



Lunch Box Safety Talks

Safety Over Sandwiches

JANUARY: Confined Space Entry

Presented by Joe Mlynek

OSHA 29 CFR 1910.146

- ▶ Standard outlines all requirements for confined space entry.
- ▶ Grain handling standard also addresses specific requirements for entry into grain storage structures.

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](https://www.osha.gov)

Examples of Confined Spaces:

- ▶ Tanks
- ▶ Boilers
- ▶ Sewers
- ▶ Silos
- ▶ Bins
- ▶ Hoppers
- ▶ Vaults
- ▶ Pipes
- ▶ Trenches
- ▶ Tunnels
- ▶ Ducts
- ▶ Pits

Permit-Required Confined Space

- ▶ 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.

Hazards in Confined Spaces:

▶ Hazardous Atmosphere

- Oxygen Deficiency–
 - Acceptable Range 19.5% to 23.5%
- Flammable Gases
 - Acceptable Range = <10% LEL
 - Propane
 - Acetylene



Hazardous Atmosphere

- ▶ Atmospheric Concentrations of Substances for which a PEL is published:
 - Carbon Monoxide (CO)
 - Acceptable Range = < 35 ppm
 - Phosphine (PH₃)
 - Acceptable Range = < 0.3 ppm
 - Hydrogen Sulfide (H₂S)
 - Acceptable Range = < 10 ppm
- ▶ Combustible Dust



Other Hazards:

- ▶ Electricity
- ▶ Falls
- ▶ Extreme Temperatures
- ▶ Chemical Exposure
- ▶ Mechanical Hazards
 - Augers
 - Mixers
- ▶ Engulfment



Hazards of Grain Storage

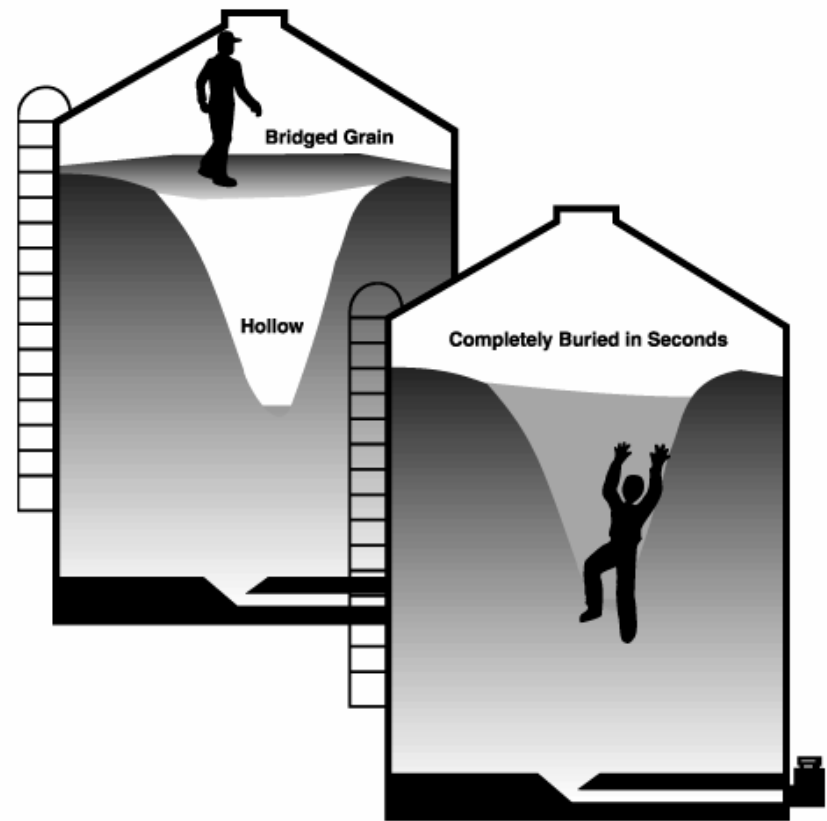


Grain Bin Entrapment

- ▶ Work to identify ways to eliminate the need to enter.
- ▶ Employees can become trapped in grain in three ways:
 - Collapsing 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 to form a crust.
- ▶ Hollow cavity under bridged grain can be undetectable.



