


Grain Safety Technology

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National Farmers Convene'17
Springfield, Missouri
January 25, 2017



Successful Storage Makes Safe Storage

- Proper storage moisture
- Insect control
- Cool the grain
- Grain quality




\$3.40/bu. x 100,000 bu. = \$340,000




Causes of Grain Storage Problems

- Grain too wet
- Grain too warm
- Storage facilities not cleaned before filling
- Too much foreign material and fines
- Grain not checked often enough during storage
- Uneven grain temperatures in storage bin



Grain Not Checked Often Enough

- Grain in storage should be checked
 - Weekly in fall and spring due to rapid temperature changes
 - Every 2-3 weeks in cold weather
 - Every 1-2 weeks in warm weather
- Small problems can quickly turn into large, expensive problems
- Mold and insects grow under similar conditions – producing heat and moisture which can make the situation worse



Grain Safety Tips 1

- Post signs on bins of entrapment hazards
- Install ladders inside bins
- Lock out children & bystanders from grain areas
 - No one under age 18 in a confined space
- Manage & storage grain for quality
 - Out-of-condition grain crusts, won't flow
- Avoid entering bins if at all possible
- Check bins for proper oxygen levels
- Run fans before entry to clear toxic fumes



Grain Safety Tips 2

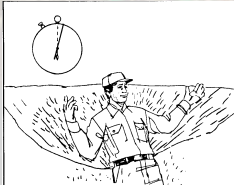
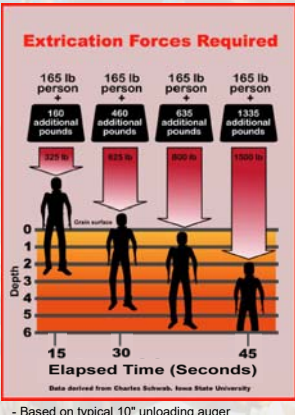
- Lockout/tagout power to unloading augers
 - Prevents anyone unknowing starting the equipment
- Always work in tandem around bins; communicate
- Never enter a bin of flowing grain
 - No escape within **3-5 seconds!**





Suffocation Hazard

- Flowing grain can suffocate you in a matter of seconds

Depth (ft)	Weight of Grain (lb)	Elapsed Time (Seconds)
0	165 lb person + 160 additional pounds	15
1	165 lb person + 460 additional pounds	30
2	165 lb person + 635 additional pounds	45
3	165 lb person + 1335 additional pounds	-

Data derived from Charles Schwab, Iowa State University
- Based on typical 10" unloading auger

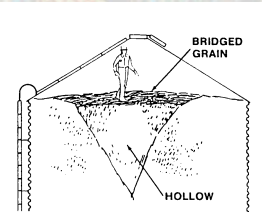
CAUTION!

Research has shown that up to 400 pounds of pull is required to extract a body from waist-deep in grain. That is more than enough force to permanently damage the spinal column.

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Crusty Grain

- Crusty grain on the surface with a void underneath will cause suffocation



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What Entrapment Does to the Human Body

- Average human male body 6'2", 190 lbs.; approximately 3000 sq.in. surface area
- At **0.4 psi**.....1200 lbs. of force spread over the body!
- Every square inch has 650 sweat glands, 20 blood vessels and over 1000 nerve endings
- Aseptic bone necrosis as well as other circulatory and body chemical disruptions develop from interruptions in circulation
- Nerve damage similar to diabetes symptoms
- Lactic acid build up

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Reference: Carol Jones, Oklahoma State University
http://www.geapsanqola.com/carol_jones.pdf

Grain Safety Tips


- Wear a body harness; tie off to outside of bin
- Stay near the outer bin wall when in bin
- Wear NIOSH-approved dust-filtering respirator
- Wear hearing protection around fans & dryers




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Grain Rescue Tube

- Insert tube in sections
- Vacuum out grain inside
- Extricate person



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Grain Safety Tips .

- Keep shields in place
- Beware of ice/moisture on ladders
- Install safety cages on ladders
- Beware of power lines



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Checking Your Grain

- Check for changes in grain condition
 - Temperature
 - Moisture
 - General condition
- Run fan and smell the exhaust for a musty or sour smell
- Check roof condition – does frost melt off one bin faster than another?
- Look for insects
- Keep records of the conditions – compare them!!



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Checking Your Grain Moisture

- Pull multiple samples from various locations and depths –
 - Minimum is one from the center and one from the edge both approx. 3 feet from the surface
- Let samples warm to room temperature in sealed container or Ziploc bag BEFORE measuring

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Moisture Meter Error

- Calibrated for 15% corn – error on high moistures
 - Adjust for temperature
 - Not accurate <40°F
 - Electronic meters more sensitive to outside of kernel
 - Moisture variation after rapid drying
 - Meters affected by condensation
-
- Measure moisture content
 - Place sample in sealed container for several hours (6-12 hrs)
 - Warm to 70°F
 - Recheck moisture



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Checking Your Grain Temp.

- Check in several locations
- Check at several depths
 - Use a probe with a thermometer attached or pull samples to the surface and measure
 - Record the temperatures
- Allows you to identify
 - Cooling front
 - Heating caused by insect or mold activity

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Checking Temperatures

- How??



Can be attached to a 3/8" diameter rod

\$26.75 <http://www.enasco.com/product/C12108N>

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Senses only grain near cable

Cable
Temperature sensor
Temperature indicator
Fan

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Checking Grain

• How??

Probe as deep as 13-1/2 feet for samples

\$159.95 <http://www.enasco.com/product/C08661N>

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Sampling Tips

- Sample once a month when:
 - grain temperature less than 50°F
 - Bins condition stable
- Sample twice a month when:
 - Problems detected
 - Grain mass not stabilized
- Small problems are early indicators
 - Insects
 - Moisture
 - High temperature
 - Smell
 - Temperature differences greater than 10°F

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Safety in Applying Structural & Residual Protectants

- Read all labels and follow instructions
- Use PPE recommended
- Check label for grains that can be treated
- Follow label rates to keep grain salable (within legal tolerances)

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Online Resources

- Grain Bin Safety (MU) - 1:51 min. <https://www.youtube.com/watch?v=n0cLGwqUXkI>
- Grain Bin Rescue Training (MU FRTI) – 1:40 min. <https://www.youtube.com/watch?v=tz0NwB-1BdQ>
- Labor Talk: Grain Bin Safety – 3:51 min. <https://www.youtube.com/watch?v=KKozPwkGQ08>
- NFU Safety on the Farm: Grain Bins & Augers - 4:25 min. <https://www.youtube.com/watch?v=vf3upIQitvk&feature=youtu.be>
- Grain Safety Training <http://grainsafety.org/>

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Questions??

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Washington, DC 20250-9410

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