National Grain and Feed Association

Safety and Health Management Process for Grain Handling Industry

Denver Colorado
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Presenter:
Brian Grimm
Safety Director
Bartlett Grain Company, L.P., KCMO
Agenda

• Review of Industry Hazards
• Safety Risk Management Principles and Measurements
• Review of Industry Hazards Per OSHA
• Grain Handling Standard
• Other Key Programs (Beyond Grain Handling Standard)
• Training Required
• Auditing
• Key Tasks and Inspections
• Where to Get Help
Our industry continues to increase educational opportunities for members, including safety programs.

Our Industry continues to increase in speed and capacity.

Our industry continues to work with manufacturers to make compliance and safety standard in design.
Review of Industry

Our Industry continues to see engulfments, but the shift has been more towards the farm.

Our Industry continues to be the focus of national, regional, and local OSHA emphasis programs.

Our industry continues to receive large fines, but at a lesser frequency.
2014 – 82% on farms

Estimate for 2015: 25 incidents with 14 fatalities.

Source: www.agconfinedspaces.org

Figure 6: Number of annual grain entrapment cases recorded between 2004 and 2014.
Distribution of Cases by State: 1964 – 2014, Grain Entrapments (n=1096)

Figure 5: Geographic distribution of grain entrapment cases for 2014 and previous years.

Source: www.agconfinedspaces.org

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Review of Industry – Top Citations Category

- 1910.272 Grain Handling Standard – 20% of citations
- 1910.305 Wiring methods, components, and equipment for general use. – 11%
- 1910.178 Powered industrial trucks. – 8%
- 1910.219 Mechanical power-transmission apparatus. – 6.5%
- 1910.23 Guarding floor and wall openings and holes. – 6.3%
- 1910.303 Electrical General. – 5.8%
- 1910.27 Fixed ladders. – 5%
- 1910.146 Permit-required confined spaces – 3%
- General Duty Clause – 2.5%
- 1910.134 Respiratory Protection. – 2.3%

4 of the top 20 categories are from Subpart S – Electrical. It appears there has been increased emphasis in this area.
Review of Industry – Top Detailed Citations

- 1910.23(c)(1) - Every open-sided floor or platform shall be guarded....
- General Duty Clause – They will cite you for any reason......
- 1910.272(j)(1) – Written housekeeping plan....
- 1910.219(e)(3)(i) – Belt guards.......
- 1910.27(d)(1)(iv) – Ladder cages ..... 
- 1910.272(g)(1)(iii) - The atmosphere within a bin, silo, or tank shall be tested...
- 1910.272(g)(1)(i) - The employer shall issue a permit for entering bins...
- 1910.219(d)(1) – Guarding. Pulleys.....
- 1910.305(b)(1)(ii) – Electrical - Unused openings shall be effectively closed.
- 1910.303(g)(2)(i) – Electrical – Guarding of live electrical ......
- 1910.272(m)(3) – A Preventive Maintenance certification record .......
Safety Risk Management Principles
Safety Risk Management Principles

- Understand Risk
- Risk Management
  - Program
  - Hazard (Risk) Assessment
  - Reduce Risk
- Costs of Risk
Understand Risk

Risk:

- How likely harm from a particular hazard will occur.
- Reality of the industry.
- Can be identified and managed.
Risk Management

Strategies, techniques, & systems put in place to identify and reduce risk.
Risk Management

4 Elements of an Effective Program

- Management commitment & employee involvement
- Worksite hazard risk assessment
- Hazard prevention & control
- Safety & health training
Hazard (Risk) Assessment

A process to:

- Identify hazards in the workplace
- Assess risks to health and safety
- Identify & implement measures to eliminate or reduce the risks.
Assess Risk

Frequency - How often worker is exposed to risk
Severity - How serious is potential injury
Risk

Exposure - The opportunity to become injured or contract a disease.
## Hazard Risk Assessment

### HAZARD RISK ASSESSMENT MATRIX

<table>
<thead>
<tr>
<th>Frequency of Occurrence</th>
<th>Hazard Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Catastrophic</td>
</tr>
<tr>
<td>(A) Frequent</td>
<td>1A</td>
</tr>
<tr>
<td>(B) Probable</td>
<td>1B</td>
</tr>
<tr>
<td>(C) Occasional</td>
<td>1C</td>
</tr>
<tr>
<td>(D) Remote</td>
<td>1D</td>
</tr>
<tr>
<td>(E) Improbable</td>
<td>1E</td>
</tr>
</tbody>
</table>

- **Red**: Unacceptable
- **Yellow**: High
- **Orange**: Medium
- **Light Blue**: Low

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Reduce Risk

Steps to reduce risk

1. Use Safety Hierarchy
   • Identify types of controls & strategies to reduce risk/hazards.

2. Rank effectiveness of different strategies.

3. Choose controls/strategies to use.

4. Implement controls/strategies.
Reduce Risk - Safety Hierarchy

Level 1
Engineering Controls
- MOST EFFECTIVE

Level 2
Administrative Controls
- USE WITH OTHERS

Level 3
Personal Protection
- LEAST EFFECTIVE

Eliminate hazard or risk
Substitute
Engineering Controls

Isolate, Contain (Guard), Modify
Instructions, Warnings
Training

PPE
Behavior
Administrative Controls

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Reduce Risk – Effectiveness

Level 1 – Engineering Controls

- MOST Effective
- First Choice
- Best Strategy – Eliminate hazard
  - OR prevent creation of hazard
- Others:
  - Substitute (less dangerous, toxic, etc.)
  - Modify/redesign equipment or work process
  - Isolate, contain, separate – (includes guards)
  - Reduce (Example: Dust levels)
Reduce Risk – Effectiveness

Level 2 – Administrative Controls

- Low Effectiveness
- More effective with other controls.
- Requires more effort & dollars to maintain/sustain.
- Examples:
  - Warnings – systems, signs, barriers, labels
  - Policy & procedures – Safe work practices; planning processes; work process such as job rotation.
  - Maintenance Systems
  - Training; Communications
Reduce Risk – Effectiveness

Level 3 – Personal Protective Equipment

- Least Effective when used by itself.
- Last resort strategy.
- Provide PPE & keep in easily accessible location.
- Requires consistent training & reinforcement.
- Includes (not limited to):
  - Hearing, vision, skin, respiratory protection
  - Fall protection
  - Other
<table>
<thead>
<tr>
<th>Method</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eliminate</td>
<td>Manage grain quality to prevent entry</td>
</tr>
<tr>
<td>Substitute</td>
<td>Use less toxic chemical</td>
</tr>
<tr>
<td>Separate</td>
<td>Time/Space (machine controls away from hazard) or Barrier (guards, PPE)</td>
</tr>
<tr>
<td>Reduce amount</td>
<td>Reduce sound levels</td>
</tr>
<tr>
<td>Modify rate of release</td>
<td>Pressure reducing valves</td>
</tr>
<tr>
<td>Modify qualities</td>
<td>Blow out panels on elevator legs</td>
</tr>
</tbody>
</table>
Reduce Risk – Choose Strategy

Factors in Choosing Safety Strategy

1. Risk level – Severity & Frequency of Injury Potential
2. Regulations
3. Function interference
4. Cost
## Understand Risks - Costs

### Sales Required to Pay for an Accident

<table>
<thead>
<tr>
<th>Profit Margin</th>
<th>1%</th>
<th>2%</th>
<th>3%</th>
<th>4%</th>
<th>5%</th>
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</thead>
<tbody>
<tr>
<td>$1,000</td>
<td>100,000</td>
<td>50,000</td>
<td>33,000</td>
<td>25,000</td>
<td>20,000</td>
</tr>
<tr>
<td>$5,000</td>
<td>500,000</td>
<td>250,000</td>
<td>167,000</td>
<td>125,000</td>
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<td>$10,000</td>
<td>1M</td>
<td>500,000</td>
<td>333,000</td>
<td>250,000</td>
<td>200,000</td>
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<tr>
<td>$25,000</td>
<td>2.5M</td>
<td>1.25M</td>
<td>833,000</td>
<td>625,000</td>
<td>500,000</td>
</tr>
<tr>
<td>$50,000</td>
<td>5.0M</td>
<td>2.5M</td>
<td>1.667M</td>
<td>1.250M</td>
<td>1M</td>
</tr>
<tr>
<td>$100,000</td>
<td>10M</td>
<td>5M</td>
<td>3.333M</td>
<td>2.5M</td>
<td>2M</td>
</tr>
<tr>
<td>$150,000</td>
<td>15M</td>
<td>7.5M</td>
<td>5M</td>
<td>3.750M</td>
<td>3M</td>
</tr>
<tr>
<td>$200,000</td>
<td>20M</td>
<td>10M</td>
<td>6.666M</td>
<td>5M</td>
<td>4M</td>
</tr>
</tbody>
</table>

**Accident Costs = Direct + Indirect Costs**
Understand Risks - Costs

Direct Costs

Indirect Costs
- 2 to 20 times the direct costs
- Hidden

Like this iceberg, hidden costs of accidents are not visible on the surface, but are there just the same!
Understand Risk – Costs

Direct Costs

- Definite and known costs.
- Worker’s compensation premium.
- Costs for repair/replacement of damaged equipment & materials.
Indirect Costs

- Hidden
- Other non-billable costs of an accident
- Internal systems adapting to the accident
- 70%-90% of the total true accident cost.
Understanding Risk - Costs

- Loss of Productivity
- Training
- Legal Costs
- Human Resources
- Hiring Replacement
- Moral Consequences

Indirect Costs
Understand Risk - Costs

Claims reported:

- > 3 days after injury add:
  - 16% to Medical Costs
  - 38% to Indemnity Costs

- > 12 days after injury increase likelihood of Attorney Representation
  - 67% for Medical Claims
  - 69% for Indemnity Claims
Understand Risk - Costs

OSHA’s SAFETY PAYS PROGRAM:


Direct Costs
1. Select an injury type from the drop-down menu OR enter the total workers’ compensation costs.
2. Enter the profit margin (leave blank to use default of 2%).
3. Enter the number of injuries (leave blank to use default of one).
4. Select “Add Calculate” to compute the total direct and indirect costs.
5. Repeat the step to add additional injuries to the list.