Safety Precautions for Bridged Grain

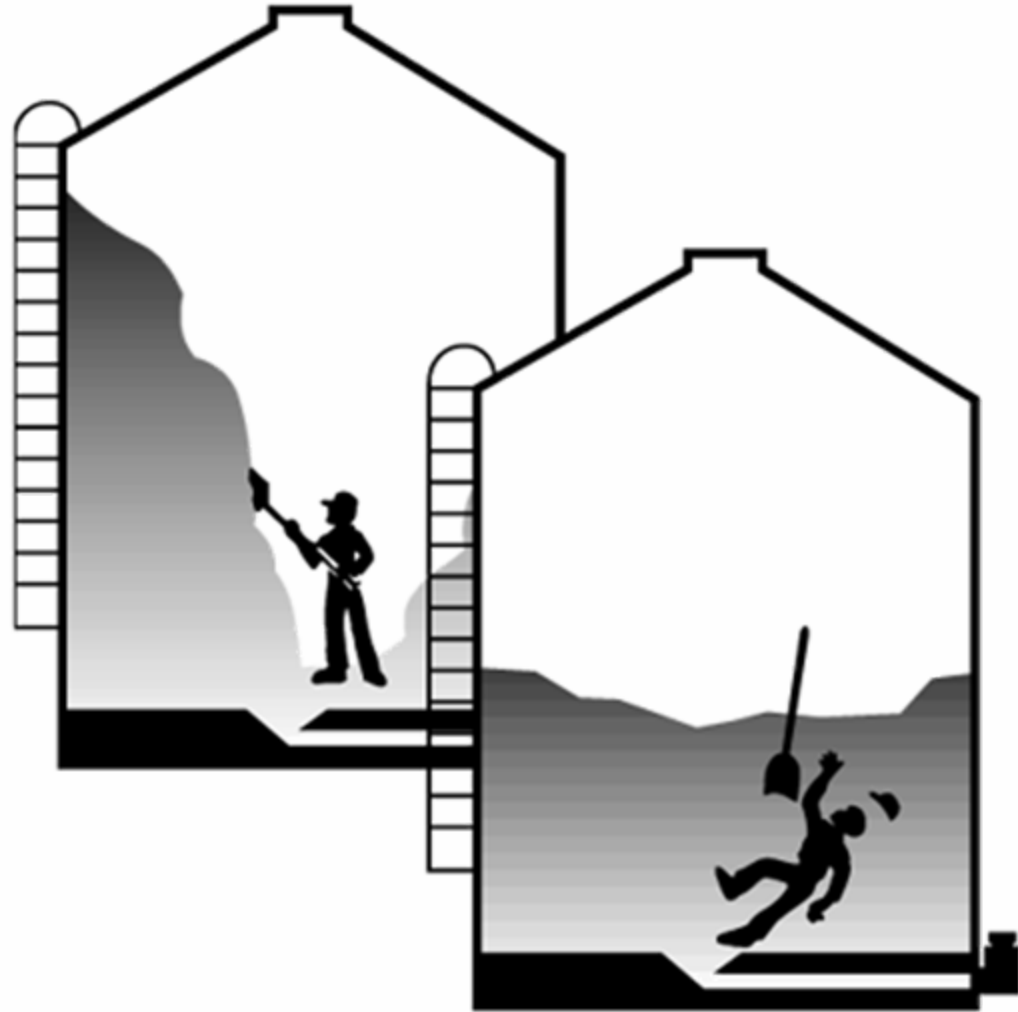
- ▶ Prevent bridging by storing grain in good condition.
- ▶ Never enter bins while grain is being reclaimed.
- ▶ Follow documented confined space entry procedures and use required retrieval equipment and PPE.

Collapse of a Vertical Mass of Grain

- ▶ Grain can set up in a large mass against the 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.

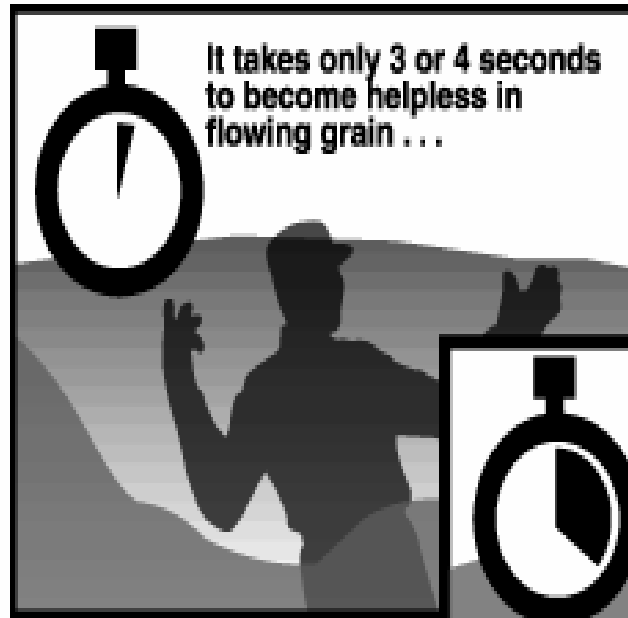
Safety Precautions

- ▶ Try to clear mass from outside the space.
- ▶ Suspended work using retrieval equipment.
- ▶ Use required safety lines, retrieval equipment, etc.



