emergency helicopter to the nearest major trauma center. The victim was under examination at the major trauma center when he died from his injuries approximately six hours after being found.

At the scene, responding officers noted that there were remnants of the victim's clothing near the center of the auger, where small drive hooks were built into the auger. This friction-driven auger was only two years old and utilized small hook legs on the outside center portion, which "walked" the auger around the circumference of the bin while it was energized. As the auger shaft rotated, these hooks extended past the 4-inch flighting of the auger to make contact in the grain and turn the auger around. Additionally, when the auger reached the floor of the grain bin these legs protruded further than the spiral flighting of the auger. The center portion is where the victim's pant leg became entangled.

Investigators also noted that the final resting place of the victim and the auger was on the opposite side of the grain bin from where small items, including a small notepad, a wristband, glasses and a pen, were located on the grain bin floor. The items had come out during the initial entanglement, suggesting that the victim became entangled in the auger and was dragged halfway around the circumference of the grain bin before the drive mechanism began to squeal.

It is not known why the augers were energized at the time the victim was sweeping inside the grain bin, as normally these augers are turned off while workers are inside the bin. It is believed that as the victim was sweeping the grain bin floor, the sweep auger rotated around the inside of the bin and came up behind him, entangling the material on the back of his pants around the auger flighting.

It is important to note that the sweep auger travels around the grain bin at a faster rate when there is no grain present. This auger is designed to travel at a slow rate when grain is present so that it is moving grain at a uniform rate toward the center discharge auger. The drive hooks that are present only provide traction in loose grain while it is stored in the grain bin. When the grain is removed from the bin these drive hooks contact the concrete floor directly, allowing the sweep auger to move at a faster rate inside the grain bin. This faster rotation rate may have been unfamiliar to the victim

and as he was cleaning inside the bin, he may not have been aware that the sweep auger was approaching behind him at an increased rate of speed.

CAUSE OF DEATH

The cause of death was listed by the medical examiner as multiple injuries.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: *Employers should ensure workers do not enter grain bins while the unloading mechanism is operating.*

Discussion: In this scenario, both the vertical discharge and the sweep augers were energized. The floor could have been swept as efficiently without any unloading augers operating at the time.

Recommendation #2: *Employers should establish lockout/tagout procedures and ensure employees follow them any time a worker enters a grain bin or other confined space.*

Discussion: Establishing and following proper lockout/tagout procedures helps to ensure that augers are not energized when workers are inside grain bins performing maintenance or cleaning. During this incident, it appears that the victim energized the sweep auger himself and then reentered the grain bin. In similar incidents, it is also important to protect workers from having equipment inadvertently energized by other workers, who may not be aware of the location of coworkers.

Recommendation #3: *Employers should provide employees with proper training in lockout/tagout procedures and procedures for safe entry into confined spaces, such as grain bins.*

Discussion: On this particular farm, certain safety training had been done, although there was no lockout/tagout or grain bin safety programs and no locks had been given to workers. Subsequent to this incident, changes are being made to the electrical system and safety training has already begun with the employees at this farm to help prevent future injury.

Recommendation #4: *Farm owners should consider utilizing grain bin and auger designs that can help ensure safety for workers such as self-unloading or bottom-unloading bins*

Discussion: Certain grain bin unloading designs provide additional safety to farm workers. Designs such as self-unloading bins that contain cone bottoms or bottom-unloading grain bins as well as bins that have protected unloading augers provide additional barriers to entanglement. In bottom-unloading grain bins, the unloading auger is built into the floor of the grain bin and grain flows down through that area. Occasionally this design also would need a sweep auger which would only transport the grain to the center of the bin which would then exit down through the center of the floor. Commonly in this style of bin, it is only necessary to sweep the grain to the center of the bin without the use of a sweep auger.

Keywords: *farm, grain bin, auger, entanglement, lockout/tagout, confined space*

The Fatality Assessment and Control (FACE) program is one of many workplace health and safety programs administered by the New York State Department of Health (NYS DOH). It is a research program designed to identify and study fatal occupational injuries. Under a cooperative agreement with the National Institute for Occupational Safety and Health (NIOSH), the NYS DOH FACE program collects information on occupational fatalities in New York State (excluding New York City) and targets specific types of fatalities for evaluation. NYS FACE investigators evaluate information from multiple sources. Findings are summarized in narrative reports that include recommendations for preventing similar events in the future. These recommendations are distributed to employers, workers, and other organizations interested in promoting workplace safety. The FACE program does not determine fault or legal liability associated with a fatal incident. Names of employers, victims and/or witnesses are not included in written investigative reports or other databases to protect the confidentiality of those who voluntarily participate in the program.

Additional information regarding the New York State FACE program can be obtained from:

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www.health.state.ny.us/nysdoh/face/face.htm