

# Growing Safely

FOCUSED ON SAFETY  
IN AGRICULTURE



## Grain Bin Safety

Since 1964, Purdue University has recorded more than 800 cases of flowing grain entrapments. Many, if not most “non-fatal” incidents go unreported. The U.S. averages 15-20 documented entrapments per year based on 40 years of data. An estimated 55% of documented grain entrapments result in death. Based on historical data, roughly 70% of the documented entrapments occur on farms.



The goal of this document is provide insight into preventing grain entrapments and understanding how three types of entrapments occur. Severe injuries and deaths can be avoided with a constant commitment to basic safety measures and situational awareness. **Every flowing grain entrapment is a preventable incident.**

Forty-five percent of known grain entrapments involve corn. This is due to several factors including - increasing corn yields per acre, higher returns, and marketing strategies involving grain storage. Unfortunately, there isn't a declining trend when it comes to flowing grain entrapments.

Multiple factors contribute to grain entrapments. However, the leading cause for entrapments is “out of condition grain.” Increases or spikes in grain entrapments normally follow years where grain quality is difficult to maintain in the bin. Falls from grain bins also increase due to more trips up and down bins to monitor grain quality.

Knowledge and prevention are crucial to stop flowing grain tragedies. Many people are simply unaware of the dangers of flowing grain. The most common remark made by survivors of grain entrapments is they never anticipated the “tremendous force of grain.” Another surprising aspect of grain entrapments is the speed at which a person is rendered completely helpless. Both factors in combination, “speed and force of the grain” have caused many experienced people to be victims of grain entrapments.

Understanding flowing grain characteristics can help prevent grain suffocation and grain auger entanglements.

## Preventing Grain Entrapments

### 1. Grain Bins are Off Limits to Children and Unauthorized Personnel

Treat grain bins and grain handling facilities as hazardous areas. Only allow trained family members and employees near the facility. This is never a play area for kids.

### 2. Never Work Alone Around Grain Bins

Work in tandem with good communication. Someone should know what the activities are and should communicate if they leave the bin area. Remain in sight of each other. Never lose sight of the other person.

### 3. Never Enter a Bin of Flowing Grain

Educate and train authorized family members and employees on the dangers of flowing grain. Ignorance is deadly. An understanding of the speed of engulfment, combined with the tremendous force of grain, will develop respect for safety around flowing grain.

### 4. Lockout, Tagout Power Supply on All Unloading Mechanisms

Always lock out the power source while someone is working on grain mechanisms or are inside the grain bin. This prevents anyone from unknowingly starting equipment while someone else is inside the structure. Lockout/Tagout is a serious signal that can prevent a significant injury.

### 5. Manage and Monitor Stored Grain for Quality

The No. 1 reason entrapments occur is out-of-condition grain. Spoiled grain creates problems unloading bins. A good stored grain management and monitoring program can prevent problems occurring in the first place. Management and monitoring is something you can control.

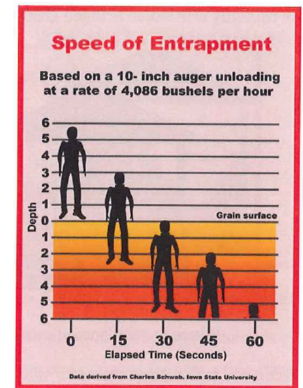


## Dangers of Flowing Grain Entrapments

### Flowing Column of Grain

Never enter a bin of flowing grain. As the flow of grain exits the bin, a moving column of grain forms over the outlet. The grain mass flows at nearly the rate of the unloading auger. Individuals entering the bin while it is flowing get drawn into the flowing column and are pulled down through the grain mass.

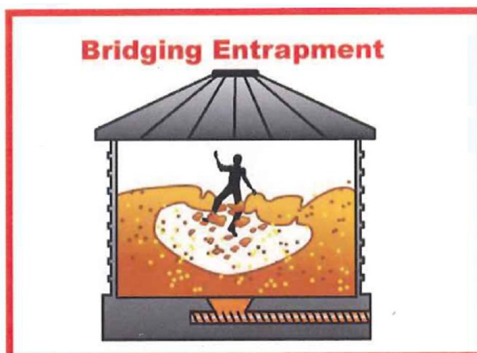
Once entrapped, it is impossible to escape flowing grain. A flowing column of grain can entrap someone to their knees and waist in 3-5 seconds. Depending on the size and speed of the unloading auger, a person can be completely engulfed in less than 30 seconds, leading to suffocation. The speed and force of the grain can entrap an unsuspecting person before they realize what is happening.



The only way safe way to avoid being drawn into a column of flowing grain is to never enter a bin while it is unloading.

Besides suffocation, the victim is also at risk of continuing to sink to the floor or outlet and becoming entangled in the unloading auger. Survivors of entrapments and engulfments have often underestimated the tremendous force of the grain.

Most commonly, individuals enter grain bins when grain stops flowing from the exit. Often, out-of-condition grain forms a crust and the crust is drawn into the column of grain. The crusted grain forms a bridge over the grain inlet preventing grain flow. A common practice is to break up the crusted bridge with a rod so grain can start flowing again. Problems arise due to running the auger while using the rod to break up the crust. Once grain starts flowing, individuals get pulled into the column of flowing



**Bridging** is another type of grain entrapment. Out-of-condition grain can form a hard crust. When grain is pulled away it forms a cavity below the crust. The problem begins when an individual enters the bin to investigate. The crust appears solid and conceals the void beneath it. When the victim breaks through the crust, he is quickly covered by the avalanche of grain collapsing into the cavity. If the unloading auger is running, the problem is compounded by the individual falling helplessly into the column of grain and being pulled deeper into the grain mass. Entanglement into the unloading auger is another possibility.



**Avalanche** entrapments are another form of entrapment. This is again caused by out-of-condition grain. Generally a crust forms and creates a freestanding vertical wall of corn. The problem begins when an individual enters the bin to knock down or chip away at the crusted mass. When grain is removed from the base of the mass, the potential for an avalanche and entrapment increases. The avalanche of grain can break loose and cover the victim or large chunks of heavy grain can break off and strike the victim, causing serious injury. Large chunks of grain can strike the victim with enough force to break bones.

*Purdue Extension S-77 Beware of Flowing Grain  
GEAPS 540 Safety Management of Grain & Processing Facilities  
Purdue University Grain Storage Rescue Training, Steve Wettschurack  
Certified Farm Accident Rescue Instructor*

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