

# Grain Handling Safety

What if "IT" happens to you?

Carol Jones, PhD
Stored Products Research and Education Center
Oklahoma State University



#### The Facts

- Farming...#6 on US Bureau of Labor Standards' list of most dangerous occupations (adults and children
- Estimated 300 US children die each year in farming accidents
- Under 16 account for 20% of farm fatalities
- Not to mention permanent disabilities (estimated 1000 each year)



## Grain Handling

- 77% of grain bin accident victims unloading bins.
- More than 40% of accidents involved grain out of condition.
- Trapped in 4-5 seconds, buried in 20 seconds.



## How does it happen?

- Three ways it can happen; all are associated with unloading:
  - Flowing Grain
  - Collapse of a Grain Bridge
  - Avalanche of a Vertical Grain Wall
- Grain Bin or Gravity Wagon...



# Flowing Grain



2 – 3 seconds for engulfment



# Collapse of grain bridge



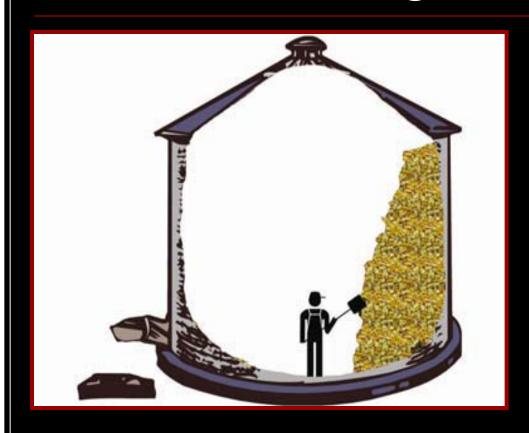
**Out of Condition Grain** 

Victim may travel 4 – 5 '





# Avalanche of grain wall



Vibration!!!



#### Prevention

- Warn family, employees, visitors of dangers.
- Place warning decals on all bin entrances, gravity wagons.
- Use "lock out/tag out" procedures prior to entry of bin



#### Prevention

- Attempt to do work from outside.
- Install ladders inside/outside of all bins.
- Wear safety harness tied off, or boatswains chair.
- Don't walk on grain.



#### Prevention

- 3 people if entering bin.
- Stay above height of grain.
- Post bins.
- Assume hazardous atmosphere.
- Monitor children always!!!! (even older children).



- Always assume the victim is alive.
- LOTO.
- Emergency Notifications.
- Establish scene control/prevent entry.
- Safely assess position/location of victim.



- Reassure victim.
- If possible and safe, secure and tie off victim.
- Manage vibration.
- Start aeration. No heat.
- Ensure no fumigant present.



- Contact an emergency rescue team or fire department.
- Backboards may fit through bin entries to be used as grain retainers.
- Cold grain may have effect of cold water drowning. If victim out within 5 hours, attempt CPR.



- Avoid putting additional pressure on victim:
  - Stay away from area immediately around victim until retainers in place.
  - Use ladder, plywood, or other material to distribute weight.
  - Keep unnecessary personnel out of grain bin.



#### Protect rescuers:

- Attach safety lines and harnesses (connected to anchorage above grain) to rescuers.
- Use respiratory protection: dust filter masks, filter respirators, SCBA.



## DON'T TRY TO PULL VICTIM OUT!!!

- 53 lb. child, knee-deep grain = 71 lbs.
- 53 lb. child, shoulder-deep grain = 240 lbs.



#### Cut holes in bin, drain:

- Do immediately if victim completely submerged.
- Cut 3-4 holes symmetrically spaced around bin to avoid collapse. More holes for large bins.
- Observer to monitor grain flow.
- Control flow through openings; be prepared to stop flow.
- Use air chisel, power saw, tractor loader, or cutting torch.
- Drain grain uniformly from 2, 3, or 4 holes around bin.



- Construct retaining wall if surrounding grain slope is above victim's head:
  - Use plywood, sheet metal, large trash cans with bottoms removed, or heavy cardboard cylinders to keep grain from victim's chest area or higher.
  - Build self-supporting box/brace walls to prevent collapse.
  - Scoop or vacuum grain to knee deep or lower around victim.
  - Rock side to side, don't pull.



- Talk with victim if possible.
- Don't Give Up!



### BE PREPARED

- Have emergency numbers handy.
- Know where everyone is ALWAYS.
- Talk about a plan ahead of time.
- Get training when available.
  - Coming to OSU this summer!
  - First responder teams, producers, elevator personnel, and YOU!



# Questions?



**SPREC** 

Home of World-Class Stored Product Research

Stillwater, Oklahoma