Confined Spaces

August 2024

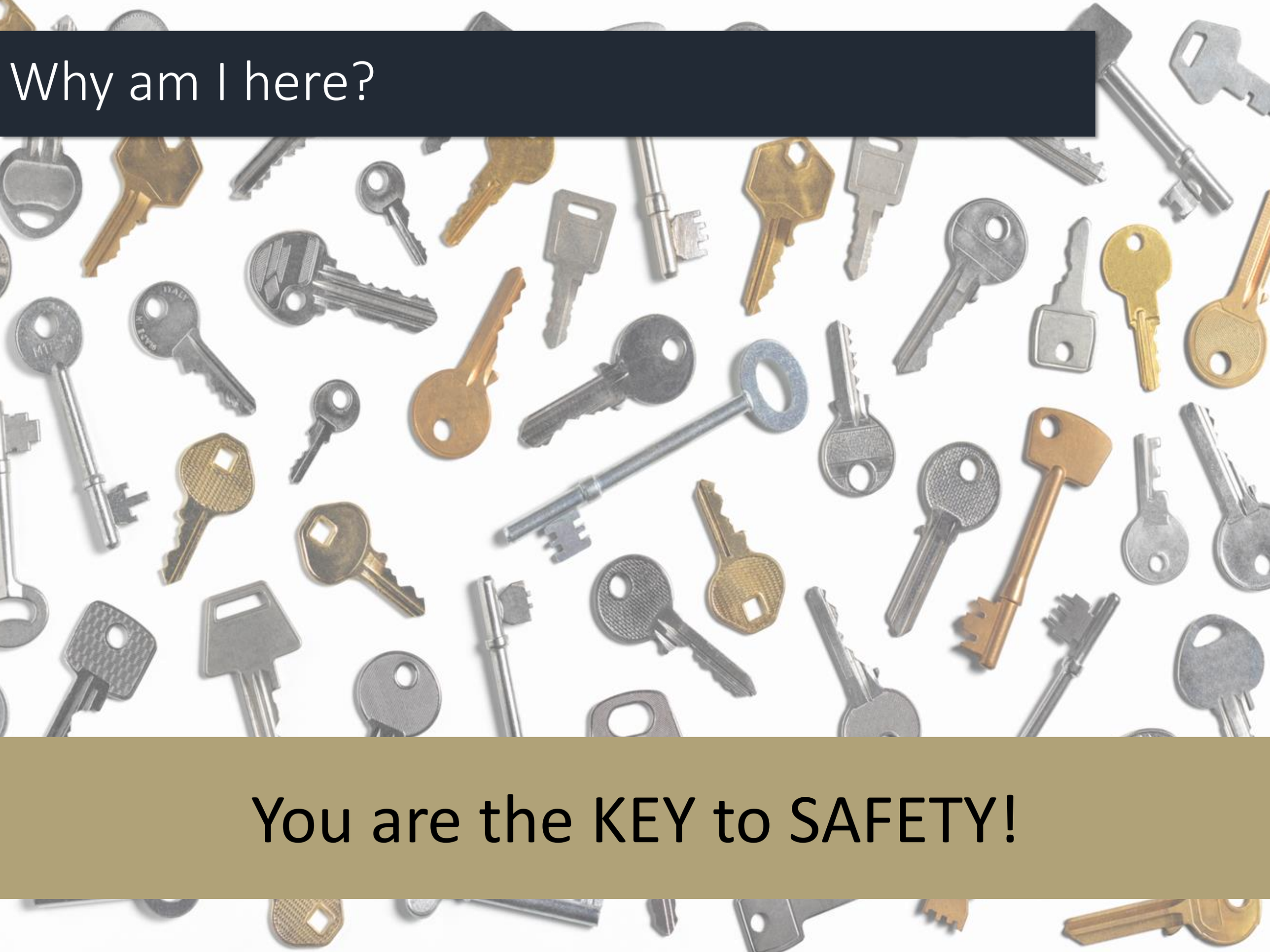
Housekeeping

Muster Point

Presenter & Introductions

Safety begins with me!

