

Grain Storage and Handling Operations —



The Deadliest Hazards



There are several potentially deadly hazards in grain storage and handling operations. Most fatalities occur when employees enter the bin, become engulfed in the grain, and suffocate. Fatalities are also caused by exposure to hazardous atmospheres, combustible dust explosions, entanglement in augers and other moving equipment, and falling from elevations.

Fatal facts

According to data voluntarily entered in Purdue University's National Grain Entrapment Database, there have been more than 498 reported cases of farmers and farm workers suffocating in grain bins during the last 50 years. More than 300 other cases involved people receiving serious injuries from grain engulfment in the United States. About 20 percent of the cases involved teenagers, and 70 percent of the cases took place on small- to medium-sized farms. Because this is a voluntary reporting database, it is likely that many more deaths and serious injuries have occurred.

According to the Occupational Safety and Health Administration (OSHA), U.S. grain handling facilities reported more than 500 explosions since 1978. These reported explosions resulted in at least 180 fatalities and 675 injuries. Because these events do not always have to be reported to OSHA, the actual number of deaths and serious injuries from grain explosions is likely much higher.

Grain bin deaths continue to occur in Ohio. Recently, a 26-year-old worker fell 18 feet inside a grain bin, a farmer fell when the grate he was standing on gave way while he was shoveling grain into an auger, a 68-year-old farmer was engulfed in grain, and a 20-year old worker was caught in an auger.

BWC Division of Safety & Hygiene

The Ohio Bureau of Workers' Compensation, Division of Safety & Hygiene (DSH) offers services to aid in the prevention of injuries, illnesses, and fatalities associated with grain storage and handling operations.

Consultative services

Our specialists provide personal assistance with on-site and virtual safety consultation and training related to all types of grain bin hazards. [Click here](#) to request consultative services.

Video library

Our video library loans educational videos on hazard recognition and injury prevention at no charge. Titles specific to grain bin safety include: 490239 – Grain Bin Safety, 490240 – Safety on the Farm, and 490237 – Your Safety Matters. Other subjects include: Combustible Dust, Confined Space Entry, Respirators, Fall protection, Electrical hazards, Lock-out/Tag-out, Emergency preparedness, Hazardous atmospheres, and Ventilation. [Click here](#) to borrow videos or call 614-466-7388.

Other Resources

[OSHA Fact Sheet: Worker Entry into Grain Storage Bins](#)

[OSHA Grain Storage Bin Emphasis Program](#)

[OSHA Grain Handling information page](#)

[Youth safety in agriculture](#)

[Purdue University Report](#)

[Grain bin rescue video](#)

[Engulfment survivor](#)

[The Ohio State University Agriculture Safety and Health Program](#)

[NGFA](#)

The deadliest hazards

Engulfment hazards

Workers should never enter grain bins and stand or walk on the grain to help it flow down into the auger or conveyor system. Engulfment can easily occur when a worker stands or walks on grain that has bridged or caked and suddenly begins to flow. The sudden release creates a suction effect. The moving grain acts like quicksand and engulfs the employee in seconds. This causes complete burial or intense pressure on the engulfed body parts. The result is serious injuries or death from suffocation.



Atmospheric and combustible dust hazards

Chemicals are sometimes used to prevent grain spoilage and control insect infestations. Gases given off by these chemicals can produce a hazardous atmosphere in grain bins and other storage vessels. The natural fermentation process and development of mold, which can reduce oxygen below safe levels and produce toxins, can also produce a hazardous atmosphere. Grain dust can produce an explosion in a confined area when it becomes airborne and comes in contact with an ignition source such as an electrical motor, welding, cutting, open flame, overheated conveyor system, or hot exhaust.

Mechanical equipment hazards

Mechanical equipment such as augers and conveyors are used when loading and unloading grain from the bins. Unfortunately, grain sometimes clogs or bridges and prevents continuous grain flow. Employees need to clean or clear the grain manually, exposing them to moving parts that can cause serious injuries, amputations, and death.

Fall hazards

Falling inside and outside of grain storage structures can occur when employees are accessing ladders, catwalks, and any elevated working/walking surface. Falls from elevations are one of the leading causes of fatalities in all types of industries.

Injury Prevention Tips

Conduct a job safety analysis to identify specific hazards and develop an emergency preparedness plan.

Prohibit workers from entering bins during grain loading or unloading.

Prohibit walking down grain and similar practices requiring workers to enter a bin and stand or walk on grain to make it flow.

Provide a mechanical raking device or power sweep equipment to ensure grain movement within the bins.

Provide equipment that workers can use to break up surface crusts or clumps from outside the bin.

Treat grain bins as confined spaces and post confined space warning signs at all entrances to bins.

Require the use of a body harness and lifeline or boatswain's chair when a worker must enter a grain bin.

Position a lifeline to prevent a worker from sinking further than waist-deep in grain.

Develop a permit-required confined space entry procedure and require issuance of a permit each time a worker enters a bin or storage vessel.

Provide continuous ventilation to prevent unsafe atmospheric conditions.

Eliminate all potential sources of ignition from the space.

Test the air within a bin for oxygen content and the presence of hazardous gases before entry.

Provide workers with rescue equipment such as winch systems that are specifically suited for rescue from the bin.

Station a properly equipped and trained observer outside the bin to perform rescue operations.

Make sure the observer and workers who enter the bin maintain communication (visual, voice, or signal line).



Prohibit entry into bins and other storage vessels during loading or unloading operations.

De-energize, disconnect, and lock or tag out all mechanical, electrical, hydraulic, and pneumatic equipment.

Properly guard all augers, conveyors, and moving parts of equipment.



Provide appropriate fall protection/fall arrest devices whenever an employee must work at elevation.

Train workers in ladder safety and personal protective equipment.

