Lunch Box Safety Webinar
Safety Over Sandwiches

OCTOBER: Confined Space Entry/Bin Entry

Presented by Joe Mlynek, Progressive Safety Services LLC
Goal

- Clear up confusion between the requirements for confined spaces and grain storage structures.

- Discuss safe methods of entry.

- Keep employees safe during entry!
Discussion Outline

Hazards of Grain Storage (Review)

Requirements for Entry into Grain Storage Structures

Requirements for Entry into Permit Required Confined Spaces.
Hazards of Grain Storage Review
Work to identify ways to eliminate the need to enter grain storage structures (bins, silos, tanks).

Employees can become trapped in grain in several ways:

- Collapse of bridged grain
- Collapse of a vertical wall of grain
- Entrapment in flowing grain
Collapse of Bridged Grain

- Grain bridges when moldy, high in moisture, or when in poor condition.
- Kernels stick together forming a crust.
- Hollow cavity under bridged grain can be undetectable.
Safety Precautions for Bridged Grain

- Prevent bridging by storing grain in good condition.
- Never enter bins while grain is being reclaimed.
- Follow documented entry procedures and use required retrieval equipment and PPE.
Collapse of a Vertical Mass of Grain

- Grain can set up in a large mass against a wall when it has been stored in poor condition.
- The mass of grain can collapse on workers attempting remove the mass.
- The “avalanche” effect can knock workers off their feet and bury them in grain.
Safety Precautions

- Try to clear mass from outside the space.
  - Flush with same commodity.
  - Specialized tools.

- Suspended work using retrieval equipment.

- Use required, retrieval equipment, PPE, entry procedures, etc.
Flowing Grain

- Will not support the weight of a person
- Pulls person into the grain mass
Flowing Grain

Dangerous flowing situations include:

- Grain flowing downward in a bin, silo, tank, railcar, truck, or wagon.
- Grain flowing downward toward an auger.
Requirements for Entry into Grain Storage Structures

Bins, Silos, Tanks, Flat Storage per OSHA 1910.272.
Grain Storage Structures

1910.272 Requirements:

- Apply to employee entry into bins, silos, tanks, and other grain storage structures.

- Exception – Entry through unrestricted ground level openings into flat storage structures where there are no toxicity, flammability, oxygen deficiency, or other atmospheric hazards.

  - Unrestricted – employees can enter by stepping, walking, or driving through the openings.
Permits

- Issue a permit before entering bins, silos, or tanks.

- Exception: Permit is not required if the employer’s representative (who would authorize the permit) is present during the entire operation.

- Strongly encourage the use of a permit system regardless of who is part of the entry team.
The permit must be kept on file until completion of entry operations.

- Suggest keeping permits on file for one year.
Permit

- Must certify that the following precautions are taken prior to entry:
  - All mechanical, hydraulic, and pneumatic equipment which presents a danger to employees inside grain structures must be de-energized, and shall be disconnected, locked-out and tagged, blocked off, or otherwise prevented from operating by other equally effective means.
Precautions

- The atmosphere must be tested for the presence of:
  - Combustible gases and vapors when there is reason to believe that they may be present;
  - Toxic agents when there is reason to believe that they may be present.
  - Oxygen unless there is
    - continuous natural air movement or;
    - continuous forced air ventilation before and during the entry.
Precautions

Ventilation shall be provided when;
- oxygen is less than 19.5%
- combustible gas or vapor is in excess of 10% of the lower flammable limit, or
- toxic agents are present at levels in excess of the PEL (i.e. phosphine).

Ventilation shall be provided until the unsafe condition(s) are eliminated.
Ventilation shall be continued as long as there is a possibility of recurrence of an unsafe condition while in the bin.
Precautions

- If toxicity or oxygen deficiency cannot be eliminated by ventilation, employees shall wear an appropriate respirator.
Precautions

- Walking Down Grain or similar practices where an employee walks on grain to make it flow within or out from a grain storage structure is prohibited.

- Employees are prohibited from being on moving grain.
Precautions

- A body harness or boatswain’s chair attached to a lifeline are required when:
  - An employee enters a grain storage structure from a level at or above the level of grain products.
  - An employee walks or stands on or in stored grain at a depth which poses an engulfment hazard.
Lifelines

- The lifeline:
  - Must be positioned and of sufficient length to prevent the employee from sinking further than waist deep in grain.
  - Exception “Where the employer can demonstrate that the protection required are not feasible or creates a greater hazard the employer can provide an alternative means of protection against sinking further than waist deep in grain.”
Precautions

- An observer equipped to provide assistance needs to be stationed outside of the bin, silo, or tank.