Injury Type

Workers’ Compensation Costs (annual sum of costs)
Enter Profit Margin (%): (leave blank to use default of 2%) Enter Number of Injuries: (leave blank to use default of one)

Add Calculate Clear

Estimated Total Cost
The extent to which the employer pays the direct costs depends on the nature of the employer’s workers’ compensation insurance policy. The employer always pays the indirect costs.

Injury Type Instances Direct Cost Indirect Cost Total Cost Additional Sale (Indirect) Additional Sale (Total)

Totals
Estimated Direct Costs
Estimated Indirect Costs:
Combined Total (Direct and Indirect Costs):
Sales To Cover Indirect Costs:
Sales To Cover Total Costs:

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Accident Frequency Pyramid

- **Fatalities**: 1
- **Lost Time and Restricted Duty**: 30
- **Recordables and First Aid Injuries**: 300
- **Near-Misses, Property Damage, Fires, Spills, etc.**: 3,000

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Why Investigate Incidents?

These lower level incidents had the potential to become SIF (Serious Injury or Fatality) events. The location actually was lucky to avoid something more disastrous.

Source: Dekra
These were high-risk situations without proper management controls or in which controls were not complied with and could have resulted in a fatality. Simply one or two variables could have been different and this would be a major incident.

You cannot take incidents lightly, they all are important teaching and learning opportunities.

**Why Investigate Incidents?**

- **Fatalities**
- **Lost Time and Restricted Duty**
- **Recordables and First Aid Injuries**
- **Near-Misses, Property Damage, Fires, Spills, etc...**

You cannot take incidents lightly, they all are important teaching and learning opportunities.

Source: Dekra
Accident Investigation Case

- Northeastern US
- Several Feet of snow in week prior
- Heavy snowfall on day of accident
- Worker came out this door, slipped on ice
- Head struck concrete wall
Causes of Accident

• Inclement weather
  • Several FEET of snow in past week
  • Heavy snowstorm in progress
  • Mill was very busy

• Exit Design
  • Pavement sloped downhill immediately after building exit
  • Meltwater from two sources discharged across exit path
Corrective Actions Implemented

• Temporary – what do we do NOW to mitigate risk?
  • Task of clearing path given to specific owners
  • Salt/sand container at exit door
  • Inspections increased during heavy snow

• Permanent – how do we solve problem?
  • Melt water re-routed
  • Exit reconfigured with elevated walkway and stairs over sloped pathway
Final Corrective Action
What is your safety culture?

Doing the right thing – some things you just know are the right thing to do – you do them to add control or to set the tone – it is not based on a rules or imminent danger situation.

Safety focus – make decisions based on keeping employees safe.

Compliance Focus – make decisions solely based on compliance guidelines and rules.
How do you measure your culture?

Lagging Indicators
Looking back – where we have been:
• Lost time rate
• Recordable injury rate
• Worker’s comp costs

Leading Indicators
Items predicting what we will see and measurements of activities to prevent and control injury:
• Number of observations conducted
• Corrective actions finished on time
• Training events
• Audit scores
• Etc...
Hazards of The Industry

Is this good access to maintain a fan or access a bin?

Is this proper ladder use?
Hazards of the Industry Can be Addressed

Access can be improved.
<table>
<thead>
<tr>
<th>OSHA Has Determined</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 Major Grain Hazards</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Hazard</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>• Engulfments</td>
</tr>
<tr>
<td>2</td>
<td>• Falls</td>
</tr>
<tr>
<td>3</td>
<td>• Electric</td>
</tr>
<tr>
<td>4</td>
<td>• Entanglement</td>
</tr>
<tr>
<td>5</td>
<td>• Struck by</td>
</tr>
<tr>
<td>6</td>
<td>• Dust Explosion</td>
</tr>
</tbody>
</table>

Other

- Respiratory – dust exposure
- Noise Exposure
Review of Each Major Hazard

- Engulfment/Entrapment
Engulfment/Entrapment

Grain bin entry exposes workers to **suffocation hazards** - Leading cause of fatalities.

**Suffocation** can occur from:
- Grain engulfment
- Hazardous atmospheres
Ways to become engulfed or entrapped:

- Flowing Grain
- Bridging/Horizonal Crust Collapse
- Avalanche/Vertical Crust on Sides Collapse
Moving/flowing grain acts like “quicksand”

- Buries the worker in seconds.

From time auger starts, you have 2-3 seconds to react.

In 4-5 seconds you are trapped!

In 22 seconds you are completely buried!
Bridged or Crusted Grain

- “Bridging” - Grain forms crust over top layers & creates an empty space beneath.
- Bridge can collapse when a worker walks on it & bury him.
- Cavity created by previous partial unloading of grain - A dangerous situation.
- Bridged grain falls into airspace when unloading starts – traps worker instantly.
- Before grain flow can be stopped, worker is covered. Suffocation occurs in seconds.

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**Avalanching Grain**

BEWARE – Never work underneath a steep pile of grain.

A few feet of grain has enough force to knock a worker down & make him helpless to free himself.

Grain will bury & suffocate a worker in seconds.

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Review of Industry - Falls
Slips, Trips, and Falls

- Same Level – Most Common
- Elevation – From one level to the next
Falls and Ladder Safety

**Step Ladder**
- Spreader & Shelf – fully extended and locked
- Level support for all 4 side rails
- Base – full spread open.

**Extension Ladder**
- Extends 3 ft above surface
- Tied off at top
- Minimum 3 ft overlap
- 4:1 ratio or 75.5° Angle: For every 4 ft of height, place 1 ft away from base.
- Secured at bottom; stable surface
Ladder Safety – Don’t

- Top step, 2 people, unlevel surface
- 2 ladders tied together
- Improper use
- Broken ladder
- Strong wind
- Steps at side of work task
Ladder Safety – Incorrect Use

- Carrying Materials Wrong way
- Over reach

Ladder Safety – Correct Use

- 3 point contact
- Hands free (tools in belt)
- Facing job task
- Centered between rails
- Below top rungs
- Non-slip shoes
- Climbing on Braces
- Carrying Materials
Fall Protection

- Planned system.
- Protects worker if loses balance while performing a task at height.
- Controls, reduces or eliminates death or injury.
Two Types of Fall Protection Systems

- Fall Restraint System
  - Prevents fall from occurring

- Fall Arrest System
  - Prevents free fall
Fall Protection Systems

Fall Restraint System

- Allows worker to approach fall hazard & work.
- Restrains worker & prevents fall to a lower level.
- Person cannot reach or fall over the edge.
- May be a structural design.
  - Guardrails
  - Aerial lift with work platform
- May include harness and restraint cable.

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Fall Protection Systems

Fall Restraint Systems

Restraint Cable

Structural Restraint
Fall Protection Systems

Fall Arrest System

- Allows a person to start a fall
- Stops (arrests) a free fall.
- Protects person from crashing onto a lower level.
- Use when worker is at risk of falling from height.
- Only use when:
  - Work cannot be completed in another way.
  - Other fall prevention means cannot be used or is not feasible.

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Fall Protection

Anchorage/Anchorage Connector
Referred to as Anchor Point or Tie Off Point

Connecting Device
Joins body harness to anchor

Fall Arrest System

Components include:

- An anchorage point
- Body harness
- Connectors – lanyards, rope grabs, anchorage connectors
- Deceleration devices –
Common Components of Fall Prevention Equipment

- Auto Locking Retractable Lifelines
- Full Body Harness
- Carabineers
- "Y" Shock Absorbing Lanyard
- Rope & Cable Grabs

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Fall Protection – Plan Ahead

How could we safely work on this dust collector?

Hazard Review identified the need to install work platforms.
Fall Protection – Plan Ahead

SRL preplaced to allow tie off before servicing top of manlift.