Why am I here?



You are the KEY to SAFETY!

Confined Spaces

Are large enough and configured so that an employee can bodily enter and perform assigned work.

Have limited or restricted means for entry or exit, such as tanks, vessels, silos, storage bins, hoppers, vaults, or pits.

Are not designed for continuous employee occupancy.

Confined Space Personnel

- **Entrants -** An entrant is a person who enters the space to perform the work.
- **Attendants -** An attendant is the person on duty outside the space whose only function is to monitor the space while entrants are working inside.
- **Entry Supervisors -** An entry supervisor is the person in charge of confined space entry and is responsible for all activities.
- **Rescuers -** This personnel must be able and available to rescue the entrant by remote means or to enter the space with sufficient gear to do the job safely.

Permit Required Confined Spaces

- Contains or has a potential to contain a hazardous atmosphere.
- Contains a material that could engulf an employee.
- Has an inside layout that could trap or smother (asphyxiate) an employee.
- Contains any other recognized serious safety or health hazard.

Permit Required Confined Spaces

Employers must inform employees of the locations and hazards of permit-required confined spaces. This is often done by posting signs around the space that state, “DANGER – PERMIT-REQUIRED CONFINED SPACE – AUTHORIZED ENTRANTS ONLY.”

Only authorized and trained personnel with a permit from the entry supervisor may enter a permit-required confined space.

Confined Spaces Entry Permit

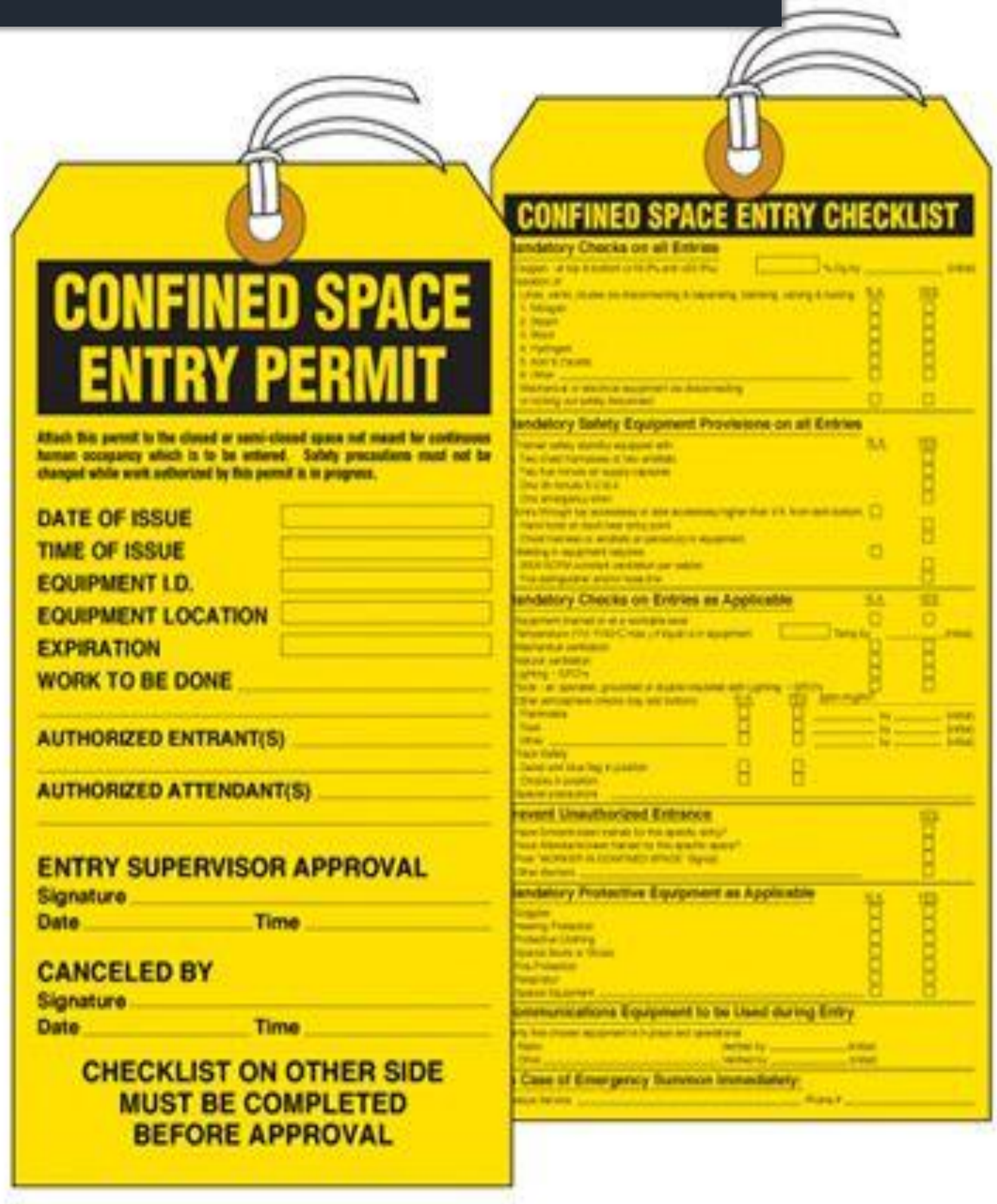
Entry permits must include:

- the name of the permit-required confined space to be entered
- the names of the entry supervisor, all entrants, and attendants involved
- the atmospheric test results
- the tester's initials or signature
- the entry supervisor's signature
- the purpose of entry
- all known hazards
- measures to isolate the space
- measures to eliminate or control hazards

Confined Spaces Entry Permit

Also:

- the names and phone numbers of rescue and emergency personnel
- the date and authorized duration of entry
- acceptable entry conditions
- communication procedures and equipment used to ensure communication during entry
- additional permits, such as hot work permits, that authorize specific work in the confined space
- special equipment and procedures needed for the entry
- any other information needed to ensure employee safety.



Atmospheric Hazards (Oxygen Deficient)

Oxygen levels decrease as a result of:

- welding, cutting, or brazing;
- chemical reactions such as rusting;
- bacterial action such as fermentation; or
- displacement by other gases such as carbon dioxide or nitrogen.

Oxygen-deficient atmospheres have less than 19.5% oxygen by volume.

OXYGEN EXPOSURE TABLE
(Physiological Reactions)

Oxygen % at Sea Level	Physiological Effects
>23.5%	Explosive atmosphere; Extremely hazardous; Oxygen-enriched environment
19.5% to 23.5%	Normal breathable air; No adverse effects; Average working conditions
15% to 19.5%	Fatigue; Loss of stamina; Decreased ability to work
12% to 15%	Exhaustion; Increased respiration; Impaired coordination
10% to 12%	Confusion and anxiety; Poor judgment; Lack of coordination
8% to 10%	Mental failure; Fainting and vomiting; Loss of consciousness
6% to 8%	At eight minutes = 100% Fatal
4% to 6%	Lack of self-control; Convulsions and coma; Respiratory arrest; Death

Atmospheric Hazards (Oxygen Enriched)

- Oxygen-enriched atmospheres occur when oxygen levels exceed 23.5% by volume.
- At that point, the atmosphere becomes flammable, and materials such as clothing or hair will burn rapidly when ignited.

Toxic Atmospheres

Toxic atmospheres can be caused when:

- Products stored in a confined space get absorbed into the walls and give off toxic gases during removal;
- Welding, sanding, or degreasing occur in the confined space; and
- Hazardous liquids, vapors, mists, solid materials, or dust are produced nearby, then enter and gather inside the confined space.