- Communications must be maintained between the observer and employee entering the bin, silo, or tank.
Precautions

- Observer must be trained in:
  - Rescue procedures.
  - Notification methods for obtaining additional assistance.
Precautions

- Employees shall not enter bins underneath bridging conditions, or where buildup of grain products on the sides could fall and bury them.
Entry into Flat Storage Structures

Requirements
Flat Storage Structures

- Flat storage structure" means:
  - grain storage building or structure that will not empty completely by gravity;
  - has an unrestricted ground level opening for entry;
  - must be entered to reclaim the residual grain using powered equipment or manual means.
Precautions

- Each employee who stands on or in stored grain where the depth poses an engulfment hazard will be equipped with:
  - Lifeline
  - Alternate means which the employer demonstrates will prevent the employee from sinking further than waist deep into the grain.
Precautions

- When the employee is standing or walking on the surface which the employer demonstrates is free of engulfment hazards the lifeline or alternate means may be disconnected or removed.
**Precautions**

- Whenever an employee walks or stand on or in stored grain or grain products at a depth which poses engulfment hazards:
  - All equipment that presents a danger to the employee shall be de-energized.
  -Disconnected and locked/tagged, blocked off, or otherwise prevented from operating by other equally effective means or methods.
Precautions

- Walking down grain is prohibited.

- No employee shall be permitted to enter under a bridging condition or where an accumulation of grain on the sides or elsewhere could fall or engulf the employee.
Permit Required
Confined Space Entry

Non-Grain Storage Structures
OSHA 29 CFR 1910.146

- Standard outlines all requirements for confined space entry.

- While many grain storage structures may meet the definition of a confined space, the confined space standard does not supersede the grain handling standard for grain storage structures.

- Many companies choose to consolidate confined spaces and grain storage structures into one program.
What constitutes a confined space?

- Is large enough and so configured that an employee can enter and perform work;
- Has limited or restricted means of entry or exit;
- Is not designed for continuous human occupancy.

Trouble with classification?
- OSHA Confined Spaces Advisor – osha.gov
Examples of Confined Spaces:

- Tanks
- Boilers
- Sewers
- Silos
- Bins
- Hoppers
- Vaults
- Pipes
- Trenches
- Tunnels
- Ducts
- Pits
A Permit–Required Confined Space has one or more of the following characteristics:

- Contains or has the potential to contain a hazardous atmosphere.
- Contains material with the potential for engulfing an entrant.
- Has an internal configuration such that an entrant can become trapped or asphyxiated.
- Contains any other serious safety or health hazard.
Labeling

- The employer shall inform exposed employees, by posting danger signs or by any other equally effective means, of the existence and location of the danger posed by the permit spaces.

  ◦ DANGER -- PERMIT-REQUIRED CONFINED SPACE, DO NOT ENTER

  ◦ Similar language
Hazards in Confined Spaces:

- Hazardous Atmosphere
  - Oxygen
    - 19.5% to 23.5%
  - Flammable Gases
    - <10% LEL
      - Propane
      - Acetylene
Hazardous Atmosphere

- Atmospheric Concentrations of Substances for which a PEL is published:
  - Carbon Monoxide (CO)
    - $= < 50$ ppm (OSHA)
    - $= < 35$ ppm (NIOSH)
  - Phosphine (PH3)
    - $= < 0.3$ ppm (OSHA/NIOSH)
  - Hydrogen Sulfide (H2S)
    - $= < 20$ ppm (OSHA)
    - $= < 10$ ppm (NIOSH)/1910.26

- Combustible Dust
Other Hazards:

- Electricity
- Falls
- Extreme Temperatures
- Chemical Exposure
- Mechanical Hazards
  - Augers
  - Mixers
- Engulfment
What Constitutes Entry?

- The act by which a person intentionally passes through an opening into a permit required confined space.

- Any part of the body passing through the opening is considered entry.
Confined Space Entry Duties and Responsibilities

- Entrant
- Attendant
- Entry Supervisor
ENTRANT

- The employee who will physically enters the confined space to perform the work.
Entrant Responsibilities

- Take an active role in evaluating the space.
- Know the hazards that may be faced.
- Use all required equipment.
- Follow all safety rules and procedures that apply to the job.
- Alert attendant when a dangerous situation is recognized.
- Immediately exit the space when attendant issues an evacuation order.
- Remove all tools from the space prior to completion of the entry.
ATTENDANT

- The employee who remains outside the confined space.
Attendant Responsibilities

- Know the hazards faced.
- Remain in the immediate area of the space.
- Control access.
- Maintain communication with entrants.
- Order evacuation:
  - Behavioral effects of hazard exposure.
  - Situation outside space could endanger entrants.
  - If attendant cannot for any reason perform duties.
- Perform non-entry rescue if needed.
Attendant Responsibilities
(Continued)

- Summon emergency assistance as needed. Must have a means of communication:
  - Radio
  - Cell phone
  - Phone in close proximity

- Assess hazards in and around the space, and take action when they pose risk to the entrant(s).

- Keep records of confined space work (atmospheric monitoring results, personnel entry/exit, etc.).
Entry Supervisor

- The employee responsible for coordinating entry.

