



CONFINED SPACE ENTRY

Understanding OSHA's Standards
For Confined Space Entry





Who is IS&R



- Started in 2012 in response to a need for compliance with OSHA 1910.146 and the costs of worker injury claims.
- We provide professional uniformed Stand-by Rescue teams and Safety monitors for the Power, Pharmaceutical, Institutional and now the Construction markets.
- May 3rd 2015 OSHA release 1926.1200 Subpart AA Confined Spaces in Construction. Which took effect on August 8th 2015.



Where we work

POWER

- Exelon Mystic & Medway Stations
- Calpine Fore River Station
- DistriGas
- Pawtucket Power
- Veolia
- MWRA(Deer Island & Metrowest Tunnel)

INSTITUTIONAL

- Children's Hospital
- Harvard University
- Northeastern University
- Boston University
- Tufts University
- Bates College
- Massport

MANUFACTURING

- Genzyme/Sanofi
- Astrazeneca
- Smithfield Foods
- Gillette / P&G
- Crane Composites
- Highliner Foods

CONTRACTORS

- Skanska USA
- Turner Construction
- JC Cannistraro
- J.C. Higgins
- D.C. Beane & Assoc
- Northeastern Mechanical
- Zoppo Construction
- P. Gioioso & Sons



Important to know

The employer must provide training that is specific to the employees job and the potential hazards they may face.

- *Qualified person* means one who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated his ability to solve or resolve problems relating to the subject matter, the work, or the project.
- *Competent person* means one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has the authorization to take prompt corrective measures to eliminate them.

TRAINING

OSHA requires contractors to provide training for those who may be involved in the permit-required confined-space process.

Training must be conducted before employees are first assigned duties relating to confined spaces or if there is a change in their assignments.







What is a Confined Space?

A Confined Space has:

- Limited means of entry and/or exit.
- Is large enough for a worker to enter it
- Is not intended for regular/continuous occupancy.

Examples include sewers, pits, crawl spaces, attics, boilers, and many more.





What is “Limited Means of Entry and/or exit”

Limited means of exit

If a person could not readily escape from the space in an emergency.

- The need to **use of a ladder** or movable stairs, or stairs that are narrow or twisted;
- A door that is **too small** to exit while walking upright;
- **Obstructions** that a worker would need to crawl over or under or squeeze around;
- The need to **travel a long distance** to a point of safety.





Examples



Partially Complete Interstitial Floor





What is a Permit Required Confined Space (PRCS)

The distinction between *confined spaces* and *permit spaces* is crucial to understanding what the standard requires. A *permit-required confined space (permit space)* is a confined space that:

- Contains or has the potential to contain a hazardous atmosphere;
- Contains a material that has the potential for engulfing an entrant;
- Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross section
- Contains any other recognized serious safety or health hazard.



Employers must evaluate all *confined spaces* to determine whether they are *permit spaces* but must take steps to protect workers only if a space is classified as a *permit space*.



Common hazards

- Atmospheric
 - O₂, CO, H₂S, NH₃, LEL
- Mechanical
 - Crushing, Mixing
 - Stored Energy
- Process materials
 - Steam
 - Sewage
 - Glycol
- Engulfment
 - Water
 - Grain
- Soil



- Electrical
 - Arc Flash
 - Energized Parts
- Chemical Exposure
 - Toxic Fumes
 - Corrosives
- Environmental Exposure
 - Too Hot or Cold
- Flammables & Combustibles
 - Methane
 - Hydrogen
 - Acetylene
 - Propane
 - Gasoline Fumes





Important acronyms

- IDLH - Immediate Danger to Life or Health. Pretty self explanatory.
- PEL – Permissible Exposure Limit. The maximum limit set by OSHA that worker can be exposed to a substance.
- PPM or Part Per Million
- OSHA’s PEL for H²S is 10 PPM which is only .001%
 - H²S at 50-100 PPM leads to eye damage.
 - H²S is lethal above 300 PPM or .03%

Oxygen is measured in %





Atmospheric Metering

- We monitor the atmosphere in a CS looking keep the right balance
- Oxygen (O_2) 19.5% to 23.5%
- Carbon Monoxide (CO) under 35 ppm
- Hydrogen Sulfide (H_2S) under 20 ppm
- Lower Explosive Limit (LEL) under 10%
- Ammonia (NH_3) under 50 ppm
- common in Power Generation and Food Processing industries

Other than Oxygen you want all other readings at 0





Lighter or heavier

Lighter than Air:

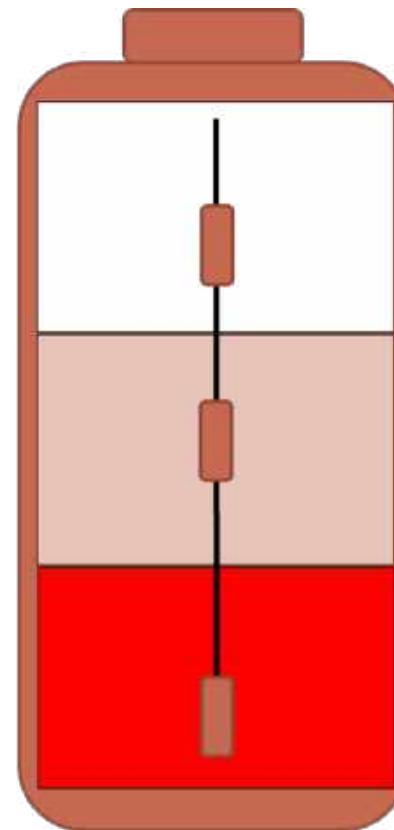
- Carbon Monoxide (CO)
- Ammonia (NH³)
- Acetylene (C²H²)

Absorbs Oxygen:

- Rusting Iron (Fe)

Heavier than Air

- Hydrogen Sulfide (H²S)
- Gasoline Vapor
- Ethanol Vapor (C²H⁵OH)
- Chlorine (Cl)



Good Air

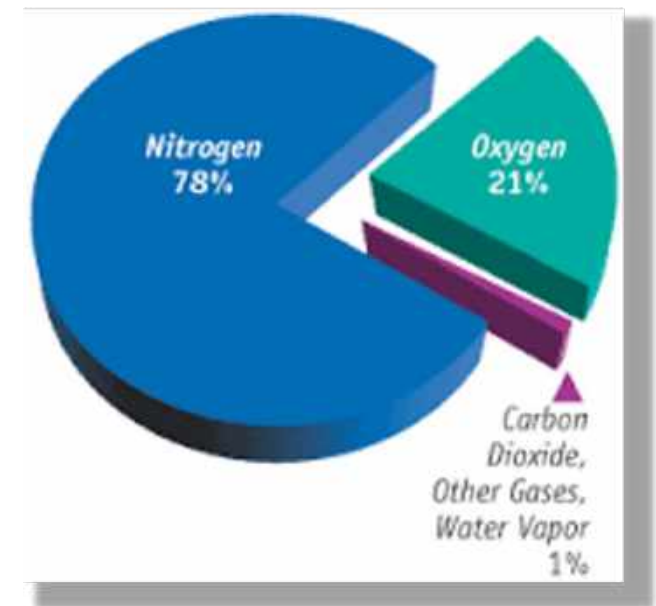
Poor Air

Deadly Air



What is air?

- The **air** you breathe is **made up of** lots of other things besides oxygen
- Oxygen only makes **up 20.8%** of **air**.
- **78.1%** of the **air** you breathe is **made up of** nitrogen
- The remaining amount split up between argon, carbon dioxide, methane and water vapor.



You can't have too much AIR but you can have too much OXYGEN!!



CS Roles – Supervisor

Entry Supervisor the competent person (such as the employer, foreman, or crew chief)

- Determines acceptable entry conditions.
- Authorizing entry.
- Oversees entry operations.
- Terminates entry when complete.
- May serve as an attendant
- May be an authorized entrant
- Fills out and signs the permit
- Communicates any hazards
- Determines what PPE is required
- Determines the Emergency Procedures





CS Roles - Attendant

- Understands the hazards including the possible effects of exposure.
- Continuously maintains an accurate headcount of entrants.
- Remains outside the permit space during entry operations until relieved by another attendant.
- Maintains communication entrants
- Alerts entrants if the need to evacuate the space arises.
- Checks Air/Gas Monitor
- Summons rescue/emergency services if needed.
- Can perform non-entry rescue.
- Is NOT permitted to enter the confined space





CS Roles – Entrant

Authorized entrant is authorized by the entry supervisor

- Understand the hazards that may be faced during entry.
- Understands proper use of PPE, monitoring, ventilation, and communication equipment.
- Communicates with the attendant
- Evacuates the space when told to.
- Will exit from the permit space as quickly as possible whenever :
 - An order to evacuate is given by the attendant or the entry supervisor;
 - any sign or symptom of exposure.
 - Detects a hazardous condition.
 - An evacuation alarm is activated.





