

GRAIN ENGULFMENT

Be sure to: *Established Command - Assign a Safety Officer - Establish communications - Formulate a plan and a backup plan - Plan an exit or escape plan*

DEFINITIONS

Victim is totally buried or immersed under the grain. You may see their hand above the grain surface or you may not even be sure where the victim is located in the mass of grain within the steel bin or concrete silo, but their head is clearly beneath the grain surface. (Grain Engulfments differ from Grain Entrapments, where the victim is only partially buried in the grain.)

GENERAL HAZARDS AND CONCERNS

- Limit the number of rescuers entering the bin to 2-3 responders.
- Rescuers must be tied off and using a secured lifeline, if there is enough grain in the bin to bury them as well.

SUGGESTED OPERATIONAL STEPS

- **Stop** (Lockout / Tagout) the unloading system.
- **Start the aeration fans** to help circulate fresh air through the grain, if possible, which may aid the victim who is buried under the grain.
- Call for specialized team & **rescue tube (cofferdam)**.
- Consider calling **industry personnel with experience** in grain handling facilities.
- Stay out of the bin until a rescue plan has been developed.
- **Every rescuer that enters the bin must wear a full body harness** attached to a properly secured lifeline. Generally, the underside of the bin roof will likely not provide adequate anchors to secure lifeline. You may have to look for a means to secure the lifeline, such as using anchors from the ground. Avoid using anchors such as ladder rungs, electrical conduit or aeration ducts, which likely will not stand up to 2,000 pounds of force on the lifeline or restraint system.
- **Complete a permit required confined space permit**, which can be used as a check-list to ask all the proper questions, prior to entry into the confined space.
- Establish five foot dust rule indicator in the rescue space. Airborne concentrations that impair visibility to less than five feet are indicators of potential explosive conditions.
- Inquire if anyone knowledgeable about this operation is present and determine if any grain fumigation was performed in the previous 30 days.
- **Limit the number of responders entering the bin** to a maximum of 2-3 people. Additional responders in the space will cause more grain movement and create additional forces on the victim.
- **Limit the number of responders climbing on top of the roof** to a maximum of 2, especially if the steel bin has an unstructured roof with no purlins or trusses under the roof to support an extra 900 - 1,200 pounds.
- Anyone on top of the roof should be operating within suitable hand-rails and/or working on work platforms that will safely support them. If this is not the case, **responders must be using the appropriate fall-protection.**
- If the victim is completely submerged, the best solution is to remove grain from the bin as rapidly and carefully as possible. **Consider cutting holes into the side walls** at equal distances around the bin, below the victim, to release the grain. Cut two to four (V-shaped) holes around the

bin circumference, depending upon the diameter of the bin to equalize pressure on the bin walls in order to minimize the possibility of the steel bin collapsing. Do not cut to the edge of the sidewall sheets or across bolt patterns. **Prior to cutting, contact technical support from list at the end of this strategy.**

- **Do not try to use the unloading or reclaim system to remove the grain.** When starting the unloading auger, the victim may be further injured by being drawn deeper into the grain and even pulled into the unloading auger or wedged in the floor opening (called discharge sump holes).

- When you remove enough grain to locate the victim, insert a **rescue tube (cofferdam)** around the victim and remove enough grain between the tube and victim to allow you to remove the victim without exerting excess force on their body. Depending on how deep the victim is buried into the grain, it could require 800 – 1,200 pounds of force to pull them out of the grain without removing the grain around them. Do not attempt to fasten wristlets or a rope around the victim and try to jerk them free or out of the grain. Remove the grain in the rescue tube with: helmets, coffee can or grain vacuum or anything you can find that might be suitable for this purpose.



Example of V-shaped hole in grain silo



A grain rescue tube is essential during a grain emergency.

TECHNICAL ASSISTANCE

For additional guidance during the incident, do not hesitate to call any of the people below for additional direction (24-7) on their cell phones:

Instructors with Emergency Services Rescue Training , Inc. (ESRT)
 Gregg Grobbel 989-450-6037
 Davis Hill 814-404- 5441
 Wayne Bauer 989-295-8319

Safety and Technical Rescue Association (SATRA)
 Bill Harp 313-415-4658