SRL placed to allow tie off before greasing the bearing.
Fall Protection – Self Retracting Life Line

• A catwalk to access rail tops
• Where fall protection is available, it has to be used
• Employees are required to have protection on when accessing the tops of railcars – not after
Review of Industry - Electrical

• Electrical Hazards? Anything wrong here?
Notice 1 wire of the 800 amp phase has pulled out of the crimp and all the load is going through the one wire.
Electrical Hazards

- 60 watt lightbulb
  - Draws ½ amp
  - ½ amp = 500 milliamperes
  - 500 milliamperes can result in death
Electrical Hazards

Faulty Equipment
• bad splices, sharp edges, bare conductors

Improper Use & Installation
• Listing & Label not followed

Insulation Integrity
• Free from short circuits
Electrical Hazards

Arcing Parts
- Cause arc, spark, flame.
- Enclose parts.
- Separate & isolate from combustible materials.

Deteriorating Agents
- Wet or damp location.
- Exposure to chemicals, acids, excessive temperatures.

Mechanical Execution
- Sloppy workmanship.
- Not neat, organized, labeled.
Electrical Hazards

Splices
• Before soldering, join mechanically and ensure electrically secure.

Unplugged Openings & Boxes
• Dust build-up.
• Rodents, etc… get inside –chew, nest.

Not Identifying & Labeling
• Disconnecting means, circuits, feeders.
• Illegibly marked or not marked.
Electrical Hazards & LOTO

Lock Out/Tag Out

- Before any maintenance or servicing.
- Prevents unexpected start-up.
- Electrical/other equipment:
  - Capable of accepting lock.
  - Lock in open position the disconnecting means of the energy source.
Lock Out/Tag Out

- **De-energize** (shut off) all energy sources.
- **Lock out** energy source.
- **Tag Out** – Identify who locked energy source.
- **Try Out** - ensure all power sources are off.
Stored Energy Release

- All potential hazardous stored energy shall be relieved, disconnected, restrained, or otherwise controlled.

Examples:
- Battery back-ups
- Springs
- Capacitors
- Gravity
Electrical Hazards

Grain Auger Near Power Line
Truck came out of dump, left trailer up, turned, and took out pole and power lines.
Electrical Hazards

- Always lower & secure augers before transporting.
- Check for overhead power lines.
- If contact is made or power line broken:
  - Remain on the tractor
  - Call 911 & the power company (if known) immediately.
Electrical Hazards

Overhead Power Lines

- Avoid working by lines.
- Shut off power when working near them.
- Metal ladders must be grounded.
- Be aware of long tools that could come in contact with the line.

Moving the power lines higher – the original lines were only a few inches away from bin opening in case we ever needed in the bin.
Review of Industry

• Entanglements
Entanglement Hazards

DANGER MOVING PARTS

DANGER
ENTANGLEMENT IN PTO SHAFT CAN SERIOUSLY INJURE OR KILL YOU.

WARNING
YOU CAN BECOME CAUGHT IN THE EQUIPMENT'S MOVING PARTS.
Entanglement Hazards

Common Machine Hazards

- Pinch Points
- Wrap Points
- Pull-in Points
- Shear/Cutting Points
Entanglement Hazards

- Guard ALL exposed moving parts including augers.
- Use LOTO.

Unguarded parts

Best Practice for All!

Guarded Part

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Entanglement Hazards - Guarding

- Guards to protect:
  - Around
  - Under
  - Through
  - Over

Note – this should be guarded
Entanglement Hazards – Guarding Examples

“Before” - New facility – guarding deficiency

“After”
Entanglement Hazards – Guarding Examples

“Before” - New facility – guarding deficiency shaft slot is open

“After”
Entanglement Hazards – Guarding Examples

“Before” - New facility – guarding deficiency, still have exposed shafting

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Entanglement Hazards – Guarding Examples

“Before” - New facility – guarding deficiency – exposed shaft

“After”
Entanglement Hazards

Operating Equipment

- Wear tight fitting clothing.
- Guards & shields **ALWAYS** in place.
- Never step over operating PTO.
- Keep children away from operating equipment.
Entanglement Hazards

- You do NOT have time to react!

- Takes ¾ second to react.
- 540 RPM pulls a person’s body over 5.25 ft in ¾ second.
PTO Master Shield Guard for Tractor
Struck By Injuries

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Struck By Injuries

Vehicles

Never stand, sit, play
- Near
- Under
- Behind

a raised grain truck or other vehicles.

Machinery

- Machinery can throw objects or fuel
- Residual energy & movement

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Struck By Injuries (prevention)

- Hi-viz clothing
- Backup alarms and lights on vehicles
- Walking around vehicle before operating it
- Staying alert
- Obeying traffic rules and signs
- Minimizing distractions
- Inspecting and maintaining vehicles
- Using seat belts
- Turning on headlights
- Communication (visual or verbal with operator/driver)
Falling Objects

- Secure overhead objects.
- Transport tools in secure manner.
- Post warning signs.
- Wear hard hats
  - Reduce severity of injury from falling objects
- Toe boards on walkways
Any Struck By Hazard Here?

Hazard Review identified that people coming down these stairs (state inspectors) could accidentally turn and walk into truck pattern.

Added a railing here and a watch for moving vehicle sign. This is to prevent from walking down stairs and stepping into truck path.

Added a railing to force people straight – and allowing more time to see truck.
Any Struck By Hazard Here?

Mark hazards at a minimum to alert of struck by hazard.
Any Struck By Hazard Here?

Hazard Review – Truck Hoist

Warn of hazard with signage. Install buzzer when lifting. Keep people out of the area.
Hazard Review – Using hoist in a place people could pass by.

Caution tape off the area. Utilize flashing lights and a buzzer when lifting. Have sign to mark of the hazard.
Hazard Review – Two commonly cited Struck-By items under General Duty Clause

- PVC can’t be used for compressed air (unless specifically approved by manufacturer).
- Worm-gear style hose clamps not allowed on compressed air hoses (unless specifically approved by manufacturer).
- From one manufacturer: If worm gear hose clamps are used - they must be at least 1/2" wide and be torqued to 40 foot pounds. If you are using worm-gear style clamps and they are less than 1/2" wide - we automatically know that we need to replace.
Employees working directly below:

- Welding rod just out of the picture.
- 2 Wires on grating.
- Washer in grating.
- A bolt had already been picked up.
Struck By – Consider Hi-Viz

You can incorporate Hi-viz into your hardhats.

You can incorporate Hi-viz into your clothing.
Struck By – Regional Emphasis Program

**Scope.** This Notice applies to the jurisdictional areas of the OSHA Region VII Des Moines, Omaha, Wichita, Kansas City, and St. Louis Area Offices. All

**Background.** From fiscal years 2011-2013, 36 percent (24 of 67) of Region VII accident investigations were vehicle-related struck-by fatalities. These investigations resulted in an average of 4 violations per inspection. Also during this timeframe, 336 struck-by inspections were conducted in Region VII with an average 2.4 violations/inspection. Under the FY 2014 Region VII local emphasis programs on powered industrial trucks, 44 inspections were conducted and resulted in 4 violations/inspection. During FY 2015, 442 struck-by inspections were conducted with an average of 2.81 violations/inspection. In accordance with the Department of Labor Strategic Plan 2014-2018, this LEP addresses OSHA Performance Goal 2.1: “Improve workplace safety and health through the enforcement of occupational safety and health regulations and standards.”

**Operations Manual (FOM).** This LEP is intended to address hazards associated with the operation of material handling or personnel handling motorized equipment (including but not limited to powered industrial trucks, skid steers, cranes, man lifts, front-end loaders, aerial lifts, etc.) in general industry, construction and maritime.

Dust Explosions

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Dust Explosions

Past 35 years (‘76-‘11):
- 503 grain elevator explosions
- 677 injuries
- 184 deaths

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Dust Explosion Demonstration
Dust Explosions

- Combustible dust is suspended in air and ignited.
- Cause very rapid burning, release of gaseous products and subsequent pressure rise.
Dust Explosions

Explosion Pentagon

Prevention & Protection

- Policies, practices, procedures.
- Control fire elements.
- Keep them apart.

