**There are numerous safety and health hazards associated with grain handling operations.**

One of these hazards is suffocation and or entrapment. Suffocation in grain bins usually occurs when a person is buried while the bin is being emptied. Flowing grain can quickly submerge a worker and cause suffocation.

**Ways to avoid suffocation or entrapment:**

* Never allow people in or around the grain bins during the processes of filling or emptying the bins.
* Before working in a grain bin, always turn off the power and use lockout/tagout procedures to ensure there is no stored energy in any machinery.
* Prohibit walking down on grain to make it flow.
* Unstable grain may avalanche when dislodged or disturbed so be wary of steep piles.
* Always use caution when working around surface crusts; the crust can collapse, and one can become entrapped in the grain.
* Anyone entering the bin must have either a body harness with a lifeline or a boatswain’s chair. Ensure that both are secured when used.
* Use an observer stationed outside the bin, silo, or tank being entered. Someone who is equipped to provide assistance:



* Do not rely solely on one person outside a grain bin to assist one person inside the bin.
* Rescue of a worker inside the bin may require at least two workers outside the bin.
* Communications (visual, voice, or signal line) shall be maintained between the observer and employee entering the bin, silo, or tank.
* Be aware that machinery noise can interfere with communication between co-workers.

Many injuries also result from bodily entanglement in machinery. Augers, power take-offs (PTOs), and other moving or rotating machinery should be used with caution.

**Avoid injury by machinery:**

* Do not enter a bin with automatic equipment, unless the control circuit is properly "locked out" before entry. Automatic unloading machinery may activate unexpectedly.
* Never enter when equipment is running. Grain bins and silos have electrical lockout boxes. All equipment must be shut down and properly locked out before entry.
* Be aware that loose-fitting clothing, gloves, hair, and jewelry can get caught.
* Practice proper lockout/tagout procedures.
* Maintain machine guards and other safety devices.

**Avoid exposure to grain dust and associated airborne contaminants such as:**

* Dusts
* Molds
* Toxins (aflatoxin, mycotoxin, endotoxin, etc.)
* "Silo gases" from fermentation:
	+ Nitric oxide (NO)
	+ Nitrogen dioxide (NO2)
	+ Nitrogen tetroxide (N2O4)
	+ Carbon dioxide (CO2)
	+ Methane (CH4)
	+ Ammonia (NH3)
	+ Hydrogen sulfide (H2S)
* Fumigants used for pest control purposes
* Carbon monoxide (CO) and other combustion by-products, if machinery is used in or near confined spaces
* Other toxic gases and fumes released by accidental ignition of building materials, hydraulic fluid, etc.

**Contaminants can cause:**

* Illness
* Acute respiratory reactions; sensitivity to mold and dust increase with repeated exposure.
* Oxygen deficiency: In confined spaces oxygen can be displaced by accumulated gases or depletedby microbial activity in stored products, workers in the spaces, and/or combustion (internal combustion engines and fires).
* Flame or explosions

**Take precautions:**

* Ventilate to verify that air in the space is suitable for worker entry.
* Conduct hazard assessments before entering any silos.
* Do not work alone in heavy dust or mold. Weara respirator that has been selected and specified based on the exposures.

All that is needed for a fire or explosion are a sufficient fuel source, oxygen, and heat or a spark. Grain dusts, cotton lint, and many other organic materials are combustible. Methane, gasoline, or diesel fuels may also be present in agricultural facilities. However, there are preventative measures.

**The following will help avoid grain dust explosions and fires:**

* Proper ventilation controls dust and dissipating flammable gases and other airborne contaminants.
* Proper maintenance of grain-handling equipment reduces the risk of accidental ignition from sources such as overheated bearings.
* Prohibiting smoking or any open flames reduces the risk of fire.
* Using metal detection gear helps prevent sparking.
* Using only appropriately rated electrical equipment, e.g., fuses, insulation, wiring, (all must be properly sized and protected) will reduce the risk of sparking or fire.
* Always obtain a hot work permit before welding, cutting or other heat-generating activities.

**Additional cautions**

* Complete all Confined Space Permit requirements before entering a bin.
* Unload grain wagons on a level surface.
* Grain bins, silos, grain-hauling vehicles, equipment, and animal quarters are **off limits**

to children and unauthorized personnel.

* Be wary of grain in poor condition. Suffocation, toxic atmospheres, and explosions are all more likely with poor grain, because of molds, blocked flow, and surface crusts over cavities.

This form documents that the training specified above was presented to the listed participants. By signing below, each participant acknowledges receiving this training.

Organization: Date:

Trainer: Trainer’s Signature:

**Class Participants:**

Name: Signature:

Name: Signature:

Name: Signature:

Name: Signature:

Name: Signature:

Name: Signature:

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