Focus On: Confined Spaces

Let's get serious about confined space safety. Confined spaces can be seriously dangerous and are the leading cause of multiple fatalities in the workplace. Here's why…

A confined space has limited openings for entry or exit, is large enough for entering and working, but is ***not*** designed for continuous worker occupancy. Examples: vaults, tanks, bins, manholes, pits, silos, pipelines.

Oxygen Levels

High oxygen levels in a confined space increase the risk of fire and explosion. Materials that would not normally catch fire or burn in normal air may do so extremely quickly and easily.

Low oxygen levels can lead to unconsciousness and death. Common causes of oxygen deficiency:

1. Oxygen is used up when metals rust.
2. During combustion (i.e. propane heaters, cutting and welding, internal combustion engines).
3. Oxygen is replaced by other gases – welding gases or gases forced into the space to prevent corrosion.
4. Micro-organisms use up oxygen (i.e. sewer lines and fermentation vessels).
5. Rust and biological matter.

Toxic Atmospheres

Toxic atmosphere causes:

1. Evaporation of liquids such as liquid fuel in a tank.
2. Pockets of gas released when waste materials are disturbed – i.e. hydrogen sulfide released from manure pits during cleaning.
3. Cutting, welding, painting, and grinding work done inside the space.
4. Outside sources – i.e. exhaust from vehicles and equipment.

At certain concentrations some substances become immediately dangerous to life and health (IDLH). Even brief exposure to these substances can cause death or permanent damage to vital organs.

Explosive Atmospheres

In addition to oxygen enriched atmospheres, other causes for explosive atmospheres include:

1. Ignition of gases and vapors.
2. Combustible dust – i.e. coal and grain dusts.
3. Chemical reactions
4. Substances used in the space – i.e. welding gases, methane, hydrogen, solvents.

Ignition sources to be aware of:

1. Open flames.
2. Welding arcs and arcing of electrical motors.
3. Sparks from metal impact (tools striking a metal pipe), static electricity.
4. Lighting in the space.

Physical Hazards

Physical hazards cover a wide range of hazards common to confined spaces.

1. Engulfment or drowning from loose materials such sand, grain, soil, sawdust and water.
2. Granular materials (particularly when wet) such as grain can form bridges or shelves above a worker that break free and engulf an entrant.
3. Slips, trip, and fall hazards.
4. Hazardous energy – shock, accidental start-up, moving equipment parts.
5. Harmful substances entering through piping.
6. Poor visibility, noise, and temperature extremes.

Be a Better Supervisor

To help prevent confined space injuries and fatalities employers

must have a written confined space entry program. Part of the program includes identifying confined spaces non-permit and permit-required) on site. Employers must inform exposed employees of the existence, location, and hazards of all permit-required spaces. It is your responsibility to help your employer carry these out these responsibilities.

Assessment and Entry Permit

A hazard assessment and an entry permit are required for every permit-required confined space entry. A confined space entry program must:

- Designate an entry supervisor be provided for each permit space entry.
- List entry supervisor qualifications; and
- Describe the entry supervisor's duties.

Entry into the space cannot occur until the permit is completed and approval to enter is given.

- The permit must be kept at the job site for the duration of the job.
- If there is an interruption in the work or a change in the alarm conditions for which entry was approved, a new entry permit must be completed.
- A written copy of operating and rescue procedures must also be at the work site for the duration of the job.

Click here for a list of what information the entry permit is required to have.

Implement Hazard Controls

Hazardous Atmospheres

All confined spaces should be tested for atmospheric hazards prior to entry and in many cases, testing is required throughout the duration of the work. Testing must be done by a trained user and all testing equipment must be in good condition, properly calibrated, and warning alarms set to the right levels.

Elimination of the substance is the best way to remove the risk – but if that isn't possible other control measures must be used.

- Ventilation
- Purging
- Inerting
- Flushing

In toxic and low oxygen atmospheres where the hazards can't be eliminated, air-purifying and supplied-air respirators are required.

Physical Hazards

Protect against physical hazards by using:

- Fall protection
- Respirators/supplied air
- LOTO
- Piping isolation
- Hearing protection
- Pumps to remove water
- Barriers
- Non-sparking tools

Communication and Emergency Response

The ability for confined space entrants, attendants, and supervisors to communicate is critical, required, and in some cases, lifesaving. A communication system should allow for communication:

- With others inside the confined space.
- With those outside it.
- To summon help in case of an emergency.

Ideally, communication methods should be:

- Hands-free
- Wireless
- Full-duplex
- Independently powered

- Integrated with hearing protection

The preferred method of rescue is to use retrieval systems that make it unnecessary to send in rescue personnel. If retrieval systems won't be effective and you must rely on rescue personnel to enter the space, you must take steps to ensure rescue operations are as safe as possible.

Ongoing

Finally, it is important to closely monitor confined spaces on an ongoing basis.

- You must review the entry procedure at least once a year and more frequently any time you have reason to believe it's not providing entrants the necessary safety.
    - Triggers for review include near misses or injuries, unauthorized entries, detection of new or unpermitted hazards inside the space, changes in the space's use or configuration and worker complaints.
- You must reassess non-permit spaces and decide whether to reclassify them as permit spaces when there are changes to the configuration of the space or the work done inside it.
- You can also reclassify permit as non-permit if you can demonstrate that it no longer contains the actual or potential hazards that led you to classify it as a permit space.