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Dust Explosions

Explosion Safeguards

- Fire prevention & protection
- Dust control
- Engineering controls
- Maintenance
- Housekeeping
- Training
Dust Explosions

Dust Control

- Less than 1/8” dust
- Dust control systems.
  - Filters
  - Cyclone collector.
- Wash down procedures.
  - Hoses & water used to remove accumulated dust.
- Sweep on a regular basis.
- Repair leaks.
**Dust Explosions**

**Engineering Controls**

- Limit/control potential ignition sources
- Follow applicable NFPA standards
- Monitor temperature, alignment, vibration, etc…
- Electrical in area is rated (Class 2, Div 1 or 2, Group G)

**Perform Maintenance**

- Equipment log with identifier
- Scheduled tasks
- Lubrication
- Follow manufacturer or industry recommendations
Dust Explosions

**Housekeeping**
- Determine method, procedures, and tools used.
- Establish frequency.
- Track and inspect.

**Training**
- Review safe work practices.
- Perform hazard recognition training.
Dust Explosions

- Inspections:
  - Develop a thorough inspection routine and frequency.
  - Document inspection and findings.
  - Create corrective actions for follow up.
  - Continually train on and improve the process.
  - Uses all your senses (sight, hearing, smell, feel, etc…)

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Dust Explosions

- Inspections may reveal:
  - Bad lagging
  - Good Lagging
  - Worn belts
  - Rubbing equipment
  - Hot Bearings

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Dust Explosions

- Inspections may reveal:

- Belt rubbing the casing.
Dust Explosions

Do NOT “jog” bucket elevator legs. Repeated starting and stopping of drive motors to clear a “choked” leg is not allowed.
Other: Health Risks
Health Risks

- Dust exposure
  - Acute and chronic lung problems.
- Noise Exposure
  - Occupational hearing loss
Health Risks

- Sources of noise may include:
  - Vehicle engines
  - Grain spouts
  - Air blow down
  - Fans
  - Vacuums
  - Equipment (especially drives and gear boxes)
  - Locomotives
  - Etc.
Health Risks

Dust

• Train on dust hazards
• Monitor dust levels
• Control airborne dust where possible
• Establish and follow a respiratory program
Chemical hazards may include:

- Maintenance supplies
- Fumigants
- Pesticides and Ag. Chemicals
- Cleaning products
- Paints
- Welding fumes, etc…
Health Risks

- Ergonomic issues may include:
  - Repetitive lifting
  - Repetitive climbing
  - Heavy lifting
  - Bagging/sewing
  - Clerical work
  - Etc…..
Addressing the Issues

- Grain Handling Standard

- OSHA established in 1987 based on explosions in 1977 at the request of USDA
GHS - Emergency Action Plan

- Fire/emergency reporting
- Evacuation, including maps/routes
- Instructions for employees to execute critical plant operations
- Account for employees
- Rescue or medical duties
- Who to contact for more information

Can be VERBAL if < 10 employees
General Requirements

- How dust explosions happen
- Recognizing combustible dust hazards
- Preventing dust accumulation
- Common ignition sources
  - Smoking
  - Hot works
  - Friction in equipment
GHS – Specific Training Requirements

Procedures for:
• Cleaning grinding equipment
• Clearing choked legs
• Housekeeping
• Hot works
• Preventive maintenance
• Lockout/tag-out
Training is also required to safely execute “special tasks” such as:

• Grain bin entry
• Handling of flammables
• Handling of toxic chemicals
GHS – Hot Work Program

- **HOT WORK** is any work that creates open flames, sparks, or high temperatures.
- Welding, cutting, brazing, soldering, and grinding.
- Hot Work can **IGNITE GRAIN DUST**.
- Use a **Hot Work Permit system** to control hazards.

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“Permit” doesn’t mean “Paperwork”

“Permit” means “I PERMIT you to do this work BECAUSE you have safely controlled this hazard”
GHS – Grain Bin Entry

- Use a permit system to certify that hazards are addressed prior to entry
- De-energize (lock out) all mechanical, electrical, hydraulic, and pneumatic equipment
- Test atmosphere for combustible gases, vapors, and toxic gases
- Test for oxygen unless there is continuous forced air movement or ventilation
A harness, lifeline, or a boatswain’s chair is required if:

- An employee enters at or above the level of the stored grain
- An employee walks or stands on/in stored grain of a depth which poses an engulfment hazard
**Grain Bin Entry Permit**

Remember:

“Permit” doesn’t mean “Paperwork”

“Permit” means “I PERMIT you to do this work BECAUSE you have safely controlled this hazard”

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<table>
<thead>
<tr>
<th>SECTION 2: Authorized Employee Team Members (print)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Entry Supervisor:</strong></td>
</tr>
<tr>
<td><strong>Entrant(s)</strong></td>
</tr>
<tr>
<td>NAME</td>
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<td>NAME</td>
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<td>NAME</td>
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<td>NAME</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>SECTION 3: Confined Space Hazards</th>
</tr>
</thead>
<tbody>
<tr>
<td>3a. Atmospheric Hazards of the Confined Space (subsequent measures are required if initial test fails)</td>
</tr>
<tr>
<td>- The Permit Supervisor is competent and trained to perform monitor calibration and testing</td>
</tr>
<tr>
<td>- Has your monitor been calibrated and is it working properly? (write the last calibration or attach receipt)</td>
</tr>
<tr>
<td>- Have you hopped checked your meter against a known concentration of gas (if available)? test for all gases shown below</td>
</tr>
<tr>
<td>- Oxygen (O2) in Permissible Range (between 19.5-23.5%)</td>
</tr>
<tr>
<td>- Flammable Gasses/Vapors not present (above 10% LEL)</td>
</tr>
<tr>
<td>- Toxic Gases at permissible levels</td>
</tr>
<tr>
<td>- Carbon Monoxide (CO) - less than 35 ppm</td>
</tr>
<tr>
<td>- Hydrogen Sulfide (H2S) - less than 20 ppm</td>
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<tr>
<td>- Phosgene (if fumigation suspected) - less than 3 ppm</td>
</tr>
<tr>
<td>3b. Other Serious Hazards</td>
</tr>
<tr>
<td>- Extreme Temperatures (greater than 100F, less than freezing)</td>
</tr>
<tr>
<td>- Dust (Combustible hazards and Respiratory hazards)</td>
</tr>
<tr>
<td>- Electrical (exposed live electrical, broken conduit, conductors)</td>
</tr>
<tr>
<td>- Entrapment (steep floors, steep-side hoppers, converging walls)</td>
</tr>
<tr>
<td>- Unguarded Machinery (saw, sander, grinders, watco, reclamation screw or drag, etc.)</td>
</tr>
<tr>
<td>- Energized Equipment (if present, a LOTO Permit is required; if available, use a MSLOTO)</td>
</tr>
<tr>
<td>- OTHER Mechanical Hazards (list):</td>
</tr>
<tr>
<td>- Hot Works performed (e.g. welding/grinding/cutting): If yes, a Hot Work Permit must be issued and use cont. ventilation</td>
</tr>
<tr>
<td>- OTHER (list):</td>
</tr>
</tbody>
</table>

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Entry Into Flat Storage Structures

If engulfment hazards exist: *

- Lifelines are required
- All equipment conveying grain in and out needs to be de-energized (locked out)
- Walking down grain is prohibited

*OSHA assumes hazards DO exist, unless you can demonstrate that they DON’T

DDG Pile Face IS an Engulfment Hazard
Addressing the Issues - Contractors

Need to **INFORM CONTRACTORS** of:

- Hazards
  - Fire and Explosion
  - Engulfment
- Safety Rules to Control Them
  - Smoking policy
  - Hot Works Procedure
  - Etc.
- Emergency Procedures
Housekeeping Requirements

The Grain Handling Standard (1910.272) requires a written housekeeping plan that:

- ... establishes **frequency** and methods ...
- ... to best **reduce** accumulations of **fugitive grain dust** ...
- ... on ledges, floors, equipment, and other exposed surfaces.

This means WE NEED TO CLEAN UP THE DUST at our facilities.
Priority Housekeeping Areas

- **Areas where** dust cannot exceed 1/8 inch in thickness.
- These include AT MINIMUM:
  - Areas within 35 feet of **INSIDE** bucket elevators
    - Have a boot section
    - More than 20% of height is inside a structure
  - Enclosed areas with grinding equipment
  - Enclosed areas containing grain dryers within the facility
Housekeeping Program

- Must be in writing
- Must specify
  - Areas to be cleaned
  - Frequency of cleaning
  - Methods of cleaning
- Must Address
  - ALL Ledges, floors, equipment, and other exposed surfaces where dust can accumulate
  - Grain or spilled products
- The plan is for **ALL AREAS** of the facility. NOT just Priority Housekeeping Areas!
• Grain and product spills shall not be considered fugitive grain dust accumulations
• The housekeeping program shall address the procedures for removing such spills from the work area
• The use of compressed air to blow dust from ledges, walls, and other areas shall only be permitted when all machinery that presents an ignition source in the area is shut-down, and all other known potential ignition sources in the area are removed or controlled. Know as “Blow Down”
Confined Space Entry

Definitions as per OSHA

Confined Space:
✓ Is large enough and so configured that an employee can bodily enter and perform assigned work; and
✓ Has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry.); and
✓ Is not designed for continuous employee occupancy.
Confined Space Entry

✓ Contains or has the potential to contain a hazardous atmosphere
✓ Contains material that has the potential to engulf an entrant
✓ Has walls that converge inward or floors that slope downward and taper into a smaller area which could trap or asphyxiate an entrant
✓ May contain any other recognized safety or health hazard, such as unguarded machinery, exposed live wires, or heat stress
Confined Space Entry

- Confined Space Permit
- Inventory of confined spaces
- Signage noting confined spaces
- Training of applicable employees
  - Entry Supervisor
  - Attendant
  - Entrant
- Equipment
  - Full body harness
  - Life Line
- If entering from the top
  - A tripod, winch and boatswains chair
- Confined Space monitor
- Intrinsically safe equipment i.e. lighting
- Consider a site review by local fire department
- Remember – cannot be in a bin with a sweep running unless you are following the letter of interpretation to a “T”.

National Grain and Feed Association
Entry into Grain Storage Structures

Entry through unrestricted ground level openings into flat storage structures in which there are no toxicity, flammability, oxygen-deficiency, or other atmospheric hazards is covered by paragraph (h) of this section.