Toxic Gases

Some of the most common toxic gases found in confined spaces are:

- Carbon monoxide, a colorless, tasteless, and odorless byproduct of combustion.
- Hydrogen sulfide, a colorless gas with the distinct smell of rotten eggs.

Atmospheric Testing

Hazardous gases can be found at the top, middle, or bottom of a confined space and can vary in density.

Atmospheric testing must be performed at all three levels to determine which gases are present.

If a toxic or combustible gas or an oxygen-deficient or enriched atmosphere is present, employers must ventilate and retest the confined space before permitting entry.

Ventilation

Ventilation should be continuous where possible because, in many confined spaces, the hazardous atmosphere will form again when the airflow is stopped.

Photo credit MTA Construction & Development Mega Projects
https://www.flickr.com/photos/mtacc-esa/38279623202

Types of Respiratory Protection

Air-Purifying Respirators (APRs)

Supplied-Air Respirators (SARs)

Self-Contained Breathing Apparatus (SCBA)

Air-Purifying Respirators (APRs)

APRs are best used with gases or vapors that are detected by odor, taste, or irritation.

These respirators use a filter or sorbent to remove airborne contaminants from the air before they are inhaled.

Supplied-Air Respirators (SARs)

SARs supply air to the user from a source such as a compressor or compressed air cylinder. One of the major disadvantages of using SARs is that they have a maximum allowable hose length of 300 feet. The hose, which can become twisted and tangled, gives the employee only one path of entry and exit.

Self-Contained Breathing Apparatus (SCBA)

SCBAs use a tank of breathable air carried by the employee.

Although the SCBA has a limited wear time and is often heavy and bulky, it provides the highest level of respiratory protection available.

This is the best type of respirator for work in a confined space if there is room to use one.

Isolation

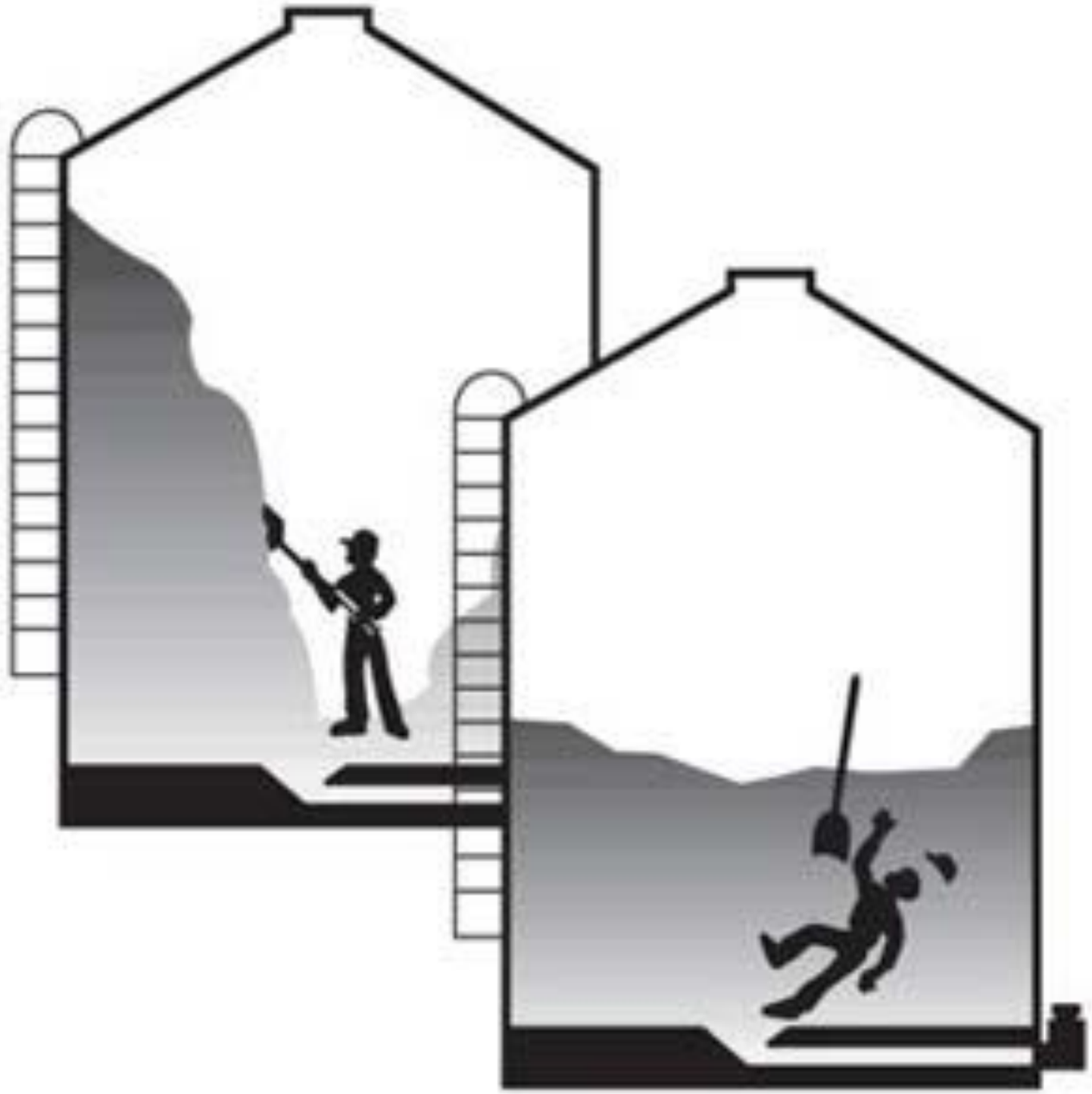
Isolation of a confined space is a process for removing the area from service by:

- Locking out electrical sources, preferably at disconnect switches away from the equipment;
- Blanking and bleeding pneumatic and hydraulic lines;
- Disconnecting belt and chain drives and mechanical linkages on shaft-driven equipment when possible;
- Securing with latches, chains, chocks, blocks, or other devices all mechanical moving parts in a confined space.

General and Physical Hazards

Employers should consider the following hazards when evaluating a confined space:

- Temperature extremes
- Engulfment hazards
- Excessive Noise/Sound
- Wet Surfaces
- Falling Objects
- Falls



Written Program (Permit Required)

The program should include:

- measures to prevent unauthorized entry;
- a review of all confined space hazards; and
- procedures and practices for safe entry into permit-required confined spaces
- Equipment needed for a permit required confined space
- An explanation of how permitted spaces must be evaluated;
- Assignments for attendants, supervisors, and rescuers;
- Designations and definitions of roles of attendants, supervisors, and rescuers;
- Rescue procedures; and
- Descriptions of the processes for issuing, using, and canceling confined space permits.

Use of Fire Department Rescue Squads

- The employer must evaluate the fire department rescue truck and personnel to determine that the rescue squad is properly trained and equipped to undertake a confined space rescue in the employer's permit-required confined space.
- The employer must determine that the fire department rescue squad can respond and deploy promptly.
- Before beginning a permit-required confined space entry, the employer must determine that the rescue squad is available to respond if needed and prepared to abort the entry if the rescue personnel go out on another call.

Photo credit NAVFAC
https://www.flickr.com/photos/navfac/8280949659

Training

Entrants, attendants, entry supervisors, and rescuers must be trained in their duties before attempting a confined space entry. The employer must ensure that all affected employees understand and can perform their tasks fully.

Rescuers must be trained in the hazards they are likely to encounter in the employer's confined spaces. Additional training is required if job duties change, new permit-required confined spaces are identified, or if affected employees show a lack of understanding or proficiency.

In addition, rescuers should be trained in first aid and cardiopulmonary resuscitation (CPR) and perform practical rescue exercises at least annually.

All training must be documented, and records retained for three years from the date training occurred.

One Team

QUESTIONS?