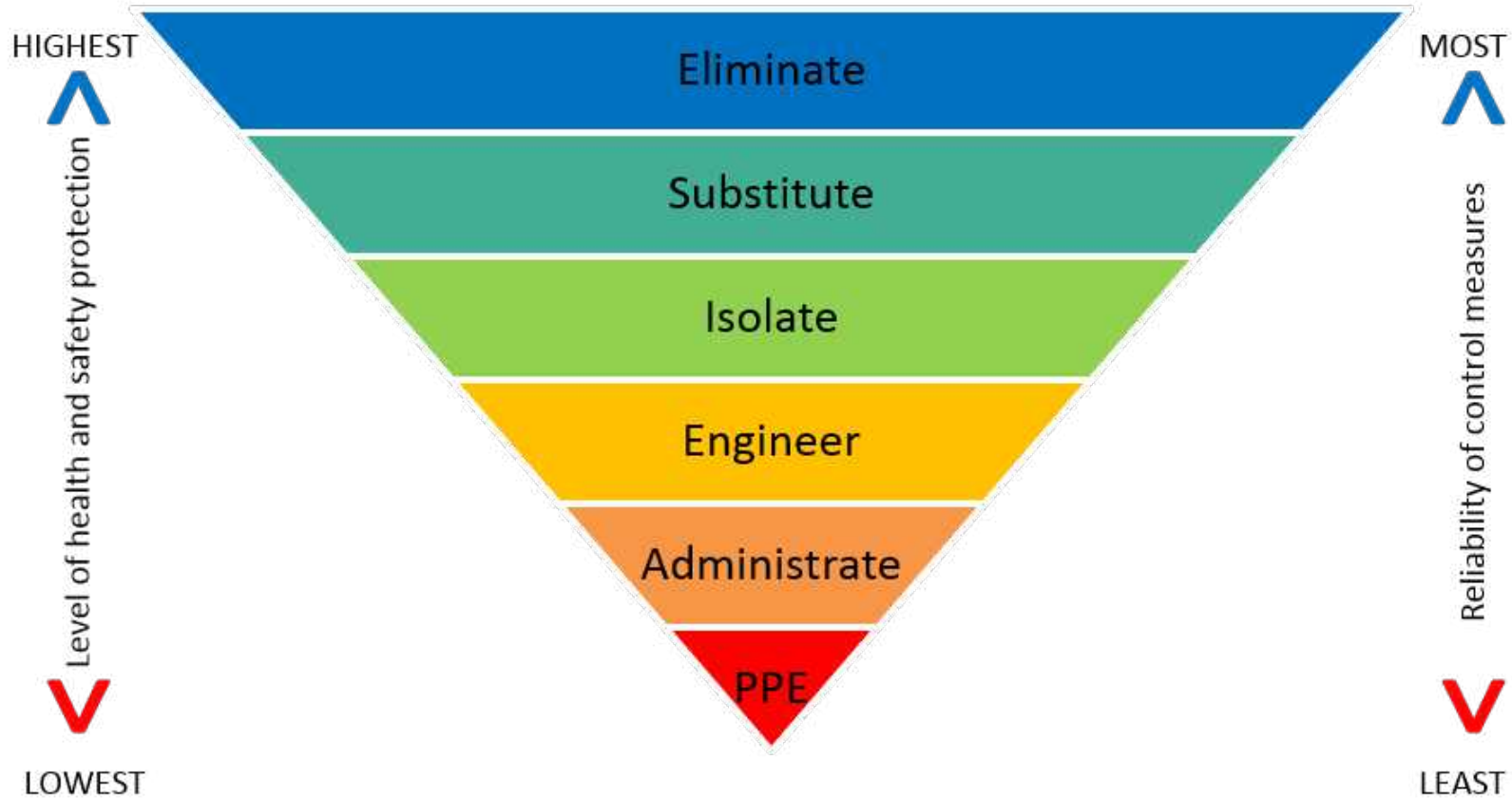
Entry permits

- Location
- Scope of work
- Potential Hazards
- Controls
- PPE
- Entrants
- Pre-entry Air reading
- Role assignments
- Emergency Procedures
- Rescue Plan
- Attendants Log
- Air readings log
- Permits must be retained by the employer for at least one year





Hierarchy of Hazard Control





Personal Protective Equipment

What (PPE) is applicable?