Entries [into a flat grain storage structure] made at or above the level of the grain and above ground level will be covered by the general provisions for entry into grain storage structures found in paragraph (g) or entry into grain storage structures.
Addressing the Issues - GHS

• Entry into Grain Storage Structures
  • Lockout/Tagout/Try equipment before entry
  • "Walking down grain" and similar practices where an employee walks on grain to make it flow within or out from a grain storage structure, or where an employee is on moving grain, is prohibited
Filter Collectors

Fabric dust filter collectors which are a part of a pneumatic dust collection system shall be equipped with a monitoring device that will indicate a pressure drop across the surface of the filter or a magnahelic gauge.

- Look at your air permits to see what your requirements are

Filter collectors installed after March 30, 1988 shall be:

- Located outside the facility; or
- Located in an area inside the facility protected by an explosion suppression system; or
Addressing the Issues - GHS

- Preventive Maintenance
- Regularly scheduled inspections of at least the mechanical and safety control equipment associated with dryers, grain stream processing equipment, dust collection equipment including filter collectors, and bucket elevators
- Lubrication and other appropriate maintenance in accordance with manufacturers' recommendations, or as determined necessary by prior operating records
Addressing the Issues - GHS

• Preventive Maintenance
• **Promptly** correct dust collection systems which are malfunctioning or which are operating below designed efficiency
• **Promptly** correct, or remove from service, overheated bearings and slipping or misaligned belts associated with inside bucket elevators
Addressing the Issues - GHS

- Preventive Maintenance
- Documentation will be maintained of each inspection
  - Containing the date of the inspection
  - The name of the person who performed the inspection
  - Serial number, or other identifier, of the equipment
Locks and Tags

- Implement procedures for the use of tags and locks which will prevent the inadvertent application of energy or motion to equipment being repaired, serviced, or adjusted, which could result in employee injury. Such locks and tags shall be removed in accordance with established procedures only by the employee installing them or, if unavailable, by his or her supervisor.
Addressing the Issues - GHS

- Grain stream processing equipment
  - The employer shall equip grain stream processing equipment (such as hammer mills, grinders, and pulverizers) with an effective means of removing ferrous material from the incoming grain stream or magnet
  - For example on legs
Addressing the Issues - GHS

• Emergency Escape
  • Provide at least two means of emergency escape from galleries (bin decks).
  • Provide at least one means of emergency escape in tunnels of existing grain elevators. Tunnels in grain elevators constructed after the effective date of the grain handling standard shall be provided with at least two means of emergency escape.
  • There are generally ladders off the sides of elevators and most do not meet existing requirements for ladders, mark the exits “Emergency Escape Only”
Addressing the Issues - GHS

• **Grain Dryers**
  • All direct-heat grain dryers shall be equipped with automatic controls that
  • Will shut-off the fuel supply in case of power or flame failure or interruption of air movement through the exhaust fan
    • Maxon or other brand – generally 2 to maintain the double block and bleed of the LOTO program.
  • Will stop the grain from being fed into the dryer if excessive temperature occurs in the exhaust of the drying section
  • Direct-heat grain dryers installed after March 30, 1988 shall be
    • Located outside the grain elevator; or
    • Located in an area inside the grain elevator protected by a fire or explosion suppression system

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Addressing the Issues - GHS

- Inside Bucket Elevators
- Bucket elevators shall not be jogged to free a choked leg. Place a sign there to remind employees.
- All belts and lagging purchased after March 30, 1988 shall be conductive. (surface electrical resistance not to exceed 300 megohms)
- All bucket elevators shall be equipped with a means of access to the head pulley section to allow inspection of the head pulley, lagging, belt, and discharge throat of the elevator head.
- The boot section shall also be provided with a means of access for clean-out of the boot and for inspection of the boot, pulley, and belt.
Addressing the Issues - GHS

- Inside Bucket Elevators
- Mount bearings externally to the leg casing; or
- Provide vibration monitoring, temperature monitoring, or other means to monitor the condition of those bearings mounted inside or partially inside the leg casing
- Equip bucket elevators with a motion detection device which will shut-down the bucket elevator when the belt speed is reduced by no more than 20% of the normal operating speed
• Equip bucket elevators with a belt alignment monitoring device which will initiate an alarm to employees when the belt is not tracking properly
• Provide a means to keep the belt tracking properly, such as a system that provides constant alignment adjustment of belts
• Does not apply to grain elevators having a permanent storage capacity of less than one million bushels, provided daily visual inspection is made of bucket movement and tracking of the belt.
Addressing the Issues

Engulfment

• Need to take all precautions to protect employees.
• De-energize (turn off) and disconnect, lockout and tag, or block off all mechanical, electrical, hydraulic and pneumatic equipment that presents a danger, particularly grain-moving equipment.
• 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.\(^3\)
• Prohibit and prevent workers from walking down grain and similar practices where walking on grain is intended to make it flow.
• Prohibit and 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.
Addressing the Issues

Engulfment

• 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, such 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. If toxicity or oxygen deficiency cannot be eliminated, workers must wear appropriate respirators.

• Issue a permit each time a worker enters a bin, unless the employer is present during the entire entry operation. The permit must certify that the above precautions have been implemented before workers enter the bin.
Addressing the Issues

• What OSHA has done
• Sent notification letters to over 13,000 worksites reminding employers of basic safeguards they must use
• Published a new grain handling fact sheet
• Updated its [Grain Handling Safety & Health Topics webpage](#)
• Developed a [Grain Bin Entry wallet card](#) (PDF*)
Addressing the Issues

• Falls – Slip/Trips/Falls
• Fall protection must be provided for each employee on a walking/working surface with an unprotected side or edge at 4 feet or more
• Develop and implement a fall protection program
  • Provide training on the fall protection program
  • Evaluate the program on a regular basis to insure the program’s effectiveness and determine whether it needs to be changed or updated
Addressing the Issues

- Employers are required to assess the workplace
  - Where protection is required, select fall protection systems appropriate for given situations.
  - Use proper construction and installation of safety systems.
  - Supervise employees properly.
  - Train workers in the proper selection, use, and maintenance of fall protection systems
- Guardrail Systems
- Fall Arrest Systems
- Guard or cover any openings or holes immediately.
Addressing the Issues

• Position portable ladders so the side rails extend at least 3 feet above the landing
• Secure side rails at the top to a rigid support and use a grab device when 3 foot extension is not possible.
• Make sure that the weight on the ladder will not cause it to slip off its support.
• Before each use, inspect ladders for cracked, broken, or defective parts.
• Do not apply more weight on the ladder than it is designed to support.
• Do not reach out beyond your belt buckle to perform work.
• Use only ladders that comply with OSHA standards.
Addressing the Issues – Pay Attention to the details – Install stuff correctly.

Concerning ladders, railings, and toe boards.....

Pay attention to the details.

Is this ladder correct?
Addressing the Issues – Pay Attention to the Details – Install Stuff Correctly.

- Doesn’t have required “pass-through” flare of 18-24”
- Rung spacing is greater than 12”
- Bottom rung not between 2” and 14” from floor.
- Top rung not even with landing.
Addressing the Issues – Pay Attention to the details – Install stuff correctly.

- Ladder width is not the required 16” minimum.
- Ladder toe clearance is not the required 7”.
- Ladder rung spacing is in excess of 12”.
Addressing the Issues – Pay Attention to the details – Install stuff correctly.

- The ladder appears to be in safe condition.
- There are at least 7 technical “OSHA” violations with this ladder. (Not counting the railing issues)
- OSHA state “de minimis” violation for one of these factors.
- Are 7 issues “de Minimis”?
- The cost to fight the violation is probably more than replacing the ladder.
- Don’t let new equipment be installed with technical violations.
- Demand your contractors and suppliers provide compliant equipment.