Flowing Grain

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

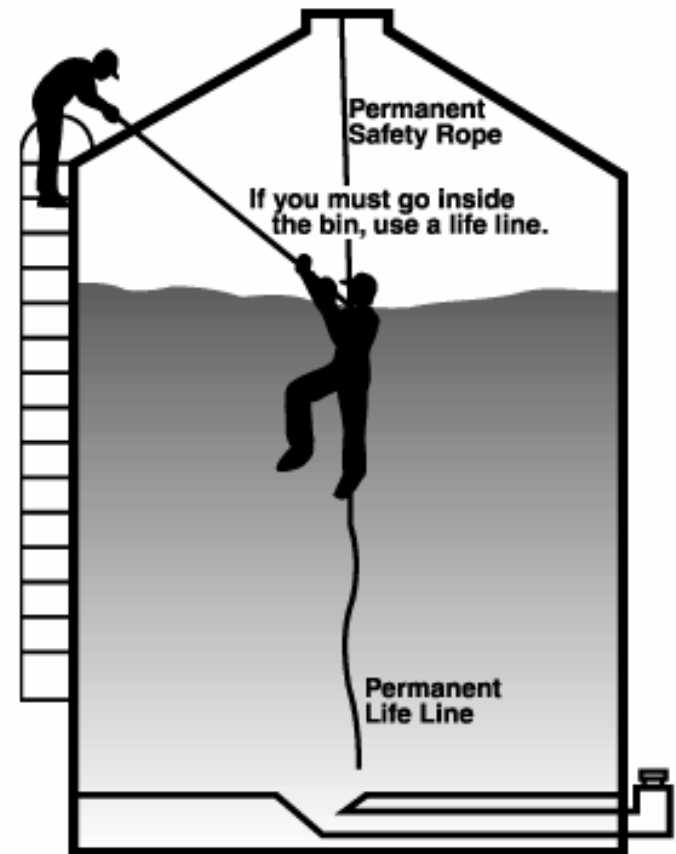


Flowing Grain

- ▶ Takes 400 lbs of pull force to extract someone waste deep in grain.
- ▶ Dangerous flowing situations include:
 - Grain flowing downward in a bin, silo, tank, railcar, truck, or wagon.
 - grain flowing downward toward and auger.

Safety Precautions

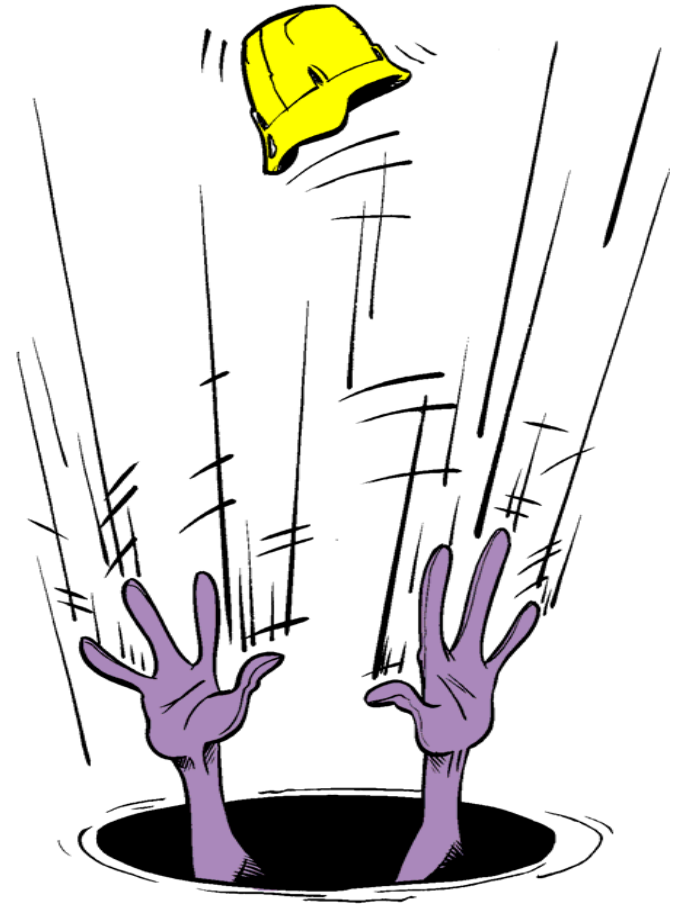
- ▶ Use permit system
- ▶ Do not enter storage bins when grain is flowing!!!
- ▶ Ensure that reclaim augers, conveyors or similar equipment are locked and tagged out.
- ▶ Use required retrieval equipment.



