Grain Bin Engulfment Meeting Kit

What’s At Stake

In many worksite situations, workers are at risk for engulfment hazards. Engulfment results when a worker is surrounded and overcome by a granular substance such as soil, sand, gravel, sawdust, seed, grain, or flour or if submerged in a liquid such as water or a chemical. Engulfment causes physical harm when the material has enough force on the body to cause injury or death by constriction, crushing, or strangulation. Respiratory hazards associated with engulfment includes suffocation from breathing in a fine substance that fills the lungs or from drowning in a liquid.

What’s the Danger

SUFFOCATION AND ENGULFMENT IN GRAIN BINS – PRINCIPAL HAZARDS

Suffocation can occur when a worker enters a bin and is engulfed by grain or when bins develop hazardous atmospheres or do not have enough oxygen. A worker can be engulfed or suffocated if the worker enters the bin and:

- Stands on moving/flowing grain and the moving grain acts like “quicksand” and buries the worker in seconds. Entering a bin while the auger is operating is dangerous. As the auger unloads the bin, grain flows to the outlet and is released, causing the grain above it to flow in and replace the released grain.
- Stands on or below a “bridging” condition that collapses and buries the worker. “Bridging” occurs when grain clumps together, because of moisture or mold, creating an empty space beneath the grain as it is released. Bridged grain resists the downward pull that normally moves loose grain to

the bin outlet and rarely becomes hard enough to support a person. If a worker steps onto the bridge, it can cave in under the worker's weight, burying them in the empty space. Even if the grain flow is stopped before entering a bin, a worker could still be covered if they step onto a grain bridge, and it caves in.

- Tries to loosen a pile of grain and the grain caves in onto the worker, or stands next to a pile of grain on the side of the bin and the grain unexpectedly caves in onto the worker. Even though a wall of grain may appear safe, one scoop of grain may weaken support and cause the grain to cave in. If a worker is knocked off balance by the weight of grain, he or she can be covered quickly and suffocate. In some cases, grain can be loosened from outside the bin by bumping it with a pole through an access cover.
- The atmospheric conditions inside the bin are at dangerous levels. Inside a storage bin, there is a potential for oxygen levels to be at unsafe levels. Also, there is a potential for hazardous gases to be present. Because such hazardous atmospheres may be present inside a bin, a worker could quickly suffocate and become a victim.

OTHER GRAIN STORAGE HAZARDS

Entanglement Hazards. Mechanical equipment within grain storage structures, such as augers and conveyors, present serious entanglement and amputation hazards. Workers can easily get limbs caught in improperly guarded moving parts. Equipment used to fill and discharge grain storage structures needs to be properly guarded to prevent this.

Sub-Floor and Other Reclaim Augers. Sub-floor augers are to be locked out while an entrant is inside a bin, unless it is guarded and secured in such a way that removes the possibility of an employee coming into contact with its moving parts.

Belt and Chain/Paddle Drag Conveyors. These systems can be used as a fill or reclaim system. As a fill system, they should be included in the facility's lockout/tagout program for bin entry since they have the potential to create hazardous conditions for

workers when inside a bin.

Power Takeoff (PTO) Shafts. PTOs, unless properly guarded, can create wrapping hazards. These hazards could be caused by the joint, burrs or the air current formed by the rotation. To mitigate the hazard, install shaft guards that entirety cover the moving parts.

HOW TO PROTECT YOURSELF

BEST GRAIN BIN OPERATIONAL PRACTICES

- De-energize (turn off) and disconnect, lockout and tag, or block off all mechanical, electrical, hydraulic and pneumatic equipment that presents a danger. Grain should not be emptied or moved into or out of the bin while workers are inside because it creates a suction that can pull the worker into the grain in seconds.
- Prevent workers from walking down grain and similar practices where walking on grain is intended to make it flow.
- Prevent worker entry onto or below a bridging condition, or where grain is built up on the side of the bin.
- Train all workers for the specific hazardous work operations they are to perform when entering and working inside of grain bins.
- Provide each worker entering a bin from a level at or above stored grain, or when a worker will walk or stand on stored grain, with a body harness. The body harness should have a lifeline that is positioned and is of sufficient length to prevent a worker from sinking further than waist-deep in grain.
- Provide workers with rescue equipment, as winch systems, that are specifically suited for rescue from the bin.
- Station an observer who is equipped to provide assistance and perform rescue operations outside the bin.
- Ensure that communications (visual, voice or signal line) are maintained between the observer and the workers who entered the bin.

- Test the air within a bin for oxygen content and the presence of hazardous gases before entry.
- Provide and continue ventilation until any unsafe atmospheric conditions are eliminated.
- Issue a permit each time a worker enters a bin, unless the employer is present during the entire entry operation.

FINAL WORD

The newest employees and the most seasoned employees are the most susceptible to bin hazards due to one group being ignorant to the hazards and the other being too comfortable with them.