(If there is a concern it is unsafe – it should be replaced regardless)
Addressing the Issues

• Electric
  • Use only equipment that is approved.
  • Do not modify cords or use them incorrectly.
• Use factory-assembled cord sets and only extension cords that are 3-wire type.
• Use only cords, connection devices, and fittings that are equipped with strain relief.
• Remove cords from receptacles by pulling on the plugs, not the cords.
• Implement an inspection program
  • Look for damaged cords, missing ground prongs
  • Contrary to popular belief, electrical and duck tape is not an acceptable repair.
Addressing the Issues

Electric

• Look for overhead power lines and buried power lines
• Stay at least 10 feet away from overhead power lines and assume
• Use non-conductive ladders when working near electrical equipment
• Use double-insulated tools and equipment, distinctively marked
• Visually inspect all electrical equipment before use
• Remove from service any equipment with frayed cords, missing ground prongs or cracked tool casings
• Look for damaged conduit, exposed wires and knockouts
• What do you do before you use any portable equipment?
Addressing the Issues

Struck By
• Ensure each employee is trained on the equipment they operate and are competent to operate
  • Safe mounting and dismounting of the PIT
  • Starting and Stopping
  • Operating at a safe speed for the area
  • Steering, Turning and Changing Direction
  • Traveling on Inclines
  • Parking of the Vehicle
  • Safe Traveling Practices
  • Visibility
  • Tip Over Hazards (ROPS/FOPS)
• Perform and document observations
• Don’t forget the use of seat belts
• Pre-use inspections (documented?)
Addressing the Issues

Respiratory dust exposure
• Voluntary use – Employee sign off Appendix D of the respiratory standard
• If you require mandatory use:
  • Employee to be medically qualified based upon the work profiles established
  • Fit Testing Requirements (several methods)
  • Training
  • Negative pressure and positive pressure testing by employee every time they put it on
  • Enforcement of required use and disposal
  • Free of facial hair around mask seal

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Addressing the Issues

- Perform Noise Testing
  - Noise Maps (Sound Pressure Readings)
  - Dosimeter Readings
- Engineer noise out where possible
- Administrative controls to lessen exposure
- Select Proper PPE
- Hearing Conservation plan and hearing testing required with 8-hr TWA over 85dB
## Other Key Programs

### Bio Security Plan

- USDA and Department of Homeland Security
- Company Contacts listed
- Personnel Security (background checks, keys, passwords, et)
- Unauthorized Access to Facilities
- Security for Shipments
- Threat Levels – Elevated Level of Security
- Emergency Actions
- Training, annual
- Annual review of program

NGFA Has A Guidance Document

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Other Key Programs

Injury Reporting

- Policy and training to report all workplace injuries
- Investigate root causes of injuries
- Address any corrective actions needed
- Many policies require retraining
- No retaliation for reporting injuries
Other Key Programs

Contractor Safety

- Contracts
- Insurance Certificates
- Sign in procedures
- Workplace rules
- Hazards at the facility
- Emergency procedures
Other Key Programs

<table>
<thead>
<tr>
<th>Record Retention</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Define length of time to keep safety records</td>
</tr>
<tr>
<td>• Confined space permits 1 year for review</td>
</tr>
<tr>
<td>• OSHA Logs 5 years plus current</td>
</tr>
<tr>
<td>• MSDS sheets 30 years past last use</td>
</tr>
<tr>
<td>• Etc....</td>
</tr>
<tr>
<td>• OSHA usually wants 6 - 12 months past history</td>
</tr>
<tr>
<td>• OSHA usually wants to see 1 year of maintenance and training</td>
</tr>
</tbody>
</table>
Visitor Policy

- Establish sign-in procedures
- Communicate emergency procedures
- Establish where they can go
- Communicate hazards they may encounter
- Communicate PPE requirements
Other Key Programs

Electrical

- List of authorized employees
- List of non-authorized employees
- PPE requirements
- NFPA 70E guidance
Other Key Programs

Fall Protection

- Procedures for unprotected work over 4 feet
- Establish tie off points before you need them
- Procedures when to rent lifts for maintenance
### Fumigation

- Fumigation management plans as required by EPA
- Licensed fumigators
- Licensed fumigator on-site when fumigant being applied
- Exposure monitoring
### Gas Detection Equipment

- Approved meters for your location
- Training on how to use meters
- Calibration frequencies per manufacturer
- Bump test procedures per manufacturer
- Calibration gas expiration tracking
- Procedures for when meter is being repaired
Other Key Programs

Hoisting and Lifting

- Training on equipment
- Safe lifting and rigging practices
- Slings
  - Chain, synthetic, wire rope slings
- Establish a documented inspection program for applicable equipment
- Be cognizant of power lines and wind conditions
- Walk the terrain, before you travel it with the equipment
- Ensure good communications when lifting over head
- Clear the area where the lift is to take place
Other Key Programs

Powered Industrial Vehicles

- Train employees on the applicable equipment they may operate
  - Skid loaders, pay loaders, tractors etc.
- Perform observation and document their capabilities
- Inspect the equipment as per the manufacturers recommendations
Other Key Programs
## Other Key Programs

### PPE

- Establish a Personal Protective Equipment Program
- Perform a PPE hazard assessment and document the hazards
- Inform and train employees
  - When it is necessary
  - What kind is necessary
  - How to properly put it on, adjust, wear and take it off
  - The limitations of the equipment
- Proper care, maintenance, useful life, and disposal of the equipment
- Furnish PPE to employees and site visitors
### Railcar Fall Protection

- Fall Hazards are always on OSHA’s radar - LEP
- There are several different suppliers
- If you have it, use
- Train your employees in the use of this equipment
- Blue Flag the applicable track
- Prohibit employees from working on tops of rail cars where wind, ice, snow and weather conditions present an unsafe work environment
- Inspect per the manufacturers recommendations
- Include this activity in your documented PPE hazard assessment
## Other Key Programs

### Rail Safety

- Reliable & Effective Communication is paramount
- Train employees on all the aspects
  - Coupling, coupling and uncoupling, crossing tracks, blue flags etc.
- Provide documented training on locomotives, trackmobiles etc. as necessary
- Switching cars
- Operating Switches and Derails
- Riding on railcars
- Crossing tracks
- Hand brake setting for loaded & unloaded cars
  - Differences in hand brakes
- Mounting and dismounting equipment
- Opening and Closing hopper gates – when to reject a car

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Other Key Program – Sweep Auger

• Workers may not enter a grain bin until after issuance of a bin entry permit.
• Before any worker enters the bin to either set up or dig out the sweep auger, the subfloor auger and the grain entry points must be de-energized and locked-out.
• Before operation of the sweep auger, the grate/guard on the subfloor auger must be in place and secured.
• Employees may not walk on the grain where the depth of the grain presents an engulfment hazard.
• All sweep augers (including portable sweep augers) must be provided with guards that protect against contact with moving parts at both the top and back areas. The only unguarded portion of the sweep auger should be the front point of operation.
• An observer must always be positioned outside the storage bin monitoring the activities of workers inside the bin.
• If a worker enters the bin while the sweep auger is energized, the employer must utilize engineering controls within the grain bin to prevent the worker from coming into contact with the energized sweep auger.
Other Key Program – Sweep Auger

• Acceptable engineering controls may include:
  • A sweep auger equipped with an attached guard that prevents the worker's contact with the unguarded portion of the auger
  • A sweep auger equipped with a control mechanism, such as a dead-man switch or other similar device, which will allow for the sweep auger's operation only when the operator is in contact with the device. If this method is utilized as a means of worker protection, the worker must be positioned at least seven feet from the energized auger at all times.
  • Any workers other than the operator of the sweep auger present in the storage bin while the sweep auger is energized must also be protected in a manner that keeps them out of the zone of danger. For example, this may include the installation of guardrails or catwalks that prevent workers from entering the area within the path of the auger.
  • The auger is provided with a positive speed control mechanism or bin stop device that prevents its uncontrolled rotation around the bin.
  • Workers may not use their hands, legs, or other similar means to dislodge or otherwise directly manipulate the sweep auger while it is energized.
  • If maintenance/adjustments are necessary to the sweep auger, the auger must be unplugged, with the person making the adjustments maintaining the control of the plug, or locked-out in accordance with lockout/tagout procedures
Other Key Programs

### Ergonomics

- The purpose of this program is to effectively eliminate or control Work-related Musculoskeletal Disorders (WMSD).
- A systematic process for anticipating, identifying, analyzing and controlling WMSD hazards.
- Identify repetitive motion jobs.
- Review injury history for patterns of WMSD.
- Use hierarchy of controls to lessen the hazards.
- Train on basic recognition of symptoms and early reporting.
Other Key Programs

OSHA 1910.1020 Employee Exposure Program

• Copy of standard must be available to employees
Training

- Back Injury / Lifting
- Bloodborne Pathogens
- Compressed Gas Safety & Propane Safety
- Confined Space Entry Training
- DOT topics for Commercial Drivers
- Electrical Safety
- Emergency Action Plan
- Fall Protection Awareness
- Fire Safety
- First Aid
Training

- Fumigation
- General Safety Rules-Cell Phone Policy- Access to Medical Records - Signs
- Grain Entrapment Prevention & Rescue
- Grain Handling Standard
- Hazard Identification
- HazCom
- Hearing Conservation Program
- Heat Illness Safety
- Hot Work Policy
- Housekeeping Policy / Using Compressed Air to Clean
- Ladder Safety and Scaffolding Training
Training

- Line of Fire Recognition
- Lockout Tagout
- MSDS/SDS
- Orientation for New Hires
- Powered Industrial Vehicles (forklifts, skid steers, etc...)
- PPE Policy Training
- Preventive Maintenance
- Railcar Fall Protection Policy
- Respirator Policy Training
- Sweep Auger Safety
- Tool Safety & Ring Test
Audits

Conduct Audit

Make Corrections

Identify Corrective Actions

Tips:
• Involve all levels of employees
• Perform at regular frequencies
• Track and monitor progress
• Today’s score is not as important as the next score
• Goal is to assess and make improvements.
## Audits

<table>
<thead>
<tr>
<th>Corporate Audits</th>
<th>Location Audits</th>
<th>3rd Party Audits</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Physical facility / Hazard Identification</td>
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<tr>
<td>• Paperwork</td>
<td>• Behaviors</td>
<td>• Paperwork</td>
</tr>
<tr>
<td>• Employee Interviews</td>
<td>• Employee involvement</td>
<td>• Employee Interviews</td>
</tr>
<tr>
<td>• Behaviors</td>
<td>• Procedures</td>
<td></td>
</tr>
</tbody>
</table>
Audits

- Sample Frequencies
  - Corporate Audit
    - Annual
  - Location Self Audits
    - Annual
  - 3rd Party Audits
    - As needed
    - Certain % a year
  - Employee Interviews / Mock OSHA Interview
    - Certain % a year
    - All new employees
Other Tasks to Improve Safety

The following slides are for your reference: We will not cover all the items. This is not comprehensive, there are many more items to do.