- Hard Hat or Helmet
- Gloves
- Eye protection
- Harness for fall protection or extraction
- Hearing protection
- Arc flash
- Steam/Burn protection
- Respirators
- Supplied Air





Personal Protective Equipment



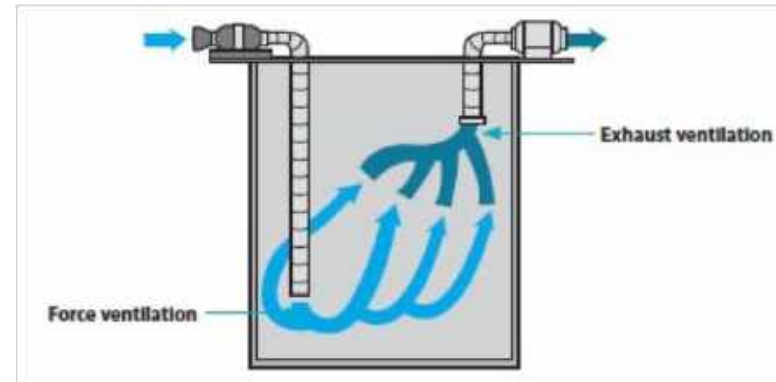
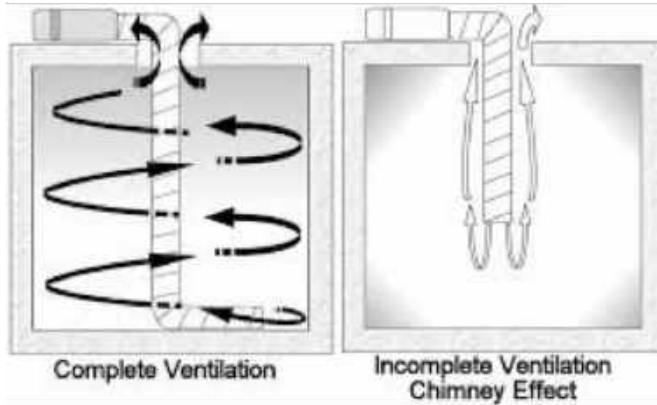
- Securing the Area
 - Barricades
 - Caution Tape
 - Signage
- Entry
 - Tripod
 - Winch
 - Ladder
- Communication
 - What equipment?
 - Radios
- Air Monitoring
 - With What? Calibration
 - Continuous or periodic?
 - Where?





Ventilation Plan

- Good Air In ? Bad Air OUT



- Are you creating a hazard
- Blocking Egress
- Stable Power supply



Emergency Procedures



- Role Assignment = Who does what?
- Does your cell phone have signal?
- Where are you?
- How can 1st responders get to you?
- Egress/Extraction
- Rescue Plan
- 1st Aid / CPR / AED





Rescue and 1st Aid

Only Skilled and Trained rescue personnel should enter a confined space to attempt a rescue.



According to the CDC/NIOSH Report, 60% of Confined Space deaths are the **'would-be' rescuer**



What is your plan in an emergency?



Self rescue & non-entry rescue



Self Rescue is the ability to exit under your own power.

- How far is it to safety?
- What obstructions are in the way?

Non-Entry Rescue is the ability for others to extricate a victim with entering the space.

- What equipment do you have?
- What training do you have?
- Is the victim obstructed?
- Can you provide 1st Aid?





Rescue & emergency services

Procedures must be implemented for summoning rescue and emergency services.

Unauthorized personnel must be prevented from attempting a rescue

An employer who designates rescue and emergency services must evaluate the rescue team or service relative to:

- The capability to reach the victim(s) within a time frame that is appropriate for the hazard(s).
- That **they are equipped for**, and proficient in, performing the needed rescue services;
- **Agrees to notify** the employer immediately in the event that the rescue service becomes unavailable.
- Rescue services are required to practice rescues at least once **every 12 months**





Listing 911 as rescue service

The Employer must evaluate and select a rescue team or service that:

- Has the capability to reach the victim(s) within a time frame that is appropriate for the permit space hazard(s) identified;
- Is equipped for, and proficient in, performing the needed rescue services;



- Agrees to notify the employer immediately in the event that the rescue service becomes unavailable;
- Rescue services are required by the standard to practice rescues at least once every 12 months



3rd party vs 911

- **Response time:** On site vs. On call
- **Availability:** 911 might not be available when needed.
- **Training:** Specific Technical Rescue Training
- **Equipment:** Highly specialized rescue equipment
 - Understanding the site and CS configuration.
 - Understanding the potential or realized hazards.





A Failure to **PLAN**
is a plan to **FAIL**