Confined Space Entry

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



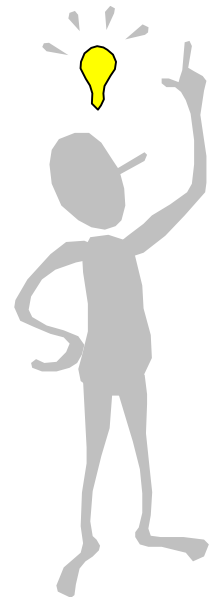
ENTRANT

- ▶ The employee who will physically enter 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:

- ▶ Notify affected persons of the entry
- ▶ Inspect and set up all equipment
- ▶ Assign roles to entry team
- ▶ Secure area around the confined space
- ▶ Isolate the Space
- ▶ Ventilate (if applicable)
- ▶ Calibrate gas monitor and perform pre-atmospheric testing.
- ▶ Complete permit
- ▶ Enter the Space
- ▶ Cancel the permit and file with supervisor

Confined Space Entry Procedures

- ▶ Each facility required to have procedures for entry into each type of space.
- ▶ OSHA 1910.146
 - Permit Required Confined 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
- ▶ Harnesses and rope grabs
- ▶ Intrinsically safe lighting/equipment
 - Class I and II Environments
- ▶ Personal protective equipment.



Vertical Entry

- ▶ Vertical entry greater than 5 feet:
 - ▶ A mechanical means shall be available for vertical entry into confined space greater than 5 feet in depth.
 - ▶ No ladder – two line system
 - ▶ Ladder – one line system



Horizontal/Side Entry

- ▶ Requires the use of a harness and retrieval line (lifeline).



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 Fill Gates**
 - Lock and Tag
 - Blank the Spout/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.

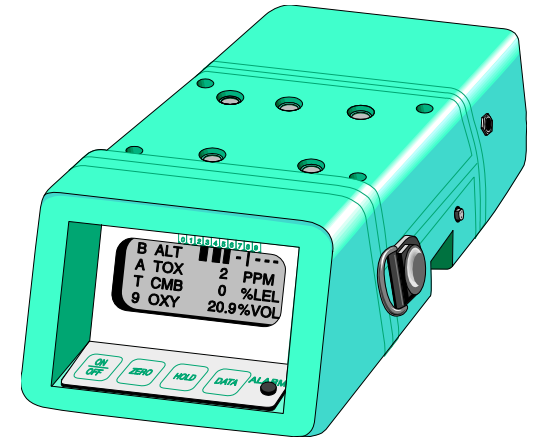
- ▶ Air supply from a clean source.



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 Gasses:
 - 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
 - after lunch
- ▶ Before and after ventilation.
- ▶ Continually throughout the entry .