These are other inspections that should be documented on some frequency.
## Other Tasks to Improve Safety

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Above Ground Storage Tank Inspection</td>
<td>Above ground storage tanks and their respective containment systems should be inspected monthly to ensure system integrity</td>
<td>Monthly</td>
</tr>
<tr>
<td>Airplane lights</td>
<td>The airplane lights are to warn airplanes of the height obstruction. This inspection is to verify that the light is actually working.</td>
<td></td>
</tr>
<tr>
<td>Bloodborne Pathogen Declination Forms or Shot Forms</td>
<td>Employees with possible exposure to bodily fluids need to be offered Hepatitis B shots.</td>
<td>Job Assignment or after Exposure</td>
</tr>
</tbody>
</table>
# Other Tasks to Improve Safety

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<tr>
<td>Body Harness Inspection</td>
<td>Body harnesses are to have documented inspection periodically. They are to be inspected before each use, but that inspection may not need to be documented. Follow manufacturer guidelines</td>
<td>Annual is pretty typical</td>
</tr>
<tr>
<td>Boot Pit Characterization Oxygen Readings</td>
<td>If not treating as confined spaces, Periodically take below ground oxygen readings to help characterize the spaces.</td>
<td>Not defined. Quarterly or Monthly?</td>
</tr>
<tr>
<td>Cable/Chain Inspections</td>
<td>If using for lifting or pulling, should have a formal inspection process. Formal documented inspection plus inspecting before each use.</td>
<td>Annual is pretty typical</td>
</tr>
</tbody>
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## Other Tasks to Improve Safety

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<tr>
<td>Concrete Spalling</td>
<td>Clean up concrete pieces around concrete facility. On a periodic basis, repeat this procedure so you can monitor for new spalling. Also perform a visual of the outside of bins.</td>
<td>Not defined. Quarterly is common.</td>
</tr>
<tr>
<td>Containment Drainage Log</td>
<td>If you have containment for oil, we need to document each time we drain it to certify that oil was not in the waste water.</td>
<td>Each time you drain containment.</td>
</tr>
<tr>
<td>Discipline</td>
<td>Develop a discipline policy and document. OSHA wants to see discipline forms</td>
<td>Each time. Be consistent.</td>
</tr>
</tbody>
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## Other Tasks to Improve Safety

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<tr>
<td><strong>Electrical Cords - Flexible Inspection</strong></td>
<td>Flexible cords are looked at to keep all inadequate and damaged cords out of our facility. Cords should be inspected before use and any damaged cord should be replaced immediately upon identification. We also check polarity and grounding on extension cords at this time. Verify flexible cords are temporary.</td>
<td>Not defined. Quarterly is common.</td>
</tr>
<tr>
<td><strong>Electrical Glove Inspection or Replacement</strong></td>
<td>The standard requires in service electrical gloves to be tested every 6 months. Gloves which have been tested but not in service need to be tested within the previous 12 months in order to be placed into service. Gloves are also inspected before each use by inflating them and listening and feeling for air leaks.</td>
<td>6 months</td>
</tr>
<tr>
<td><strong>Electrical - 110 Outlet Testing</strong></td>
<td>Verify polarity and ground on all 110-120 V outlets.</td>
<td>Once and anytime wiring is repaired.</td>
</tr>
</tbody>
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<tr>
<td>Electrical system review</td>
<td>Annually we need to review our electrical systems. We are looking for proper condition and application. We are looking for closed boxes and undamaged conditions. Any deficiencies should be corrected.</td>
<td>Annually</td>
</tr>
<tr>
<td>Emergency Contact List Review</td>
<td>Periodically the emergency contact list needs to be reviewed for completeness and to reflect changes. New employee data should be entered by the location when the person starts.</td>
<td>Periodically and when you hear of a personal change like divorce, move, etc..</td>
</tr>
<tr>
<td>Emergency Response Contact Name and Phone Number Verification</td>
<td>Annually verify that the contact information is correct for the facility if 911 is called. If you know there has been no change since the last contact, you can skip.</td>
<td>Annually or if have management change</td>
</tr>
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<tr>
<td>Emergency Evacuation Drill</td>
<td>Conduct an emergency drill and time how long it takes people to meet at the gathering space and take a headcount. Set up for each shift.</td>
<td>Annually at a minimum</td>
</tr>
<tr>
<td>Eyewash</td>
<td>Eyewash stations need to be checked weekly for functionality and cleanliness.</td>
<td>Weekly</td>
</tr>
<tr>
<td>Fire Department Invitation and Visit</td>
<td>At least annually invite the fire department through our facilities and cover fire safety, fumigation, confined space rescue, etc...</td>
<td>Annually</td>
</tr>
<tr>
<td>Fire Extinguishers</td>
<td>Monthly all fire extinguishers need inspected. Annually fire extinguishers need to be inspected by outside firm.</td>
<td>Monthly Annual</td>
</tr>
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# Other Tasks to Improve Safety

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<tr>
<td>Fire Sprinkler Inspection</td>
<td>Have outside vendor perform safety inspection on system.</td>
<td>Varies, annual at minimum</td>
</tr>
<tr>
<td>First Aid Kits</td>
<td>First aid kits will be checked for their supplies. If a remote location, verify kit has been approved by your company’s doctor.</td>
<td>Varies, quarterly is common.</td>
</tr>
<tr>
<td>Forklift Basket Inspection</td>
<td>Inspect the forklift work platform for broken welds, locking gate, etc.</td>
<td>Annual and before each use.</td>
</tr>
<tr>
<td>Hand Tool Inspection</td>
<td>Review hand tools for damage and mushroomed heads.</td>
<td>Not defined. Quarterly is common.</td>
</tr>
<tr>
<td>Title</td>
<td>Description</td>
<td>Frequency</td>
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</tr>
<tr>
<td>Hardhat Inspection</td>
<td>MSA hardhats have a service life of 5 years from being put into service. MSA suspensions have a 1-year service life. Hardhats are inspected prior to each use in an undocumented inspection.</td>
<td>Dates from putting in service.</td>
</tr>
<tr>
<td>Hoist Inspection</td>
<td>Hoist should be inspected prior to use (frequent) and certified for service annually (periodic).</td>
<td>Annual and before each use</td>
</tr>
<tr>
<td>Hooks and Carabineer Inspection</td>
<td>Hooks and Carabineers used for fall protection that are not part of another appliance need to be inspected annually and prior to each use.</td>
<td>Annual and before each use</td>
</tr>
<tr>
<td>Hydrant (Fire) Inspection and Flush</td>
<td>Perform inspection of the hydrant, lubricate the caps and valves, flush the system</td>
<td>Semi-Annual</td>
</tr>
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# Other Tasks to Improve Safety

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<tr>
<td>Ladders, Portable</td>
<td>Ladders are inspected annually with a documented inspection.</td>
<td>Annual</td>
</tr>
<tr>
<td>Ladder (Fixed Ladders) Inspection</td>
<td>Ladders are inspected annually with a documented inspection.</td>
<td>Annual</td>
</tr>
<tr>
<td>Lanyard Inspection</td>
<td>Fall protection lanyards need to be inspected annually by a competent person. The lanyards also need a visual inspection prior to each use.</td>
<td>Annual</td>
</tr>
<tr>
<td>Lockout Annual Instruction Review</td>
<td>The written lockout tag out program needs to be reviewed annually. This includes looking at the individual equipment lockout instructions</td>
<td>Annual</td>
</tr>
<tr>
<td>Lockout Periodic Inspection Form (Where you watch employees perform a lockout)</td>
<td>Annually each person who might perform a lockout needs to be observed to verify that they know how to find the correct procedure and then also that they follow and understand the procedures.</td>
<td>Annual</td>
</tr>
<tr>
<td>Title</td>
<td>Description</td>
<td>Frequency</td>
</tr>
<tr>
<td>--------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td>Magnet Inspection</td>
<td>Magnets need to be on a predefined schedule for cleaning</td>
<td>Manufacturer specs or company policy.</td>
</tr>
<tr>
<td>Manlift (cage)</td>
<td>Have an outside manlift company inspect cage and belt manlifts. 5 year weight tests.</td>
<td>Annual</td>
</tr>
<tr>
<td>Manager Inspection and Hazard Review</td>
<td>Manager or designate inspects the facility for common hazards like lighting, clear exit paths, housekeeping, etc.</td>
<td>Monthly is common</td>
</tr>
<tr>
<td>MSDS/SDS Chemical Inventory Review</td>
<td>Perform a chemical inventory and make sure we have MSDS sheets for current products and that we remove old products.</td>
<td>Not defined. Annual is common.</td>
</tr>
<tr>
<td>OSHA Log Posting</td>
<td>Reminder to post OSHA Log 300A on Feb 1 and remove on 5/1 of each year</td>
<td>Annual</td>
</tr>
</tbody>
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# Other Tasks to Improve Safety