- When possible should be the role of a foreman, supervisor, operations manager or experienced employee.
Entry Supervisor Responsibilities

- Know hazards faced with entry.
- Ensure permit and documentation filled out.
- Ensure atmospheric testing performed.
- Ensure the space is isolated.
- Ensure all employees trained.
- Verify rescue services available.
- Terminate permit upon completion of entry.
- File permit – One Year.
Permit-Required Confined Space Entry Procedure:

1) Notify affected persons of the entry
2) Inspect and set up all equipment
3) Assign roles to entry team
4) Secure area around the confined space
5) Isolate the Space
6) Ventilate (if applicable)
7) Calibrate gas monitor and perform pre-atmospheric testing.
8) Complete permit
9) Enter the Space
10) Cancel the permit and file with supervisor
Confined Space Entry Procedures

- Each facility required to have procedures for entry into each type of space.
Notify Affected Persons

- Notify persons in the immediate area and management of the entry.
- Review isolation and lockout procedures to be used.
- Communicate the time frame for the entry.
Inspect/Set-Up All Equipment

- Fall protection/retrieval equipment
- Intrinsically safe lighting/equipment
  - Class I and II Environments
- Calibrate/Bump Test Air monitor
- Personal protective equipment.
Vertical Entry

- Vertical entry greater than 5 feet:
  - A mechanical means shall be available
  - No ladder – two-line system
  - Ladder – one-line system
Assign Entry Roles to the Team

- Entry Supervisor
- Entrant(s)
- Attendant(s)

REMINDER ALL PERSONS INVOLVED MUST COMPLETE REQUIRED TRAINING!!!!
Secure the Area Around the Confined Space

- Restrict access to the immediate area prior to, during and after entry
  - Non-essential personnel
  - Traffic

- Remove obstacles that may get in the way of entry or potential rescue operations:
  - Vehicles
  - Debris
  - Un-needed Equipment
Isolate the Space from all Hazards

- Close and Isolate Systems
  - Lock and Tag
  - Blank/In-Flow
  - Communicate with Control Room

- Empty the Space
  - Remove as much of the contents as possible prior to entry

- Lockout/Tagout Equipment
  - Augers
  - Moving equipment
Ventilate the Space

- Continuous ventilation required if:
  - Initial atmospheric tests are not acceptable.
  - Natural ventilation is not adequate.
  - Chemicals are being introduced into the space for cleaning, maintenance or other purposes.

- Must not enter space until ventilation has eliminated the hazardous atmosphere.

- Air supply from a clean source.
Test the Atmosphere

- In this order:
  - Check for Oxygen Content:
    - At least 19.5% and less than 23.5%
  - Check for Combustibles:
    - Less than 10% of the LEL
  - Check for Toxic Gases:
    - Carbon monoxide
    - Hydrogen Sulfide (pits, tunnels, etc.)
    - Phosphine (fumigation)
    - Ammonia (liquid fertilizer)
    - Others???????
Atmosphere Testing Shall Be Performed:

- Prior to every entry when the space is vacant;
  - after breaks

- Before and after ventilation.

- Continually throughout the entry.
Air Monitors

- Monitor may have a pump or aspirator, tubing or wand to draw air to the monitor (remote sampling).

- Monitors are equipped with a peak/low function/latching features (top entry):
  - Allows user to measure different levels of a space
  - Best used for spaces of greater depth
  - The monitor will save the peak and low readings for the gases indicated
Always test the air at various levels to be sure that the entire space is safe.

Good air near the opening does NOT mean there is good air at the bottom of the tank or bin!
Air Monitors

- Make sure that monitor has been calibrated according to manufacturer recommendations.
- Make sure monitor rated for Class II Division 1 Group G environments.
Complete Entry Permit Form

- Permit must be correctly and completely filled out prior to entry.
- Permit must be activated by Entry Supervisor’s signature.
- Permit duration may not exceed the time required to complete the assigned work.
- Entry is not allowed without a valid permit.
- File for one year.
Enter the Space and Proceed with work:

- An attendant shall remain near the entrance for the duration of the work.
- The attendant shall ensure that the permit is up to date with current entrants.
- The attendant shall maintain the permit for the duration of the work.
When the Job is Done:

- Remove all personnel, tools, and debris from the space.
- Close the space.
- Cancel the permit.
- Review the job, any problems, etc.
- Communicate issues to Management
Rescue

- Self Rescue
- Non-Entry
- Capabilities:
  - Trained services must be available
  - Can be internal or external provider
- Annual rescue training and pre-planning
Wrap-Up

- Supervisor Talking Points
- Quiz

Further Information:

- Osha.gov
  - 1910.272 Grain Handling Standard
  - 1910.146 Permit Required Confined Space
  - Confined Space Advisor
  - Local Area Office
Questions?

Joe Mlynek CSP, CLCS
Progressive Safety Services LLC
joe.mlynek@progressivesafety.us

Website: progressivesafety.us