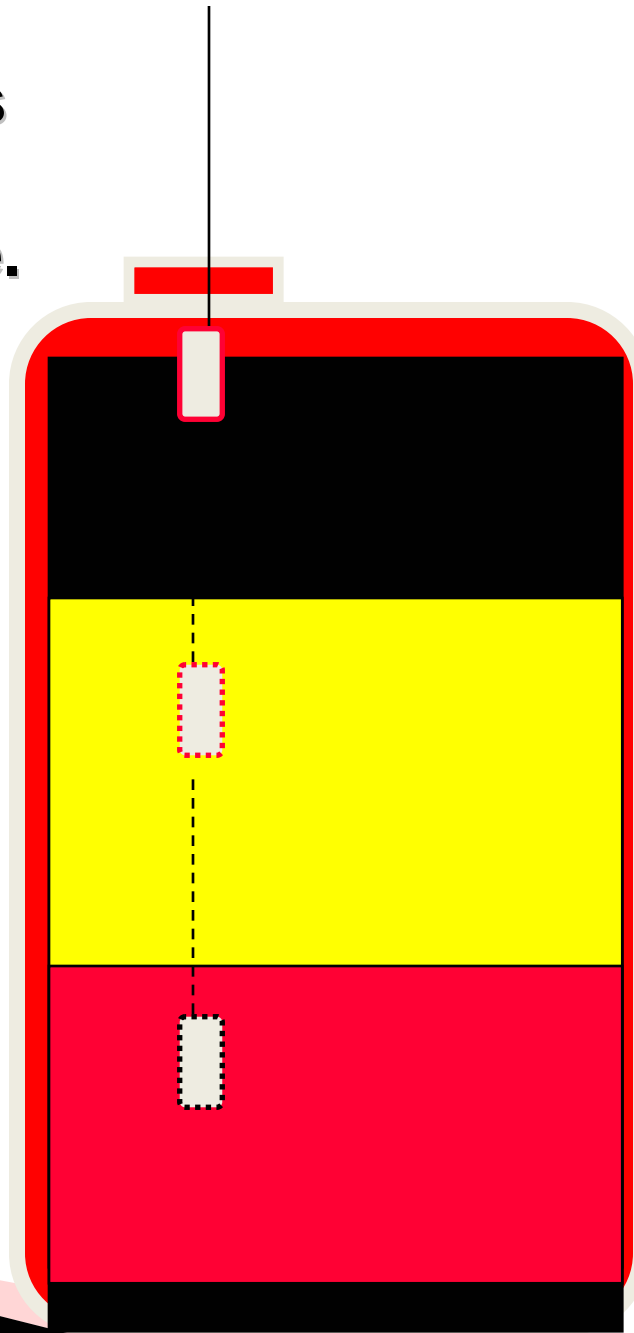


Air Monitors

- ▶ 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!



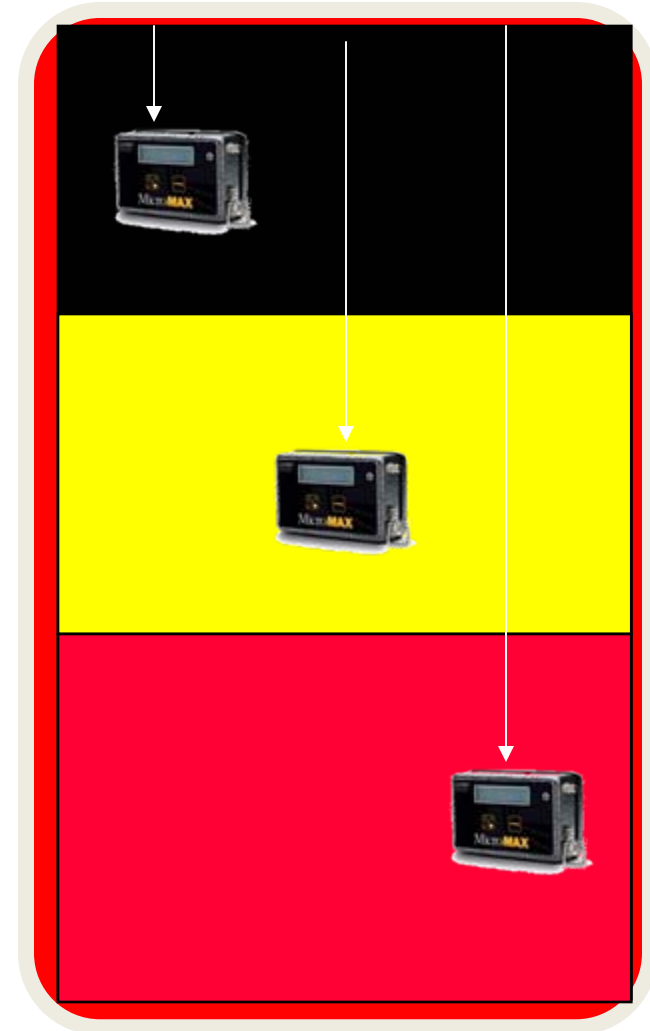
Good Air

Poor Air

Deadly Air

Peak/Low or Latching Function

- ▶ Example – Bin 120 foot depth.
- ▶ Drop monitor to bottom for initial check. If readings not acceptable.
- ▶ Measure air in each level:
 - 1–40 feet
 - 40–80 feet
 - 80–120 feet



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 to be valid.
- ▶ Permit duration may not exceed the time required to complete the assigned work.
- ▶ Entry is not allowed without a valid permit.
- ▶ Kept on 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

Questions?

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