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<tr>
<td>Pit Grating Inspection</td>
<td>Inspect grating to make sure it is in good shape and minimum spacing is less than 2.5&quot;</td>
<td>Not defined. Quarterly is common</td>
</tr>
<tr>
<td>Policy Review</td>
<td>Review written policies and make sure they are still current.</td>
<td>Annually</td>
</tr>
<tr>
<td>PPE hazard Assessment / Certification</td>
<td>Review the PPE Hazard Assessments each year to make sure they are still current.</td>
<td>Annually</td>
</tr>
<tr>
<td>Propane Bottle Review for Certification</td>
<td>Bottles need recertified 12 years from manufacturing and then each 5 years for up to 3 cycles.</td>
<td></td>
</tr>
<tr>
<td>Radio Inspection</td>
<td>Monthly 2-way radios are inspected for transmission and receiving capability. They usually are part of alarm system so this also serves as alarm testing.</td>
<td>Monthly</td>
</tr>
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## Other Tasks to Improve Safety

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<tr>
<td>Rail or Truck Fall Protection System</td>
<td>A competent person is to review the fall protection system to verify that it is in safe operating condition. The inspection is to spot potential deficiencies that may need corrected.</td>
<td>Per manufacturer. Annual is common.</td>
</tr>
<tr>
<td>Respirator Inspection</td>
<td>Respirators need required inspections verifying they are in safe condition.</td>
<td>Monthly</td>
</tr>
<tr>
<td>Rope Lifeline Inspection</td>
<td>Ropes used for lifeline applications will be inspected annually for safe conditions. The ropes will also be inspected prior to each use in an undocumented inspection.</td>
<td>Annual</td>
</tr>
<tr>
<td>Scaffolding Inspection</td>
<td>Periodically scaffolding needs to be inspected checking for safe condition.</td>
<td>Manufacturer specs.</td>
</tr>
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## Other Tasks to Improve Safety

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<tr>
<td>Self Retracting Lifeline Inspection</td>
<td>Self Retracting Lifelines will be inspected for safe conditions. The SRLs will also be inspected prior to each use in an undocumented inspection.</td>
<td>Per manufacturer. Annual is common</td>
</tr>
<tr>
<td>Shower (safety)</td>
<td>Safety showers will be checked for safe condition, cleanliness, and accessibility.</td>
<td>Weekly</td>
</tr>
<tr>
<td>Sling Inspection Cable</td>
<td>Cable slings used for lifting will be inspected annually for safe conditions. The slings will also be inspected prior to each use in an undocumented inspection.</td>
<td>Annual</td>
</tr>
<tr>
<td>Sling (synthetic) Inspection</td>
<td>Synthetic slings used for lifting will be inspected annually for safe conditions. The slings will also be inspected prior to each use in an undocumented inspection.</td>
<td>Annual</td>
</tr>
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## Other Tasks to Improve Safety

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<tbody>
<tr>
<td>Tie Off Adaptor and Anchorages Inspection</td>
<td>Tie off adaptors and anchorage points used for fall protection will be inspected annually for safe conditions. The anchorage items will also be inspected prior to each use in an undocumented inspection.</td>
<td>Per manufacturer. Annual is common</td>
</tr>
<tr>
<td>Track Inspection</td>
<td>Periodically inspect track condition to prevent derails.</td>
<td></td>
</tr>
<tr>
<td>Trolleys for Fall Protection</td>
<td>Inspection of the fall protection trolleys on fixed fall protection systems. Follow manufacturers guidelines.</td>
<td>Per manufacturer. Annual is common.</td>
</tr>
<tr>
<td>Winch Tripod Davit Arm Inspection</td>
<td>Inspect tripod/winch system. It needs to be inspected prior to each use, but that is not a documented inspection.</td>
<td>Per manufacturer. Annual is common.</td>
</tr>
</tbody>
</table>
How to Get Started

• There is no magic bullet
  • Start with one training at a time
  • Start with adding one program
  • Start with adding one inspection

• The important thing is to be heading in the right direction.

• It often takes 2-4 years to develop a system and 5-10 years to see the
Where to Get Help – NGFA Education

- “Grain Bin Safety: Protection You and Your Family”
  - NGFA and NCGA safety training DVD

- “Your Safety Matters”
  - NGFA and GEAPS safety training DVD

- “Don’t Go With the Flow”
  - NGFA and Purdue University entrapment rescue training video

- Facility Security Risk-Assessment and Security Guide
  - Guide that assists in conducting facility risk assessments, as well as in developing and implementing facility security plans

- Guidance for Sweep Auger Operations in Grain Bins
  - Provides basic concepts that assists grain handling facilities in developing and implementing a sweep auger operations

- Permit Required Confined Space/Boot Pit Evaluation Guide for Grain Elevators
  - Provides basic concepts that assists in evaluating boot pits under OSHA’s permit-required confined space program
Where to Get Help – NGFA Guidance

• NGFA/Grain Journal Safety, Health and Environmental or Safety Conference
  • August 2-4, 2016 Omaha, NE

• Local Trade Association/NGFA Regional Safety Seminars
  o Usually 4 or 5 a year
    • Rocky Mountain Agribusiness Association (RMAA) – Jan. 11 in Denver
    • Nebraska Grain and Feed Association – Jan. 13 in Grand Island, Neb.
    • Montana Grain Elevator Association – Jan. 26 in Great Falls, Mont.
    • Oklahoma Grain and Feed Association/Texas Grain and Feed Association– Feb. 24 in OKC
    • Ohio Agribusiness Association and Agribusiness Council of Indiana – March 8 in Columbus, Ohio
• Currently 24 online courses covering various grain topics.
  • http://www.geaps.com
Where to Get Help

• Your Insurance Company
  • Loss Control Department
    • Usually will do site assessments
      • Safety
      • Environmental
    • Usually will perform monitoring
      • Noise
      • Dust
    • May perform training on various topics
Where to Get Help

- OSHA Consultation Services
  - Free service with state department of labor to review programs and facilities for OSHA compliance.
  - [https://www.osha.gov/dcsp/smallbusiness/consult_directory_text.html](https://www.osha.gov/dcsp/smallbusiness/consult_directory_text.html)
Where to Get Help

- Read OSHA Publications
  - **Inspection of Grain Handling Facilities, 29 CFR 1910.272.**
  - **REGULATORY REVIEW OF OSHA'S Grain Handling Facilities Standard**
    https://www.osha.gov/dea/lookback/grainhandlingfinalreport.html
  - **DHHS (NIOSH) Publication Number 83-126 Occupational Safety in Grain Elevators and Feed Mills**
  - **Preamble to Grain Handling Standard** (You will need to find someone who has a copy. NGFA can provide)
Where to Get Help

• Read OSHA Standards
  • https://www.osha.gov/law-regs.html

• Read OSHA Interpretations

• Read Local Emphasis Programs
  • https://www.osha.gov/dep/leps/leps.html

• Read Citations for our Industries
  • https://www.osha.gov/pls/imis/industry.html
  • NAICS 424510, 493130, 311211
Where to Get Help – State Associations

• Examples
  • Rocky Mountain Agribusiness Association (RMAA)
  • Nebraska Grain and Feed Association
  • Montana Grain Elevator Association
  • Oklahoma Grain and Feed Association
  • Texas Grain and Feed Association
  • Ohio Agribusiness Association and Agribusiness Council of Indiana
Where to Get Help - GFAI

- Grain and Feed Association of Illinois
  - Have written safety templates for most key programs
  - They work nationwide – you do not need to be from Illinois

- Contact: John Lee (217) 787-2417
  jlee@gfai.org

- Contact Kris Richardson (217) 787-2417
  Krisr@gfai.org
Where to Get Help – Grain Journal Webinars

• Grain Journal
  • Routinely has webinars on various safety and quality issues.
Where to Get Help - GHSC

- Grain Handling Safety Coalition
- Grainsafety.org
- Have training presentations.
- Have training videos
- Can do large group presentations on basic grain hazards
Where to Get Help - Asmark

- ASMARK has an excellent Compliance Assessment Tool that is free of charge. Would give you a good checklist of items to investigate.

  - https://www.asmark.org/Compass/ComplianceAssessmentTool/
• Private safety consultants who work in the industry.
Where to Get Help - Networking

• Call others in the industry.
  • Many of us truly believe –

  • **There are no secrets in safety.**

  • *Colorado Seminar - Brian Grimm – bgrimm@Bartlett-grain.com*
  • *Montana Seminar – Tom Harmon - Tom.HarmonJr@gavilon.com*
  • *Nebraska Seminar – Matt Shurtliff - mshurtliff@heiskell.com*
  • *Oklahoma Seminar – Brian Grimm – bgrimm@Bartlett-grain.com*
  • *Ohio Seminar -*